vaayu

Vinted
Climate Change Impact Report

Understanding the Avoided Emissions of Second-Hand Shopping on Vinted

2021

Vinted is Making Second-Hand the First Choice Worldwide

Vinted is the largest online international customer-to-customer (C2C) marketplace in Europe dedicated to second-hand fashion. With offices based in Vilnius, Berlin, Hamburg, Prague, Amsterdam, and Utrecht, Vinted serves a growing member base of over 80 million registered members, spanning 18 markets and employing over 1,500 people. Vinted has also recently launched a dedicated shipping business with the aim of improving the delivery proposition on offer in Europe.

Committed to making second-hand the first choice worldwide, Vinted helps users sell and buy preloved wardrobe products through one-on-one interactions, building a community that inspires circularity. Vinted empowers sellers to pass on used fashion products that have more to give, enabling buyers to shop for pre-loved products. Circularity is inherent in Vinted's recommerce (reuse) business and the marketplace is open to everyone who believes that good clothes should live longer.

80 M
member base

18
markets

1,500
people

Vaayu Helps Retailers Calculate and Cut Carbon in Real-Time

Vaayu is the world's first automated carbon software empowering retailers to calculate and cut emissions in real-time. Whether it's tracking emissions from company offices or calculating carbon emissions from raw material production to manufacturing an end product, Vaayu's automated technology is helping businesses reduce their climate impact and credibly communicate their decarbonisation journey.

Drawing insights from production, sales and logistics, Vaayu provides retailers with data across their entire supply chain. This granular level of data is achieved by leveraging proprietary AI, machine learning technology and the Product Life Cycle Assessment (LCA) Database of more than 600,000 data points, developed by Vaayu's extensive team of LCA scientists, engineers and data scientists. Vaayu uses the activity-based model — the Greenhouse Gas Protocol's preferred method — to accurately measure emissions. The method provides detailed measurements based on specific data to reflect actual scenarios per material, product and business.

Tailored specifically for the retail sector, Vaayu provides unparalleled data, understanding and industry benchmarking capabilities to help businesses improve their climate footprint. Today, Vaayu partners with more than 50 global brands. By 2030, Vaayu aims to help retailers collectively reduce one gigaton of carbon emissions.

+600,000
data points

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The **Scope** sets out the specific activities and actions that were included within the boundaries of the analysis.

04

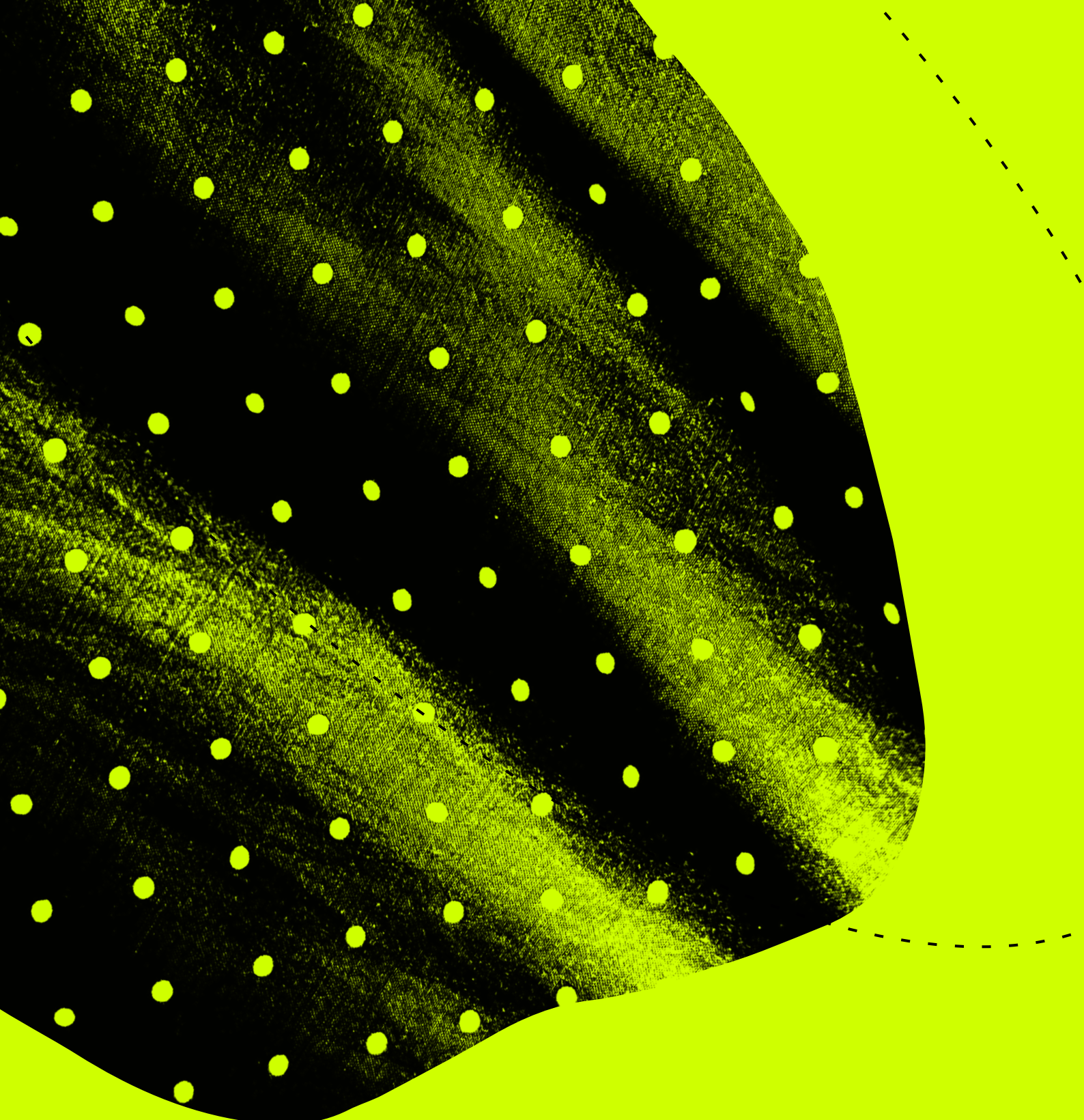The **Methodology** lays out the methods used by Vaayu to survey, collect accurate data and analyse on behalf of Vinted.

05

The **Results** explore the findings of the report via deeper data insights and visuals, drawing conclusions from the analysis.

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The **Appendices** offer supplementary materials that may be useful to understand the analysis and its context.

Section 1.

Introduction

Introduction

Climate change is one of the most pressing issues of our time. It requires robust and immediate action if we are to limit warming to the 1.5°C target defined by the Paris Agreement.

The fashion industry is estimated to make up 3-10% of global carbon emissions[1], with wider retail supply chains responsible for approximately 25% of all global emissions[2].

Without significant reductions, the fashion sector is on track to generate 2.1 billion metric tons of carbon emissions in 2030, overshooting its remaining carbon budget by nearly double[3].

One of the solutions to rapidly decarbonise retail is the shift to circular business models that help decouple business activities from resource use. As such, models like recommerce that keep pre-loved products in use play a vital role. In fashion, extending the life of clothing and keeping products in circulation for as long as possible are two critical strategies that help reduce the sector's climate impact.

[1] Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A. and Hertwich, E.G., 2016. Environmental impact assessment of household consumption. Journal of Industrial Ecology, 20(3), pp.526-536; Quantis., 2018. Measuring Fashion: Insights from the Environmental Impact of the Global Apparel and Footwear Industries Study; Berg, A. and Karl-Hendrik, M., 2021. Fashion on Climate — How the fashion industry can urgently act to reduce its greenhouse gas emissions. McKinsey & Company and Global Fashion Agenda.

[2] World Business Council for Sustainable Development, 2022. How turning retail stores into e-commerce centres can avoid massive emissions. World Economic Forum.

[3] Berg, A. and Karl-Hendrik, M., 2021. Fashion on Climate — How the fashion industry can urgently act to reduce its greenhouse gas emissions. McKinsey & Company and Global Fashion Agenda.

Life cycle assessment (LCA) is the best-practice methodology for evaluating the environmental impacts of a product or process throughout all the stages of its life cycle, from origin and use to its final disposal. Existing research has shown that extending the life of clothing by only nine months can reduce carbon emissions by as much as 10%[4]. However, there are very few studies that measure the real-world climate impact of buying and selling second-hand clothing at scale based on primary use, resale and delivery data.
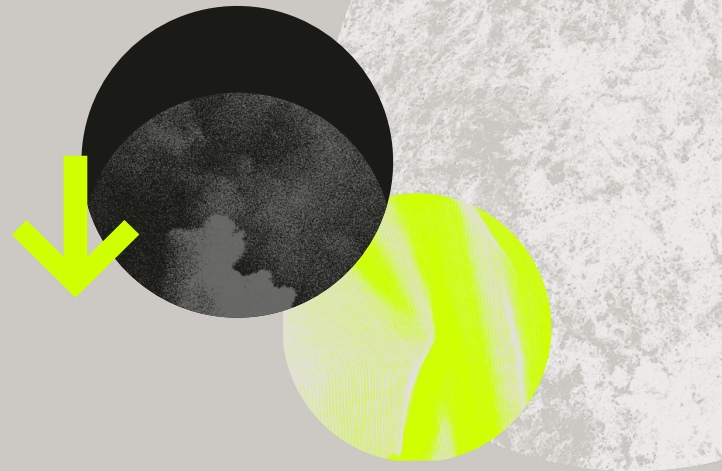
Vaayu is proud to partner with Vinted to deliver a comprehensive, independent analysis of the carbon emissions[5] avoided through its global second-hand marketplace. Insights from over 350,000 Vinted users and the detailed delivery footprints of over half a billion transactions were fed into and calculated by Vaayu's API and proprietary LCA Modelling Engine. With this research and analysis, Vaayu and Vinted have created the largest-ever primary dataset[6] on the climate impact of shopping second-hand online and at scale.
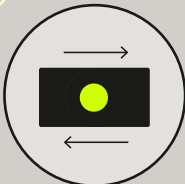
Over half a billion *transactions*

Largest primary dataset
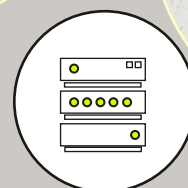
[4] WRAP, Sustainable Clothing Design.

[5] Following common usage, 'carbon' is used here as shorthand to refer to the 100-year global warming potential of a range of greenhouse gases, expressed as a mass of carbon dioxide equivalent (e.g. $kgCO_2e$).

[6] Based on 108,829 purchases compared to the next largest dataset of 3,483 purchases (Norup et al., 2019). See 5.2 Avoided Emissions Results for the detailed review of existing studies.

Section 2.

Approach & Key Findings
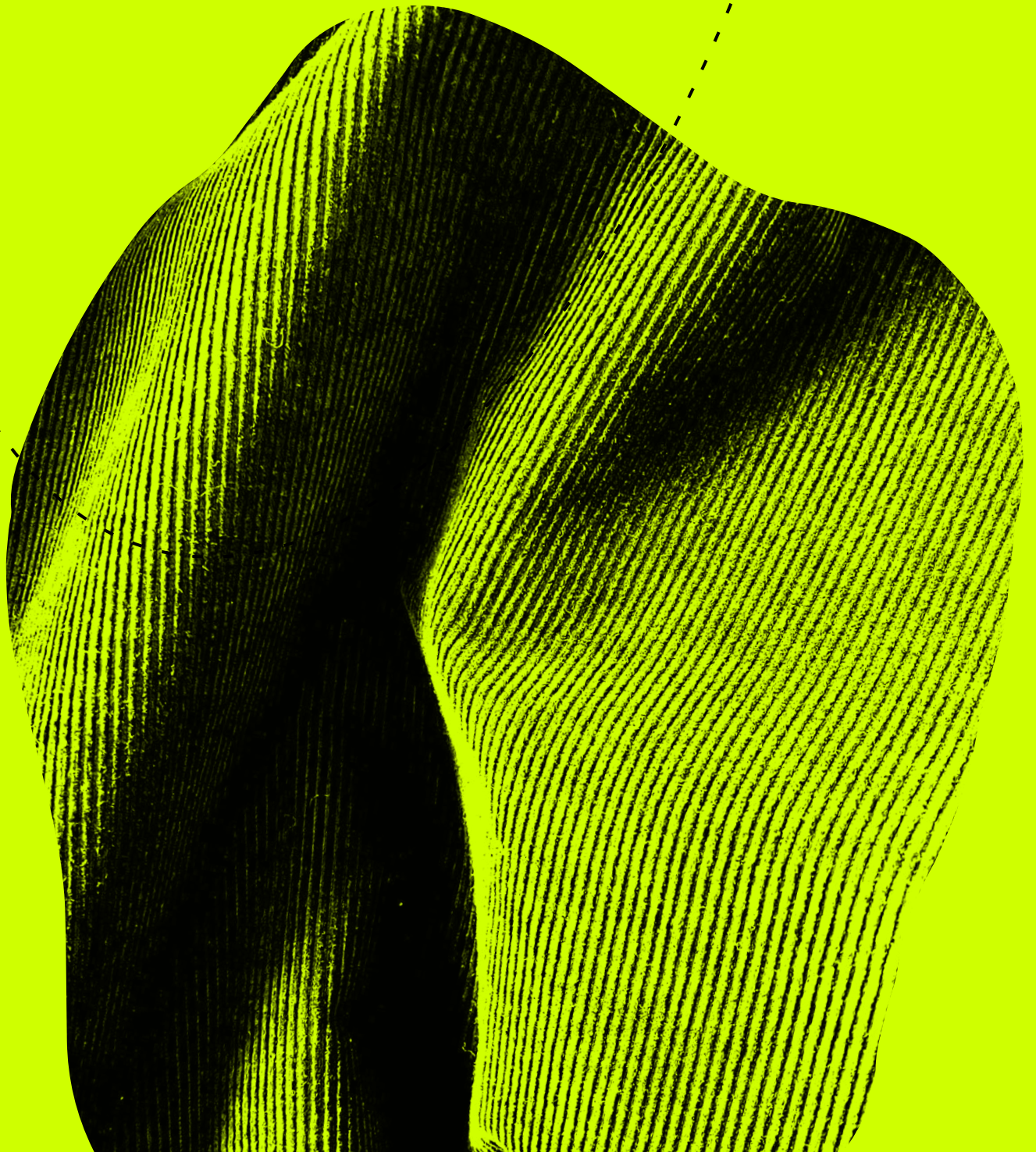
Approach

This report provides a comparative analysis of the overall climate impact of shopping for second-hand fashion on Vinted instead of new in 2021.
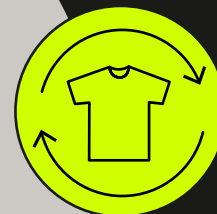
The main aims of the research were to quantify the average carbon emissions avoided by buying a second-hand fashion product, consumer-to-consumer (C2C), on Vinted, and by doing so, estimate the overall net climate impact of Vinted's marketplace.

A consequential life cycle assessment (LCA) approach was used based on leading global methods for calculating avoided emissions. Consequential LCA looks beyond a single product or transaction, meaning it's a more accurate way to quantify the impacts within a broader system.

The approach to estimating the avoided emissions of shopping second-hand fashion on Vinted compared to buying new can be summarised as follows:

$$A_{\text{Avoided Emissions}} = (P_{\text{Cradle−to−Consumer}} \times R_{\text{Replacement Rate}}) − E_{\text{Vinted Activities}}$$

In line with the World Resource Institute's recommendations[7] on the calculation of comparative emissions impacts of products.

[7] Russell, S., (2019). Estimating and reporting the comparative emissions impacts of products, World Resources Institute.
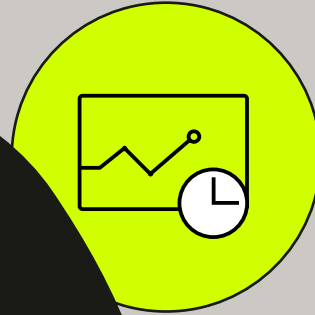
Consequential LCA can be difficult to do accurately without large amounts of data. To solve this problem, real-time tracking information from over half a billion transactions was collected and processed by Vaayu's proprietary delivery model.

To account for actual customer purchasing behaviour, Vaayu and Vinted created the largest-ever primary dataset on how often customers avoid the purchase of a new product (including online and offline purchases) by shopping second-hand. The dataset is based on over 350,000 survey responses from Vinted users and was factored into Vaayu's modelling to estimate the resulting avoided emissions.

Throughout the modelling and analysis, a conservative approach was used wherever possible to avoid overrepresenting the emissions-saving potential of Vinted's marketplace.

350,000+
survey responses from Vinted users

CO_2e
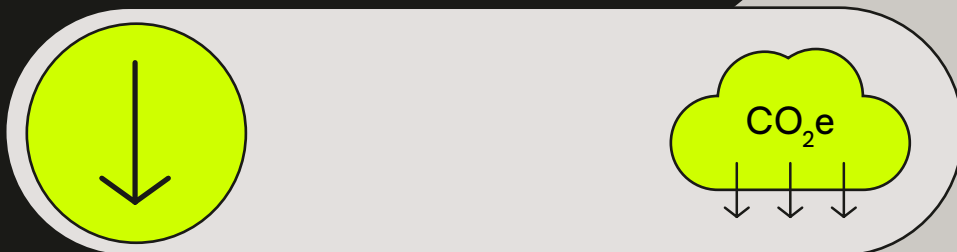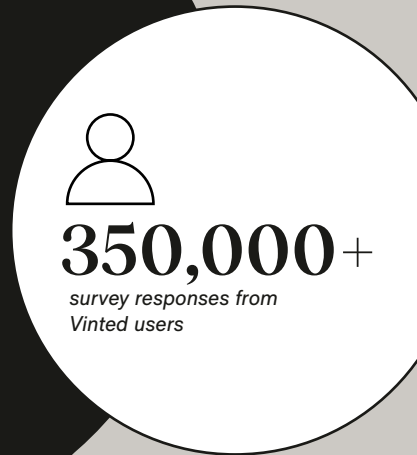
Note: This report is a complementary calculation to estimate the comparative climate impact of buying second-hand on Vinted instead of a new product. The net climate impact does not replace Vinted's corporate carbon inventory accounting, which is listed separately in this report (see 5.6 Operational Footprint Results).

Key Findings

Total Avoided Impact[8] of the Vinted Marketplace in 2021:

453

kt CO$_2$e

Equivalent to driving

3.6 billion kilometres[9]

[8] The total avoided impact is all emissions avoided with all emissions generated from Vinted activities subtracted (see 5.1 Net Impact Results).

[9] European Environmental Agency (EEA), 2022., CO$_2$ performance of new passenger cars in Europe.

RESEARCH AND REPORTING BY va$_a$yu FOR *Vinted*

On average, shopping for second-hand fashion on Vinted instead of buying new demonstrated an emissions saving of
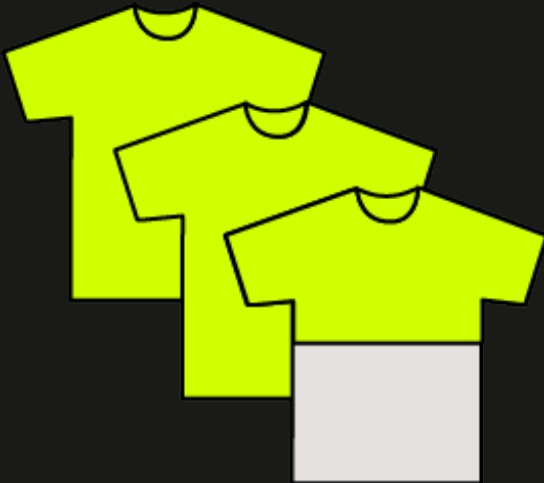
1.8 kg

CO_2e

For every **2.56** pieces of clothing bought on Vinted, the purchase of one new piece of clothing was avoided
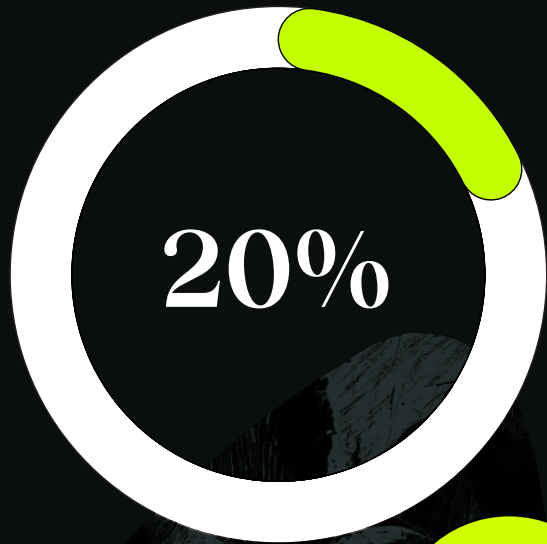
20% of Vinted's users were buying or selling fashion products on Vinted out of social or environmental concerns

Even if a new piece of clothing was almost the same price as the second-hand alternative, 20% of Vinted buyers would still have chosen to purchase second-hand

Vinted

New
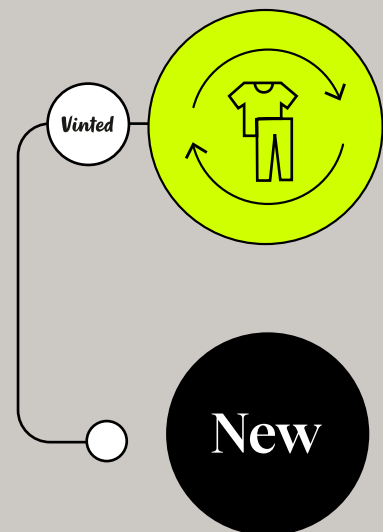
On average, carbon emissions per delivery were

1.28 kg CO$_2$e

(967 g CO$_2$e per product)

Delivering to a Pick-Up and Drop-Off (PUDO) location instead of to a buyer's home reduced emissions by

62%

13 min

PUDO

Home

For almost a quarter of respondents, the journey to and from a PUDO took an average of 13 minutes

Vinted

The average climate change impact of packaging per product was

30.86 g CO$_2$e

62% of the packaging used by sellers was reused rather than brand new
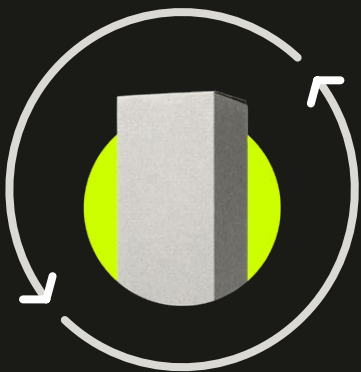
By reusing packaging in 2021, Vinted users prevented more than

17 kt CO$_2$e
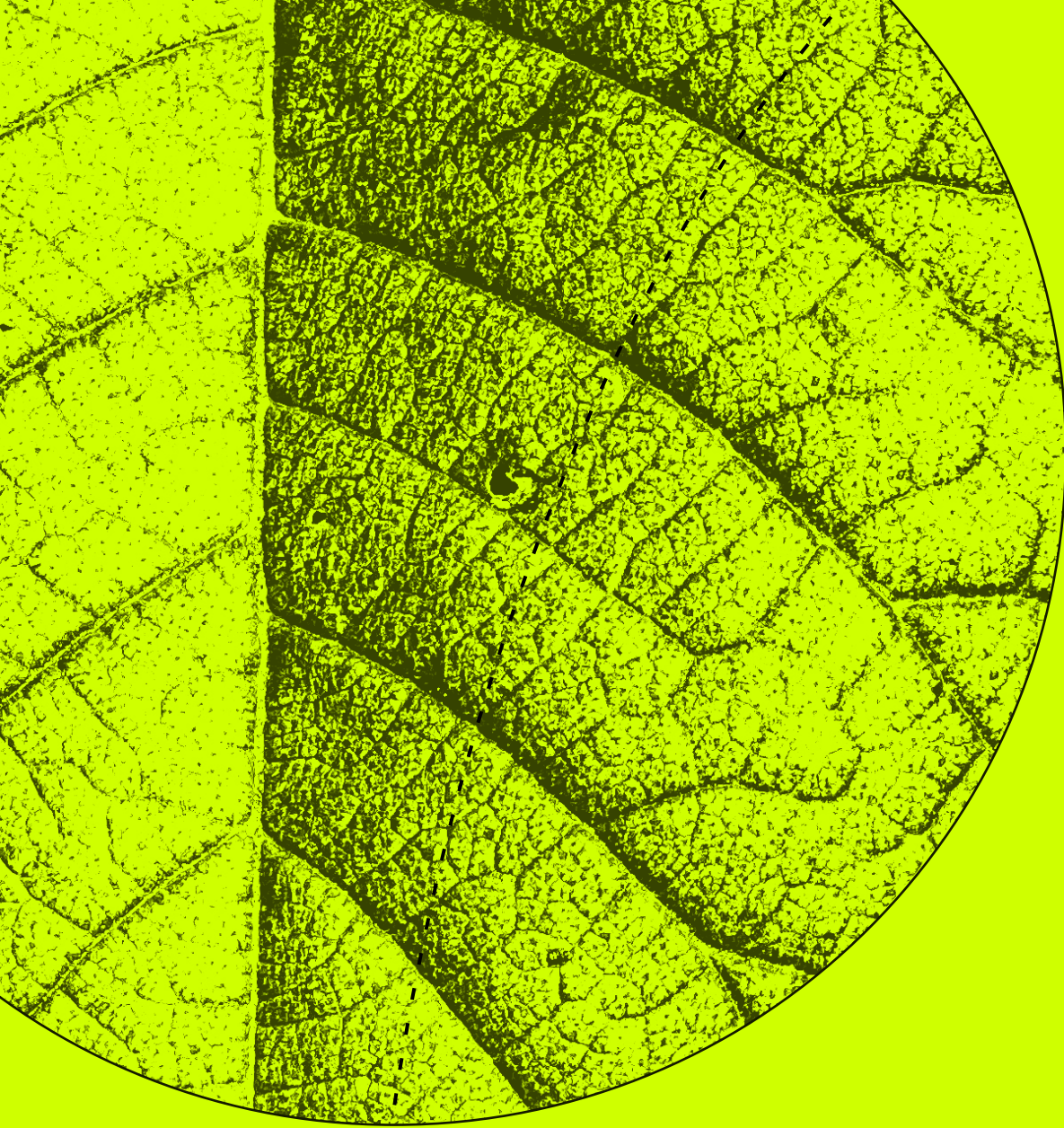
Section 3.
Scope

Scope

This section describes the overall scope of the analysis, providing details on the boundaries and the assumptions, as well as the parameters which lie outside the scope and were consequently not considered.

The diagram below highlights Vinted's role within the life cycle of a typical fashion product. Usually, the journey of a fashion product begins at the manufacturing stage, followed by its purchase, use and end-of-life. As an online marketplace, Vinted enables sellers and buyers to trade second-hand fashion products. This means that in most cases, Vinted's role occurs during the second life of a product.

Vinted's role within the lifecycle of a fashion product

Vinted marketplace
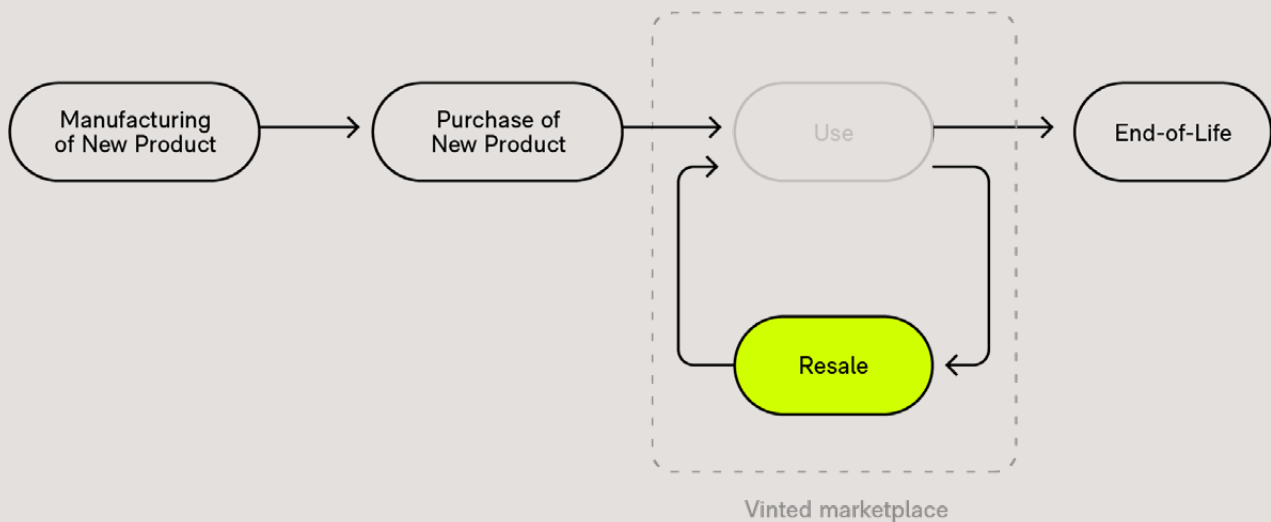
The overall scope of this study is divided into six major subsections:

1. User Survey Scope:
The scope and boundaries of the surveys used to gather information from Vinted users about their buying and selling behaviour.

2. Product Scope:
The scope and boundaries used for the analysis of the products sold on Vinted.

3. Packaging Scope:
The scope and boundaries of the packaging types and materials used for product deliveries from Vinted sellers to buyers.

4. Deliveries Scope:
The scope and boundaries of the different transportation types used to deliver fashion products from Vinted sellers to buyers.

5. Operational Footprint Scope:
The scope and boundaries of the overall organisation-level footprint, including assets over which Vinted has operational control.

6. Avoided Emissions Scope:
The scope and boundaries of the avoided emissions attributed to Vinted due to the trading of second-hand fashion products on its marketplace.

3.1 User Survey Scope

Three different types of surveys were conducted focusing on Purchase, Use and Sale[10] to better understand the behaviour of Vinted buyers and sellers. In addition, a random sample survey was introduced to gain insights into general purchase behaviour for new products and, more specifically, preferred delivery methods.

The goal of the surveys was to obtain primary data to calculate the avoided carbon emissions generated by the sale of second-hand fashion products, as well as information about delivery methods, packaging types and the materials used in product deliveries. Users reported their perceived behaviour, enabling us to approximate their actual behaviour.

Two survey iterations were run in the spring (May) and autumn (November) of 2022, with the aim of reducing seasonal bias and accounting for any seasonality trends. This is especially important for fashion, as it is highly dependent on the changing weather

conditions over the seasons. This analysis of the survey data did not show any correlation between seasons and the parameters studied in the survey. That being the case, the report focuses on the specific insights and outcomes of the second iterations, which were released closer to the time of publication of this report and included improvements based on learnings from the first survey.

Surveys were sent to both buyers and sellers of fashion products and shoes. In November 2022, 2.4 million Vinted users received a survey request, with questions covering the previous 18 months. Heavy sellers[11] were included in the analysis. However, their purchases were not considered in the assessment of the Replacement Rate based on the assumption that they were using the Vinted marketplace for economic gain.

The scope of this analysis encompassed the following countries, which made up the vast majority of Vinted transactions in 2021:

2.4 M
Vinted users across

8
countries received a survey request

○ Belgium   ○ France   ○ Germany   ○ Italy

○ Netherlands   ○ Poland   ○ Spain   ○ United Kingdom

[10] A detailed breakdown of the surveys that were sent can be found in 6. Appendices, Appendix G.

[11] Defined as users who had bought 60+ products in the last 90 days. This threshold was based on a qualitative assessment considering the activity of all users, where most users have significantly fewer transactions.

3.2 Product Scope

Vinted facilitates the resale of clothing, shoes and fashion accessories for women, men and kids. The marketplace also trades home and decor products, entertainment and pet supplies. In 2021, the substantial majority of the products sold were fashion products.

To calculate the emissions avoided by buying second-hand on Vinted instead of new, the individual second-hand fashion products were analysed. Our analysis of Vinted's product life cycle impact was focused exclusively on fashion products, and more specifically garments, where a direct equivalent was available in Vaayu's product Life Cycle Assessment (LCA) database[12]. This covered 66% of all products resold through Vinted in 2021[13].

The remaining 34% of transactions on Vinted, which included primarily footwear and accessories, were not covered in the product life cycle impact calculation. To make a fair assessment of the net impact of the marketplace as a whole, the average impact of a product calculated was used as a proxy for products that were not covered.

These non-covered categories generally had a higher manufacturing impact than clothing. They also generally had a higher Replacement Rate[14] of between 45-50%. A conservative approach was taken, and the actual average emissions of excluded products was significantly higher. The chosen approach underestimated Vinted's positive impact for these 34% of products.

All phases of the product life cycle were included in this assessment except for the use and end-of-life phases, as these were not relevant to calculate benefits from the possible avoided purchase of a product.

Impacts of product use were not taken into account. This study's focus was the comparative analysis of second-hand versus first-hand products, but the impact that comes from laundering during product use is considered equal for both. In a comparative analysis, these equal impacts cancel each other out.

A diagram and description of the life cycle stages included are outlined below:

1 Raw Material Extraction

2 Raw Material Processing

3 Product Manufacturing

4 Transport

5 Distribution
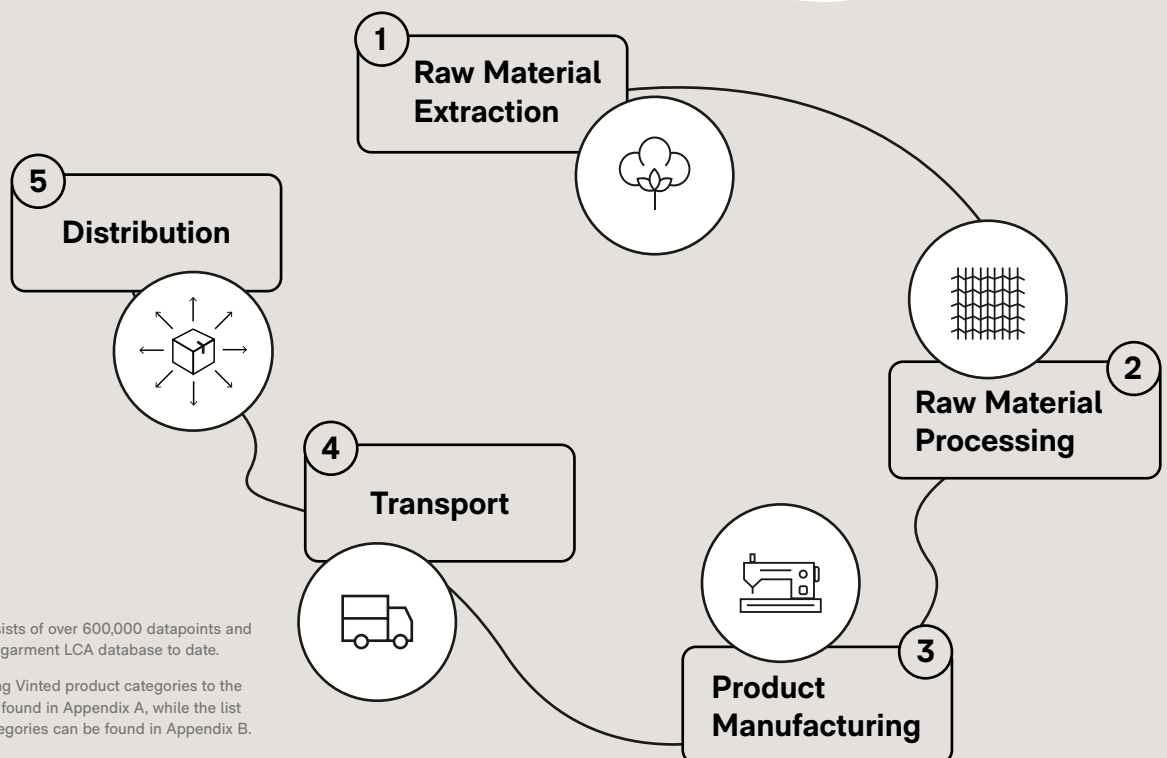
[12] Vaayu's database consists of over 600,000 datapoints and is the largest dedicated garment LCA database to date.

[13] An overview of mapping Vinted product categories to the Vaayu taxonomy can be found in Appendix A, while the list of included clothing categories can be found in Appendix B.

[14] Nørup, N. (2019). An environmental assessment of the collection, reuse, recycling and disposal of clothing and household textile waste, Technical University of Denmark.

1.

Raw Material Extraction

The activities that fall under the initial stages of raw material production. With respect to clothing or textiles, examples include the farming of cotton, rearing sheep to produce wool and synthesis of chemicals to produce synthetic fibres[15].

2.

Raw Material Processing

The second step following extraction is the processing of raw materials, giving rise to intermediary products that are used in final product manufacturing. In the context of this analysis, it refers to all steps from raw material extraction to fabric production.

3.

Product Manufacturing

The activities of the product manufacturing phase are a finished product's final assembly from the fabric produced in the previous step. Packaging of the products was also included in this step.

4.

Transport

The transportation phases between each stage until the product is manufactured are included in this scope.

5.

Distribution

The transport and infrastructure used to distribute the product from the factory gate to the consumer's home or PUDO.

[15] To produce a garment, raw material is turned into fibre, that fibre is turned into yarn (or thread) and then yarn becomes fabric. Whether the material is cotton, wool, synthetic or cellulosic, the processes of transforming fibre to fabric to fashion are the intermediate stages in garment production. (Global Fibres Overview, 2014).

3.3 Packaging Scope

To estimate the carbon emissions related to the packaging materials used to deliver fashion products on the Vinted marketplace, material type and mass were analysed, along with how packaging was used.

Through Vaayu's proprietary Application Programming Interface (API)[16], metadata about all transactions in 2021 and 2022 was transmitted to Vaayu by Vinted. The number of shipments made along with the product categories were used to calculate packaging impact.

Sale Survey

Vinted sellers were sent the Sale Survey which asked questions on the packaging they used and its condition, such as whether it was reused or new. The data collected was self-reported by sellers.

The emissions from packaging were estimated using information taken from both Vinted's metadata and the Sale Survey. This was applied to all of Vinted's fashion categories, which covered the substantial majority of products sold on the Vinted marketplace in 2021. To approximate the packaging impact of the entire Vinted marketplace, the average packaging impact was then distributed equally across all transactions.

[16] A way for two or more computer programs to communicate with each other.

3.4 Deliveries Scope

To account for Vinted's deliveries and the emissions generated per delivery, Vaayu's API was used to collect data and over half a billion transactions were analysed.

In 2022, every Vinted delivery made by third-party shipping companies was calculated on a real-time basis using granular live tracking data. Since the 2021 Vinted shipment data was analysed retrospectively in 2022, limited live tracking data was available. The 2021 data was enhanced based on live tracking data from Vinted shipments in 2022.

500 M+

Over half a billion transactions were analysed

2021 data estimated based on live tracking data from shipments made in 2022

2021

Shipment data analysed retrospectively in 2022

2022

Live tracking data available
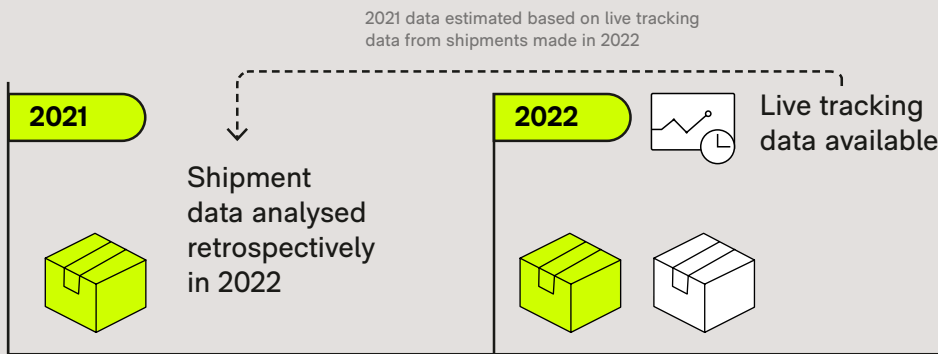
The delivery system boundary[17] of a second-hand shipment encompassed the whole journey of a package from one Vinted user's home to another (seller to buyer). Due to a lack of reliable data, the carrier's warehouse operations were excluded.

While returns were considered for the calculation of emissions from deliveries, they had a minimal impact. Unlike with many first-hand online retail purchases, Vinted did not have a comparable feature to return products.

Vinted had limited data on non-escrow[18] transactions and transactions delivered with a physical handover, as they were made outside of Vinted's marketplace. For these transactions, the emissions of an average shipment were used as a proxy.

System Boundary

Home → PUDO → Distribution centre → Inter-hub transport → Distribution centre → PUDO → Home

Distribution centre operations
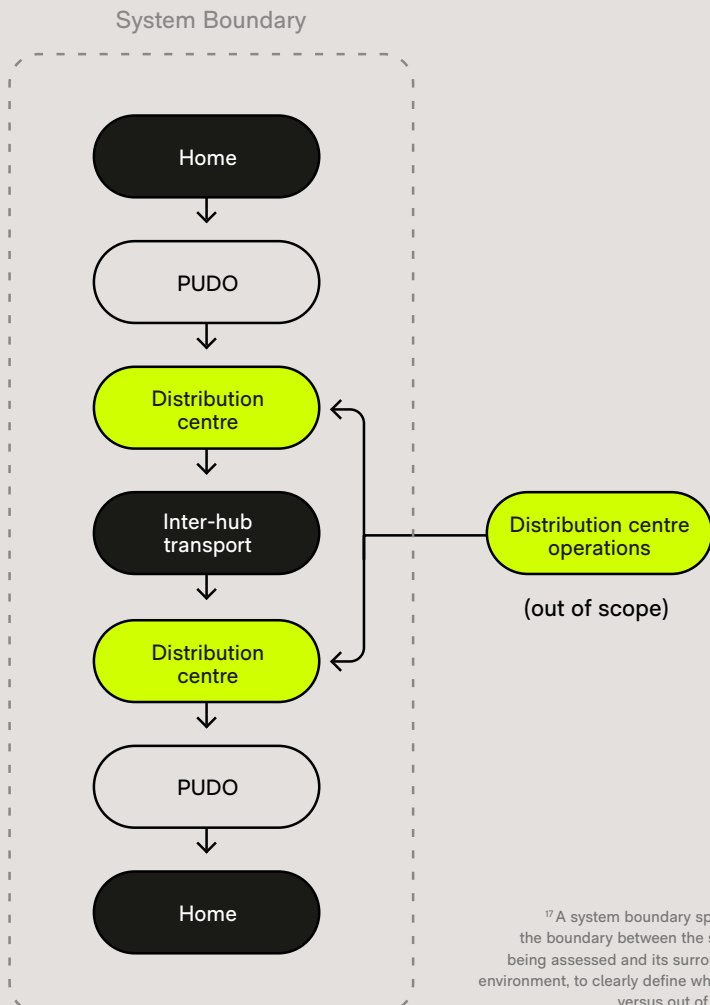
(out of scope)

[17] A system boundary specifies the boundary between the system being assessed and its surrounding environment, to clearly define what is in versus out of scope.

[18] Transactions between users which happen outside of Vinted's platform.

3.5 Operational Footprint Scope

The Operational Footprint refers to the greenhouse gas (GHG) emissions associated with an organisation's operations and business activities.

The GHG Protocol Corporate Accounting and Reporting Standard[19] provides best practice guidance on the calculation of emissions from organisations (referred to as the 'reporting company'), based on the reporting company's direct emissions and indirect emissions from energy use and supply chain activities. These emissions are typically divided into three scopes:

Scope 1 includes all direct emissions produced from business activities

Scope 2 are all indirect emissions produced due to heating and electricity

Scope 3 covers a wide range of indirect emissions along the value chain, from raw materials to packaging and shipping as well as employee business travel and commute. This category is usually responsible for a large part of the overall carbon footprint of a retailer

[19] See the GHG Protocol, Corporate Accounting and Reporting Standard.

Scope Calculations in Relation to Vinted's Operations

In order to quantify the total net impact of Vinted's operations, emissions from deliveries and packaging associated with all transactions in 2021 were accounted for in the assessment. This included non-fashion as well as products labelled "New With Tags".

The GHG emissions of Vinted from activities related to the different scopes are as follows:

Scope 1: Emissions from the combustion of fuel (petrol and diesel) used in company-owned or leased vehicles.

Scope 2: Emissions from purchased electricity and heating used in Vinted's offices and data centres.

Scope 3: Includes emissions from the following activity categories specific to Vinted:

○ Purchased goods and services (non-production related products e.g.office furniture, office supplies)

○ Capital goods

○ Energy-related activities not included in Scope 1 or Scope 2

○ Waste generated in operations

○ Business travel

○ Employee commuting

○ Packaging*

○ Deliveries*

*Related to purchases on the marketplace and described in 3.3 Packaging Scope and 3.4 Deliveries Scope above.

Additional activities — such as production of products, franchises and investments — usually fall into Scope 3; however, since they were not relevant to Vinted, they were out of scope for this assessment.

Emissions from product use and end-of-life[20] were excluded from Vinted's Operational Footprint based on Vinted's assessment of their operational responsibility as a C2C resale marketplace.

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[20] End-of-life is the life cycle stage of the product when it has completed its useful life.

Organisational Boundary

Organisational boundaries determine which entities (e.g. subsidiaries, joint ventures, partnerships) and assets (e.g. facilities, vehicles) are included in a company's Scope 1 and Scope 2 GHG emissions inventory. In setting organisational boundaries, a company selects an approach for consolidating GHG emissions and then consistently applies it. This defines the operations that constitute the company for the purpose of accounting and reporting GHG emissions.

For the purpose of this report, the operational control approach was chosen to define the boundary, which resulted in Vinted accounting for 100% of emissions from operations over which it or one of its subsidiaries has operational control.

This scenario reflects the current organisational set-up at Vinted most accurately, which is why the selection of this boundary was justified.

Reporting Timeframe

In order to quantify the total net impact of Vinted's operations, emissions from deliveries and packaging associated with all transactions in 2021 were accounted for in the assessment. This included non-fashion as well as products labelled "New With Tags". The Results section of this analysis reports on operations in the year 2021.

3.6 Avoided Emissions Scope

In the scope of this analysis, avoided emissions[21] refer to the proportion of carbon emissions that are avoided (or "saved") due to customers purchasing second-hand products on Vinted instead of buying new elsewhere.

The avoided emissions calculations exclude emissions generated by other transactions like products classified as "New With Tags". This is because the focus for avoided emissions was second-hand transactions (while in the calculation of Vinted's net impact, all products were included).

A consequential LCA approach was used for the analysis: "*all and only the processes that change as a result of the decision studied, wherever they may occur in the system*"[22] were included in the system boundary. To quantify the benefits of avoiding the purchase of a new product, only the life cycle stages from raw material extraction until the delivery to the first user were considered, along with the operational impact of the operations, packaging and deliveries. Emissions from

product use and end-of-life[23] were excluded since, in a comparative analysis, the equal impacts from the use of first-hand and second-hand products cancel each other out.

In practice, there isn't a 1:1 substitution between a new and second-hand product, which is also noted in the literature[24]. This ratio is highly dependent on user behaviour and is quantified by the Replacement Rate, which defines the substitutability of second-hand fashion products with new ones, in order to calculate the benefits of reuse[25]. The substitution ratio also ultimately determines the degree to which the carbon emissions generated by the production and distribution of a new product was avoided by purchasing through the Vinted marketplace.

The Replacement Rate as well as the direct and indirect emissions attributable to Vinted (operations, packaging, and deliveries) were taken into account in the calculation. This enabled accurate estimation of the comparative impact of choosing to buy second-hand instead of new. A simplified overview of the overall calculations is illustrated below:

Simplified overview of the overall calculations

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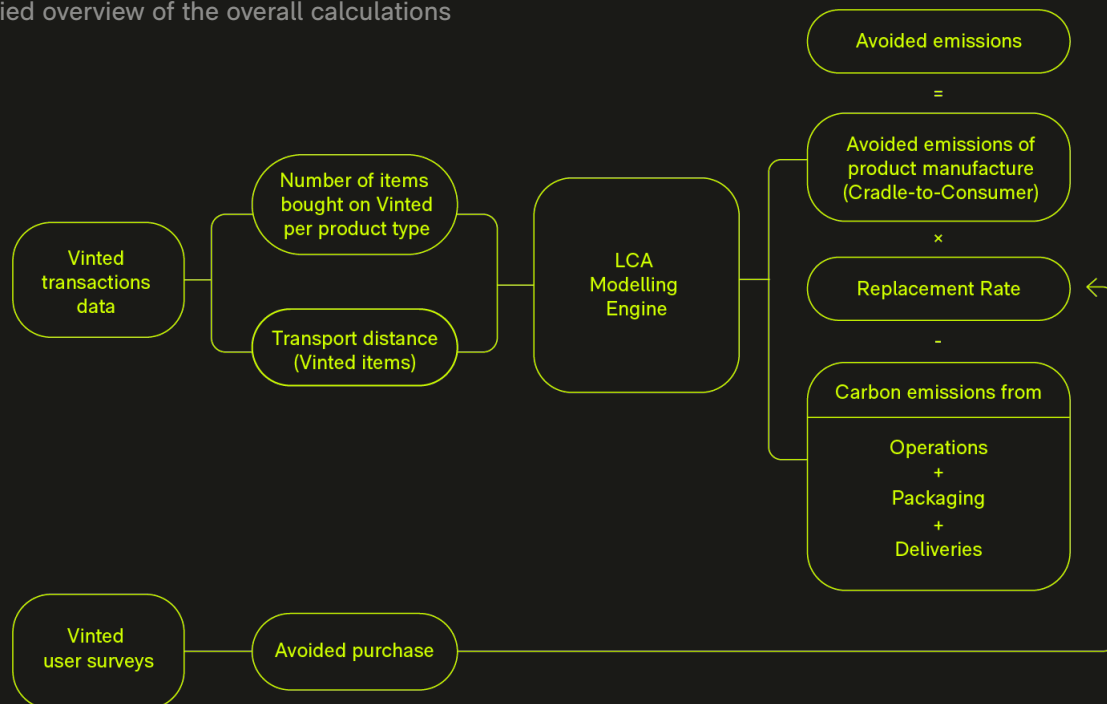
[21] Avoided emissions are emission reductions that occur outside of a product's life cycle or value chain, but as a result of the use of that product.

[22] 2019, Estimating and Reporting the Comparative Emissions Impacts of Products, World Resources Institute, pp.4.
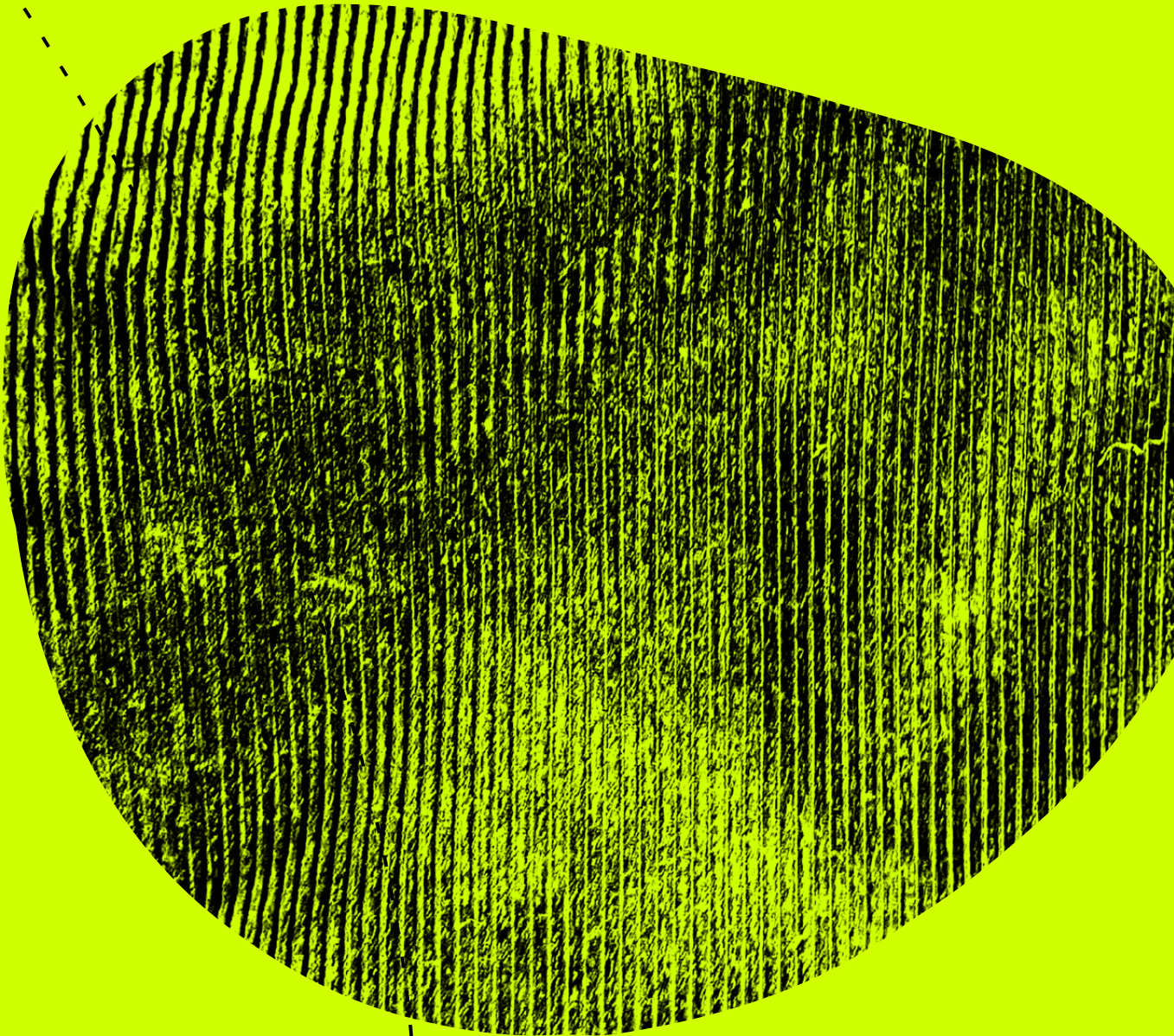
[23] End-of-life is the life cycle stage of the product when it has completed its useful life.

[24] Sandin, G. and Peters, G.M., 2018. Environmental impact of textile reuse and recycling–A review. Journal of cleaner production, 184, pp.353-365.

[25] For more information on the Replacement Rate and how it is calculated, see 4.6 Avoided Emissions Methodology.

Methodology

Introduction

The methodology approach of this analysis is in line with the World Resource Institute's recommendations[26] for calculating comparative product emissions[27] and can be summarised as follows:

$$A_{\text{Avoided Emissions}} = (P_{\text{Cradle-to-Consumer}} \times R_{\text{Replacement Rate}}) - E_{\text{Vinted Activities}}$$

Impacts from Production and Distribution (Cradle-to-Consumer)

Data from over 200 million user transactions was computed using Vaayu's proprietary LCA Modelling Engine to estimate the carbon footprint of each fashion product sold on Vinted.
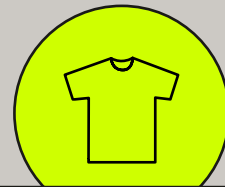
Each product category (e.g. a T-shirt) was matched with the corresponding product in Vaayu's LCA Modelling Engine based on the average from a representative sample of products.

200 million
Vinted transactions

Impacts from Avoided Purchases (Replacement Rate)

Three different surveys were sent to Vinted buyers and sellers to collect primary data on specific products purchased via Vinted's marketplace. Questions included how often buyers have worn a product, how long they have owned the product, and if they would have otherwise purchased a new product and why.

[26] Russell, S., 2019. Estimating and reporting the comparative emissions impacts of products. World Resources Institute.

[27] For the full overview of recommendations and whether they were adopted, see 6. Appendices, Appendix S.

The Replacement Rate was calculated to quantify how many first-hand purchases were negated by the purchase of a second-hand Vinted product instead.

The resulting analysis forms the largest primary dataset on avoided purchases to date[28].

Impacts from Vinted Activities

Data from over half a billion deliveries was analysed based on a model that combines carriers' live tracking data with accurate route-level data, including information on the fashion products purchased, packaging and delivery.
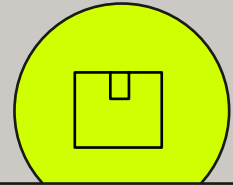
Packaging emissions were calculated based on transaction information. Where this was unavailable, Vaayu's packaging estimation model predicted the most likely packaging options used to approximate emissions.

Vinted's Operational Footprint was calculated in line with the GHG Protocol Corporate Standard[29], and the carbon emissions from relevant Scopes 1, 2 and 3 emissions categories were integrated into the analysis[30].

GREENHOUSE GAS PROTOCOL

[28] Based on 108,829 purchases compared to the next largest dataset of 3,483 purchases (Norup et al, 2019). See 5.2 Avoided Emissions Results for the detailed review of existing studies.

[29] See the GHG Protocol, Corporate Standard.

[30] Emissions from a product's use and end-of-life were excluded from Vinted's Operational Footprint, based on Vinted's assessment of their operational responsibility as a C2C resale platform.

4.1 User Survey Methodology

Introduction

One of the key focus areas of this study was consumer behaviour related to second-hand products. Vaayu carried out large-scale surveys of Vinted users to observe users' perceptions of their own behaviour. This analysis is the largest primary dataset[31] created to learn more about this behaviour.

The surveys were designed and sent to a sample of Vinted users, as described in 3.1 User Survey Scope.

The survey asked buyers, sellers and a random sample of Vinted users questions on their purchase motivations, packaging and product usage, in order to estimate the total carbon emissions avoided by Vinted's marketplace. A secondary purpose of the survey was to assess user behaviour related to transport to and from Pick-Up and Drop-Off (PUDO), specifically to understand how long Vinted users travel to PUDOs.

Four different types of surveys were sent out to different Vinted user groups. The link to each survey was sent from Vinted's Customer Relationship Management (CRM)[32] software to buyers and sellers via the Vinted in-app inbox:

The Purchase Survey focused on the behaviour of users buying at the moment of purchase and receipt of the product.

The Sale Survey focused on behaviour around the sale of a product to better understand the motivation behind the sale.

The Use Survey studied the behaviour of users related to purchases over different periods of time.

The Random Survey was sent to Vinted users and didn't concern Vinted purchases specifically but rather first-hand purchases and buyer behaviour in general.

[31] Based on 108,829 purchases compared to the next largest dataset of 3,483 purchases (Norup et al, 2019). See 5.2 Avoided Emissions Results for the detailed review of existing studies.

[32] Customer Relationship Management (CRM) software is technology that supports a business with its customer administration and interaction. CRMs help automate business and sales processes, and improve customer experience and communication.

Two iterations of the surveys were carried out; the first iteration of the survey was conducted in the spring of 2022, and the second was in the autumn of 2022. A total of more than 350,000 users were surveyed across both iterations.

The extensive consumer reach and response rate ranks the survey as the largest worldwide effort to date to investigate the motivations behind second-hand clothing purchase behaviour.

Pilot Survey

A pilot survey was conducted to determine the sample size for the final survey, test the functionality of the survey system and determine how representative the respondents were of the total Vinted population. See 6. Appendices, Appendix G and Appendix H for more details.

Spring 2022 *(May)*

Autumn 2022 *(November)*

350,000 *users*

Representative Sample

To make the sample as representative as possible, the following characteristics and groups were focused on:

Market/country

Product category

Product condition

Maturity of the user on the platform

Activity of the user on the platform

Products with refunded transactions were excluded from the survey, as these products inherently did not displace the purchase of a first-hand product and were therefore not relevant to the analysis.

Main Survey

Main survey refers to the campaign of the four types of survey sent out, not including the pilot. The campaign was conducted twice, first in May 2022 and then again in November 2022. The surveys were sent to a total of 2.4 million Vinted users from 8 countries with a response rate of 10.8%, compared to typical consumer survey response rates of 5-35%[33]. Given that this Vinted survey did not offer any incentive to respondents (in the form of a discount or voucher), the response rate received is considered relatively high.

10.8%
response rate
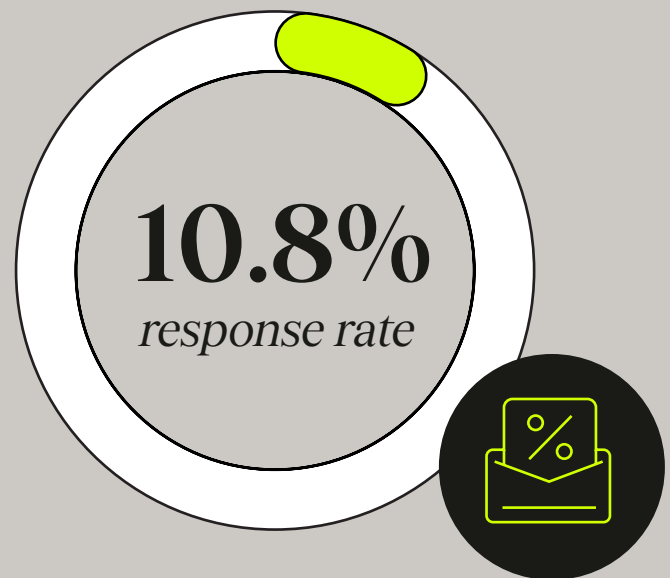
Main Survey: Total number of responses and response rate (%) per country

	BE	DE	ES	FR	IT	NL	PL	UK
Use		2.23%	5.60%	3.61%	5.98%	4.86%	2.91%	3.34%
		1,884	1,154	8,399	1,126	1,296	2,020	5,452
Purchase	9.89%	5.52%	10.72%	9.53%	14.04%	6.59%	6.18%	5.28%
	10,215	4,873	17,301	24,153	27,940	10,519	8,359	5,455
Sale	10.47%	8.56%	16.09%	12.89%	21.79%	8.18%	10.52%	8.90%
	10,603	6,607	20,470	21,088	39,460	12,160	8,535	9,014
Random	9.70%	6.53%	10.45%	9.36%	14.48%	6.39%	6.89%	6.99%
	3,171	1,337	3,590	3,678	6,551	2,216	910	2,285

Survey Types

Four different types of questionnaires were sent in May and November 2022. Three of them were Purchase Surveys where the questions focused on a single topic of study, namely second-hand purchase (Purchase), first-hand purchase (Random) and Use. They were designed with the aim of a low drop-off ratio and a high response rate from buyers. The fourth survey (Sale) was targeted at sellers only and was focused on delivery methods and both pre and post-sale behaviours. A transactional approach was used where the questions referred to specific products purchased on the Vinted marketplace. This enabled a more accurate estimation of user behaviour, product type and associated carbon emissions.

[33] Wu, M. J., Zhao, K., & Fils-Aime, F., 2022. Response rates of online surveys in published research: A meta-analysis. Computers in Human Behavior Reports.
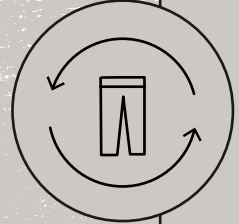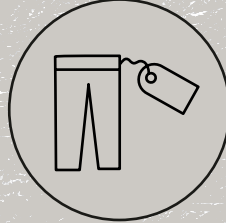
Purchase Survey

The Purchase Survey was sent to users of both first and second-hand products after the products had been marked as 'received' and only up to 12 months after their purchase. Transactions including "New With Tag" products were excluded from the calculation of the Replacement Rate. The time frame was selected to ensure that respondents could accurately recall the purchase, while also having had time to receive and use it.

The main aim was to use this data to calculate the Avoided Purchase Rate.

12
months

Use Survey

The Use Survey was sent to buyers from 1 to 18 months after they had made a purchase on Vinted. It primarily investigated the Ownership Period Ratio[34] of a product purchased on Vinted and Usage Rate[35] which is a type of Replacement Rate[36] (see 6. Appendices, Appendix J).

It was expected that buyers view their own wearing behaviour differently for a newly purchased product when compared with a product they have owned for longer. From the surveys, it was expected that statements about the past are generally more accurate than predictions about the future. Purchases made up to 18 months before the survey were randomly sampled over time to see how users responded over the lifetime of a product.

Vinted

1-18
months

[34] The Ownership Period Ratio calculates the fraction of time buyers have a Vinted product in their wardrobe as compared to the time buyers typically have a product in their wardrobe, according to the averages explored in literature.

[35] The Usage Rate calculates the ratio between the usage of a new product versus a product bought on Vinted.

[36] The Replacement Rate determines the extent to which a second-hand product displaces the purchase of a new product.

Sale Survey

The Sale Survey was sent to users who have sold their product(s), with the most recent transaction completed in the last seven days. Sellers were asked about the circumstances surrounding their sale.

Packaging questions were asked to enrich carbon emissions calculations. Questions on product usage were also asked to gather information for the Usage Rate calculations.

Finally, the methodology selected for the Replacement Rate was the Avoided Purchase Rate (reasons outlined in 5.1 Net Impact Results), and information about product use was not used for avoided emissions calculations.

7 *days*
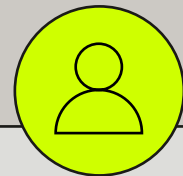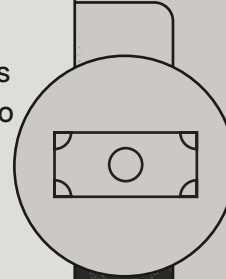
Random Survey

The Random Survey was sent to a random sample of >250,000 users who had completed their most recent Vinted transaction in the last seven days. Questions were asked to assess user behaviour related to first-hand purchases outside of using Vinted. Users were asked about their preferred delivery method and/or mode of transportation when purchasing first-hand products online and/or in-store, respectively.

Survey data was used as an input for the Last Mile distribution for the new product model. In the case of purchases made online, survey data was leveraged on shipment methods, and PUDO data was used to estimate emissions from the Last Mile delivery.

In the case of in-store purchases, data was collected on the modes of transport used by customers to travel to retail stores, as well as the Trip Chaining[37] factor. The probability split of different modes of transport along with the respective distances covered were used to calculate average emissions from customer home to store.

7 *days*
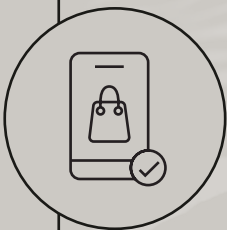
>250,000

[37] The Trip Chaining factor is a sequence of trips that starts and ends at the home location.

4.2 Product Methodology

Introduction

This section describes the methodology for calculating the emissions generated by the fashion products sold on the Vinted marketplace. As described in the previous section, the entire life cycle of a product was assessed except for use and end-of-life phases, as these were not necessary to calculate the potential benefits of an avoided purchase.

Using Vaayu's proprietary LCA Modelling Engine (product carbon footprinting technology), over 200 million Vinted transactions were computed to estimate the carbon emissions of each product sold. Following this, each product category

(e.g. a T-shirt) was matched with a sample of corresponding products in the LCA Modelling Engine (see 3.2 Product Scope and 6. Appendices, Appendix A). The average of the sample was considered a representative product for its category[38]. This included variations in weight, fibres, yarns, fabrics, processing methods and manufacturing types which were used to generate a representative product sold on Vinted. The representative product footprint was calculated as a probability distribution. Average expected values were used for calculations in the analysis, and the degree of uncertainty was used to analyse lower bound impact.

V

200 million
Vinted transactions

Vinted

CO_2e

57 categories

---
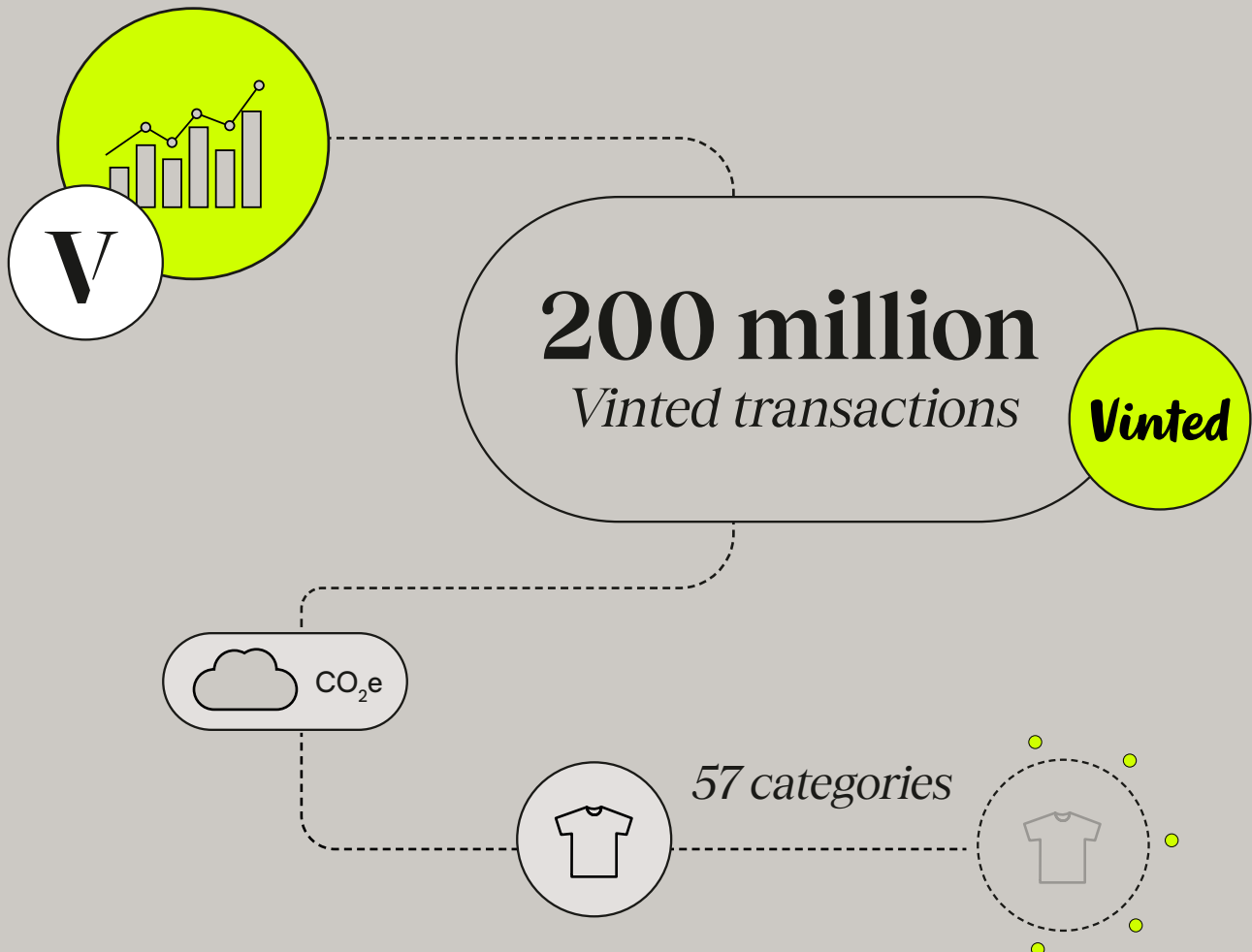
[38] See 6. Appendices, Appendix A for an overview of mapping between the Vinted product category and Vaayu taxonomy.

System Boundaries

The system boundaries for the entire life cycle of a product are shown in the figure below, starting from raw material extraction (e.g. cotton cultivation) right until the end-of-life of each product (e.g. incineration). Product use and end-of-life were not included within the system boundary and were considered out of scope. The energy and material inputs, transportation, natural resource extraction and waste treatment at each step were taken into account. The carbon emissions generated at each step were then used to calculate the total product footprint. For processes that result in multiple products, Economic Allocation[39] was used to distribute the burden of environmental impacts across products.

The below diagram is only for representation, and the exact supply chain is dependent on the specific product.

System boundaries during the entire life cycle of a product
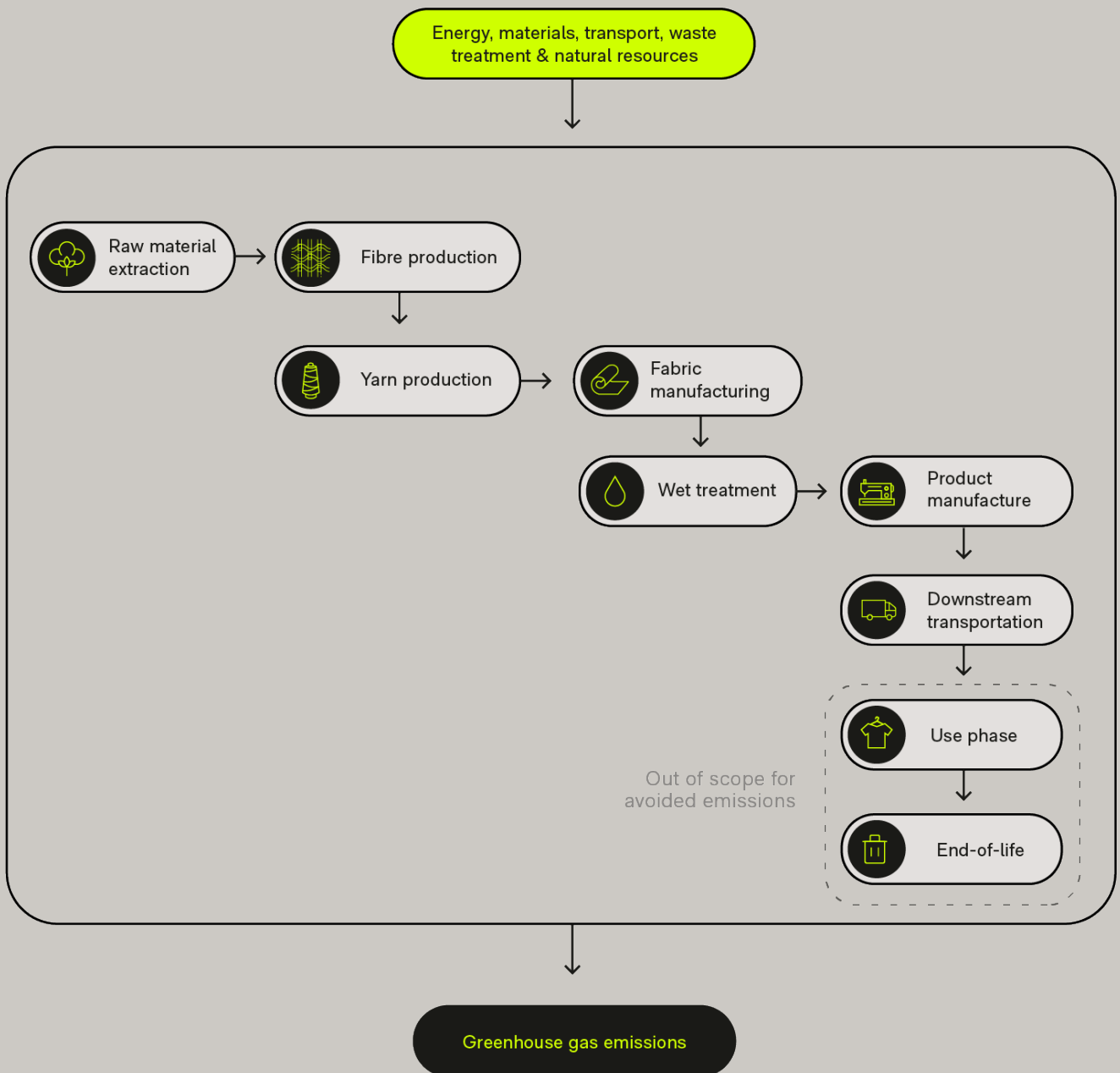
Manufacturing and Distribution

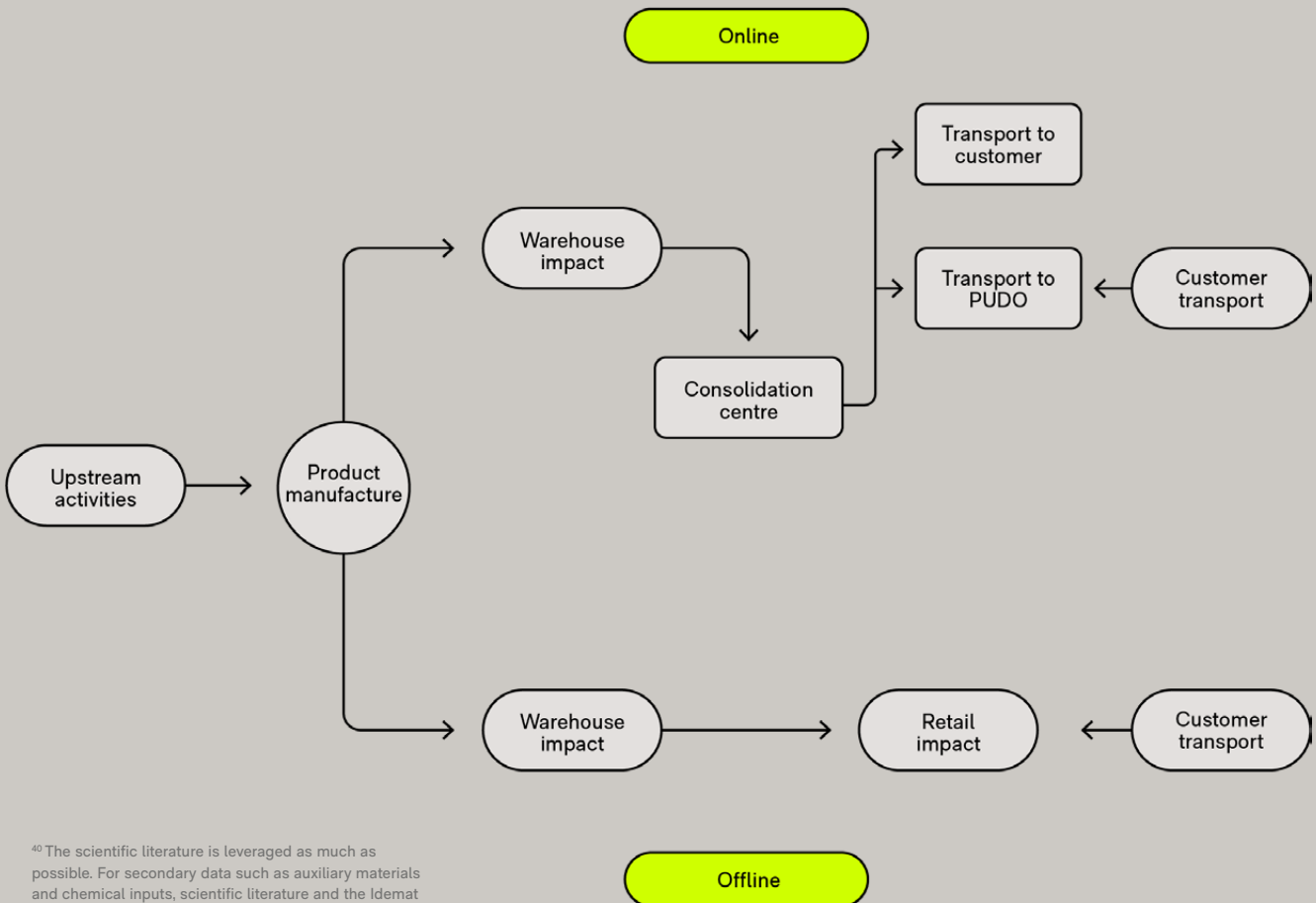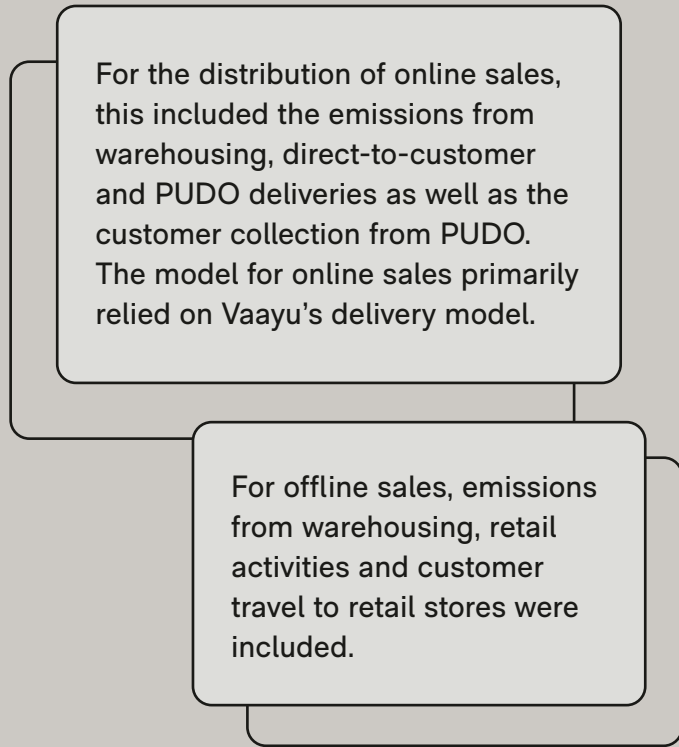The carbon emissions generated by a product or fabric was estimated by using a variety of different sources[40].

The estimated footprint of the manufacturing phase includes emissions generated by the raw material extraction until the finished fabric is ready to be assembled into a wearable product. The transportation between each stage until the transportation to the first user was included in scope. Downstream transportation includes emissions from the distribution of the product between the point of sale and the end consumer.

Distribution pathways for online and offline sales of first-hand garments were modelled according to the latest Product Environmental Footprint Category Rules (PEFCR)[41] guidelines:

For the distribution of online sales, this included the emissions from warehousing, direct-to-customer and PUDO deliveries as well as the customer collection from PUDO. The model for online sales primarily relied on Vaayu's delivery model.

For offline sales, emissions from warehousing, retail activities and customer travel to retail stores were included.

Online

Upstream activities → Product manufacture → Warehouse impact → Consolidation centre → Transport to PUDO ← Customer transport; Transport to customer

Product manufacture → Warehouse impact → Retail impact ← Customer transport

Offline

---

[40] The scientific literature is leveraged as much as possible. For secondary data such as auxiliary materials and chemical inputs, scientific literature and the Idemat (TU Delft) database are used.

[41] See the Product Environmental Footprint Category Rules, Apparel and Footwear.

To avoid overestimating the footprint of the distribution of a substitutable product online and offline, an average of both alternatives was used. 6. Appendices, Appendix P describes Vaayu's distribution model in more detail.

Country-specific electricity consumption was calculated using historical data from the European Network of Transmission System Operators for Electricity (ENTSO-E) and technology-specific emission factors such as the Intergovernmental Panel on Climate Change (IPCC) and United Nations Economic Commission for Europe (UNECE).

Additionally, the conversion factors for greenhouse gases to calculate carbon dioxide equivalents were taken from the widely accepted IPCC 2014 fifth assessment report for a 100-year time frame. Some of the emission factors on electricity generation were taken from the UNECE 2021 report on Life Cycle Assessment of Energy Generation Options.

Global carbon emissions values per kilogram of the finished fabric and per unit of a new product are shown in the two tables below. The values of impact per unit product also take into account the finished fabrics being transformed into a garment as well as the primary packaging materials[42]. The data was based on scientific literature, LCA reports and data from retailers, with the main sources highlighted in the table below. The values are a distribution since a product can be made of multiple fabrics with different production and assembly methods.

Global carbon emissions values per unit of a new product

Product	Average (kg CO_2e)	Minimum (kg CO_2e)
Tailored Coat	27.84	14.48
Jacket	15.89	9.14
Jumpsuit/Overalls	15.55	8.16
Sneakers/Trainers	15.16	7.14
Dungarees	14.70	4.78
Coat	14.56	4.94
Blazer/Suit Jacket	14.13	7.83
Slippers	13.74	5.25
Jeans	13.35	6.27
Trousers	12.90	7.68
Knitted Jumper	12.78	5.88
Cape/Poncho	12.49	6.31
Hooded Sweatshirt	12.42	5.57

The Minimum represents the lowest expected impact of a category. It's the 18th percentile impact of the sample of products within a category.

[42] Primary packaging means material that is used for the containment, protection, handling, delivery and presentation of a product that is provided to a buyer at the point of sale.

4.3 Packaging Methodology

Introduction

This section describes Vaayu's packaging estimation model used to calculate the emissions generated by the packaging used in Vinted deliveries.

A survey was conducted to analyse the types of packaging used by sellers on the Vinted marketplace. The survey was used to define the types and amounts of packaging materials used in the clothing category. This information was then used as an approximation to assume packaging types and amounts for other categories.

Two types of packaging were analysed: the primary packaging materials used for the body of the package, such as cardboard boxes made from plastic and kraft paper, as well as the secondary packaging materials, such as bubble wrap and packing tape.

Within the packaging estimation model, the LCA methodology was applied to each of the individual packaging components to determine the carbon emissions generated by each. Material and production data was used from peer-reviewed literature and scientific databases.

Primary packaging materials

Secondary packaging materials
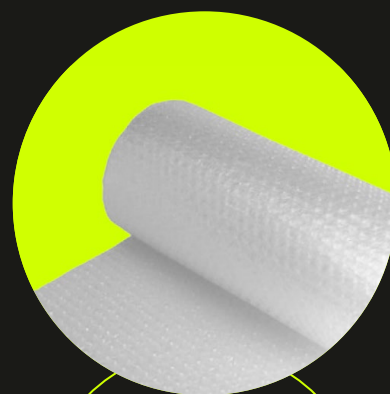
Survey

Packaging data was collected through a Sale Survey done in May 2022. It was carried out by Vaayu using Vinted's CRM. In total, the analysis of packaging use was based on 12,360 survey respondents, with each studied market having at least 680 respondents.

Packaging Mass and Type Estimate

To estimate the dimensions of the packages, an appropriate sample size of 100,000 packages shipped in 2022 was obtained by BRT, an Italian logistics service provider. Even though these were not packages used by Vinted sellers, there were two reasons for using this data. Firstly, the users' reported package dimensions in the Sale Survey were found to be overly optimistic, when compared to measurements from the logistics carriers. Secondly, it was the only data available from carriers showing the proportions of different package dimensions. This information was then matched with the responses on packaging types from the Sale Survey.

In the Vinted Sale Survey, 41% of survey respondents reported using cardboard boxes, which corresponded with the 40% of medium and large-sized packages reported from data obtained from BRT. The surface area, weight and carbon emissions of these packages were extrapolated using technical datasheets and sources

(see the first table in 5.5 Deliveries Results).

For small-sized packages, the following packaging types, or envelopes, were assumed: plastic, paper padded with Low-Density Polyethylene (LDPE) bubble wrap, a soft, flexible, lightweight plastic material or kraft paper. They accounted for 60% of all of Vinted's shipments. The proportions of the packaging types were determined from the survey responses. The surface area, weight and carbon emissions were calculated using datasheets and sources (see the first table in 5.5 Deliveries Results).

The chosen packaging type was self-reported. Consequently, there was an expectation for this to have led to a slight overestimation in the reported reuse of packaging. This is due to users possibly over-reporting good behaviour and, conversely, under-reporting bad behaviour due to the social desirability bias[43].
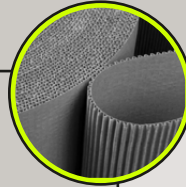

> **100K**

packages sampled in 2022

[43] Social desirability bias is a type of response bias that is the tendency of survey respondents to answer questions in a manner that will be viewed favourably by others. This bias can lead to respondents over-reporting good behaviour.

Packaging Materials

Corrugated Cardboard

Corrugated cardboard is a stiff, strong, and lightweight material made of three layers of brown kraft paper, either made from virgin or recycled paper.

The cardboard weight was calculated based on the surface density of these layers. The estimated surface area took into account the overlaps in box layers.

In this analysis, a typical cardboard box was looked at as described in the original source: a fluting sheet sandwiched between two linerboards[44].

Finally, an efficiency factor[45] of 97% was taken, which accounts for the material that is wasted during the manufacturing of the box.

Production of kraft paper involves similar steps to the cardboard box (wood chips, pulping and paper production) and yields similar carbon emissions per weight.

The data for this particular process was originally collected in 2015 from 10 mills, accounting for 71% of the production in Europe.

Low-Density Polyethylene (LDPE)

For plastics, the carbon emissions of LDPE were estimated using eco-profiles modelled in the ProBas data library[46].

Grammage, or surface density, of the bubble lining was estimated using the measurements from the same source. The grammage of the LDPE plastic bag was estimated using an Amazon LDPE mailer: 40 cm x 32 cm, weighing 14 g.

The manufacturing process of LDPE film was taken as an equivalent for the manufacture of bubble lining and the plastic mailer since a similar manufacturing process of extrusion can be assumed[47].

The resulting emissions of the mailer types were then cross-checked with the values also obtained by the same source.

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[44] According to European Database for Corrugated Board Life Cycle Studies, 2018.

[45] Efficiency factor is a ratio of some measure of performance to an expected value.

[46] Estimated using Plastics Europe eco-profiles modelled in the ProBas data library.

[47] Pilfold, K., 2013. A Comparative Life Cycle Assessment of Protective Mailers in the Postal Industry (Master's thesis, Environmental Design).

Packaging tape was considered as the only secondary packaging material.

The carbon emissions released by tape were assessed using the methodology outlined in Ecodesign of Poly Vinyl Chloride (PVC) packing tape using a life cycle assessment[48].

The amount of tape used in packaging was estimated based on the maximum volume of a package. The same metric was also used in calculating the primary packaging material emissions.

The packaging tape was assumed to be 5 cm wide and PVC as these were very common parameters of popular packaging tapes in Europe[49].

Instead of reporting an expected value on the amount of tape used per seller, a range of the expected emissions was reported. The bounds of the scenario are an expected scenario, deemed to be a realistic value and a conservative scenario which was estimated to be the worst-case scenario.

In the expected scenario, an overuse factor of 1.5 was assumed for mailers. In the conservative scenario, an overuse factor[50] of 4 was assumed. For boxes, the overuse factors 2 and 4 were used, respectively.

Overall Packaging Emissions

To approximate Vinted's entire packaging emissions, the carbon emissions from fashion product packaging were used as a proxy for those in other clothing categories. This only introduces negligible uncertainty since transactions in the clothing categories made up the substantial majority of all transactions on Vinted in 2021.

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[48] Navajas, A., Bernarte, A., Arzamendi, G. and Gandía, L.M., 2014. Ecodesign of PVC packing tape using life cycle assessment. The International Journal of Life Cycle Assessment, 19(1), pp.218-230.

[49] Examples of which include tesapack, European Aerosols, Smartape, and TART.

[50] The overuse factor here refers to the usage of more packaging than is theoretically required.

4.4 Delivery Methodology

Introduction

More than half a billion Vinted transactions were calculated for 2021 and 2022 using Vaayu's API, enriched with historical shipping data for 2021 and live tracking links for 2022. The model used to calculate the carbon emissions of deliveries, including to the buyer's home as well as to Pick-Up and Drop-Off (PUDO)[51] is described in this section.

The emissions of transportation within the supply chain during the different production stages of a new product was part of the product's carbon footprint scope (as outlined in 4.2 Product Methodology). For second-hand fashion products sold on Vinted, precise delivery data was obtained from Vinted for the delivery of each product.

The transport of a package from its origin to its destination was divided into the following three parts: First, End and Mid Leg Transport.
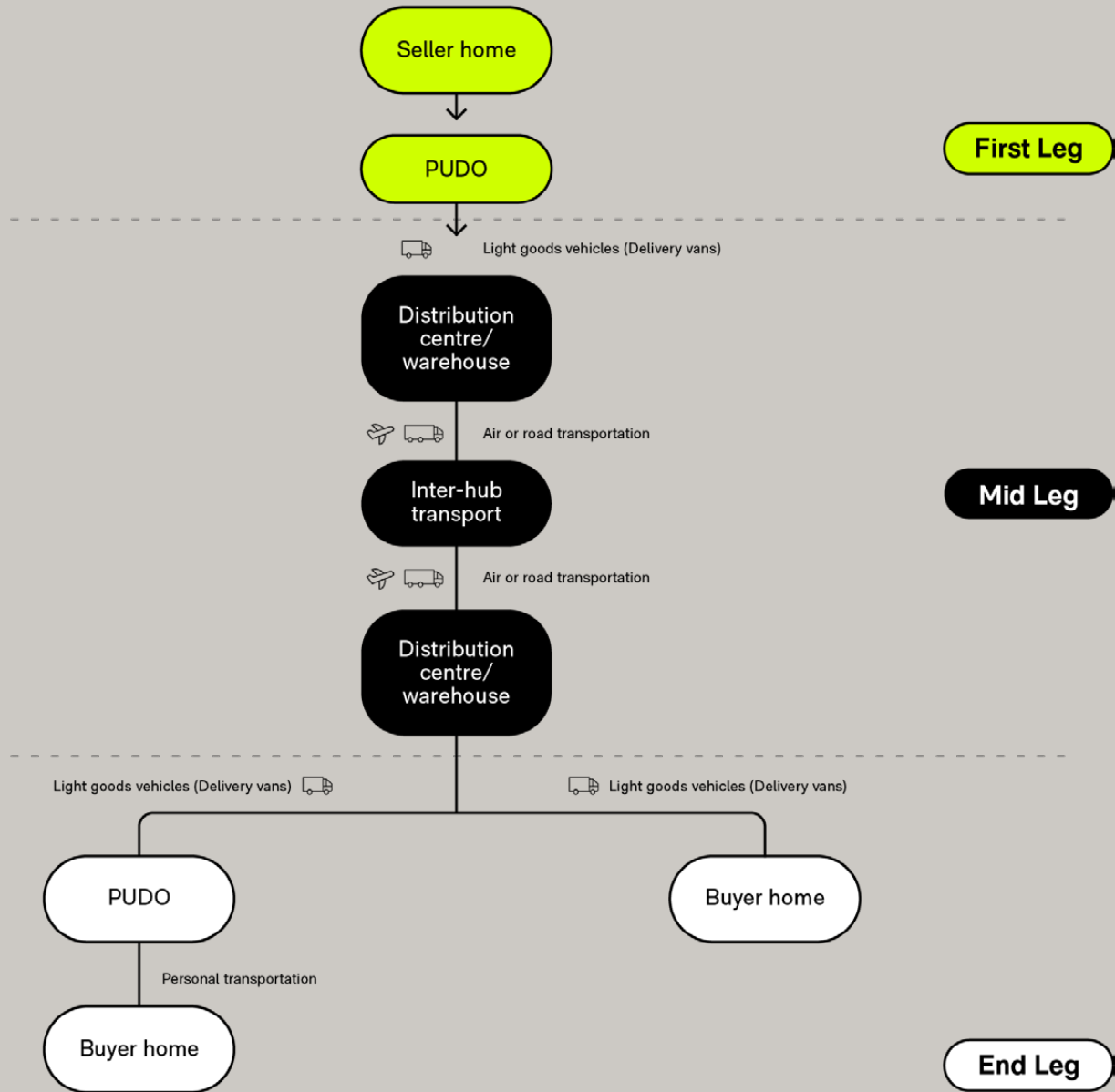
The First Leg Transport comprises the transportation between a seller's home to the PUDO or in cases of first-hand deliveries from a business to a distribution centre.

Mid Leg Transport refers to all the transportation routes between the First Leg and the End Leg Transport.

End Leg Transport refers to the transportation either from a PUDO to a buyer's home or directly from a distribution centre to a buyer's home.

An illustration of the model can also be found below.

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[51] A location, often a local shop or retail outlet, that offers a parcel Pick-Up and Drop-Off service as part of a wider network of PUDOs.

Seller home

PUDO

First Leg

Light goods vehicles (Delivery vans)

Distribution centre/ warehouse

Air or road transportation

Inter-hub transport

Mid Leg

Air or road transportation

Distribution centre/ warehouse

Light goods vehicles (Delivery vans)   Light goods vehicles (Delivery vans)

PUDO   Buyer home

Personal transportation

Buyer home

End Leg

First and End Leg Transport

Vinted users rely heavily on PUDO. Approximately 73% of all purchases on the Vinted marketplace were picked up from a PUDO in 2021 instead of being delivered to a customer's home. The survey of Vinted users has shown that the majority of Vinted users combine their trip to the PUDO with other activities (see 6. Appendices, Appendix D, Q4). A Trip Chaining[52] factor was used to allocate emissions to PUDO. Using this factor, Vaayu allocated 47% of a Vinted user's trip to the collection of their parcel.
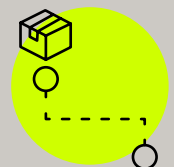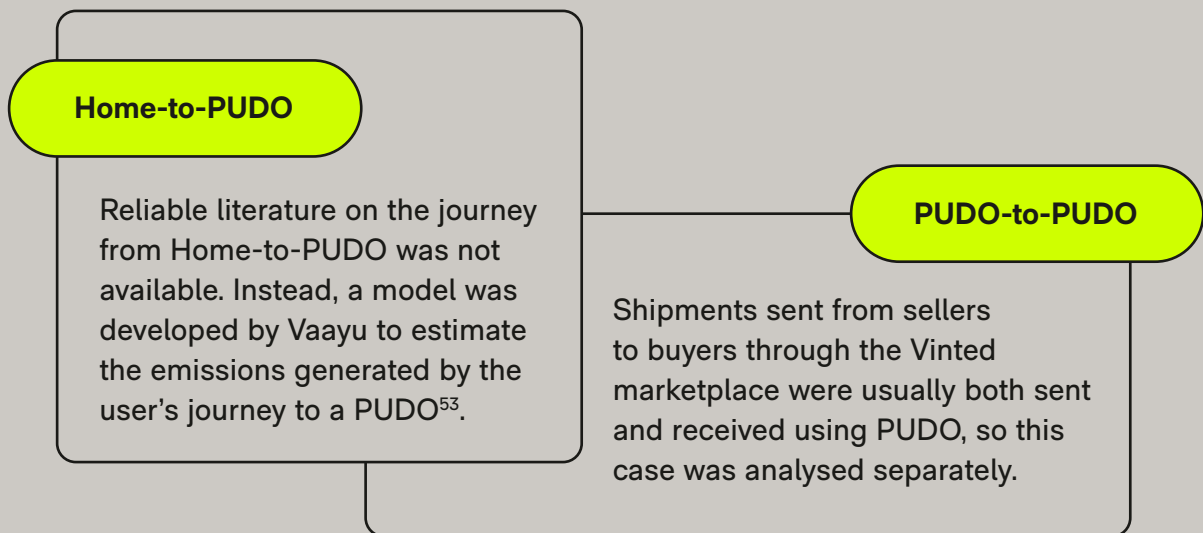
73%

of all purchases were picked up from a PUDO

[52] The Trip Chaining factor is a sequence of trips that starts and ends at the home location.

The PUDO models considered the emissions of different modes of personal and public transport. Travelling on foot and by bicycle were considered to have no emissions associated. For other modes of transport, the emissions associated with electricity or combustible fuel were considered. For shared or public transport, emissions were divided by average passenger utilisation (see 6. Appendices, Appendix Q for details).

All First Legs that were made outside of Vinted's PUDO system (27% of shipments in 2021) were assumed to have the same emissions as to a drop-off to PUDO. Further information is available in 6. Appendices, Appendix M.

A comparative analysis of Vinted's home deliveries and PUDO was conducted, based on a combination of Vaayu's PUDO delivery model and Vinted-specific parameters, including the destination of packages and availability of PUDO.

This holistic analysis compared the two approaches in a fair manner. The scope of the model included direct and indirect emissions caused by both logistics providers and users throughout a delivery's lifetime, starting with the seller up until the buyer's home.

Home-to-PUDO

Reliable literature on the journey from Home-to-PUDO was not available. Instead, a model was developed by Vaayu to estimate the emissions generated by the user's journey to a PUDO[53].

PUDO-to-PUDO

Shipments sent from sellers to buyers through the Vinted marketplace were usually both sent and received using PUDO, so this case was analysed separately.

Mid Leg Transport

In 2022, every Vinted shipment was calculated on a real-time basis utilising highly granular live tracking data. Since the 2021 Vinted shipment data was analysed retrospectively in 2022, limited live tracking data was available. The model parameters for the Mid Leg transport were therefore estimated based on live tracking data from Vinted shipments made in 2022.

The Mid Leg transportation was the same whether the package was delivered to a PUDO or to a user's home. It included all the transport after the First Leg and up to the End Leg. The

model used the geodesic distances[54] between the two points. Country-specific circuity factors were used to convert the geodesic distance to the actual road distance travelled.

Carriers' networks of warehouses are not laid out perfectly along routes. To compensate for this, the ratio of the actual route taken by a carrier to the most direct route was measured. Vaayu calls this ratio the Carrier Inefficiency. It is a carrier-specific function that is applied to every Mid Leg journey to calculate the actual distance travelled.

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[53] See 6. Appendices, Appendix Q for more information.

[54] Geodesic distance is a simple measure of distance with the shortest path between two points, "as the crow flies".

The mode of transport of Mid Legs was estimated based on live tracking data from 2022. 0.7% of Transport Legs were fulfilled through air transport, and the remaining 99.3% were considered to be road transport. No transport by sea or rail was considered, as data showed that their emissions contribution in Vinted's case was insignificant. Road transportation was used as a conservative estimate.

Both mass and volume were taken into consideration when allocating emissions to a package. Delivery vehicles have a limited weight and volume capacity. Depending on the weight and volume of the package (density), it was assessed whether the weight or the volume capacity of the vehicle would be reached if the same package filled up a vehicle. This determined whether the volume (volume-based allocation) or the mass (mass-based allocation) was the constraining factor of a specific delivery. For almost all deliveries, the density of packages was so low that volume was the constraining factor, thus volume-based allocation was primarily used.

The model also took into account the Bounce Rate[55], which was any home delivery that failed to be delivered to the buyer's home in the first instance. In those cases, the delivery had to be re-attempted, and the transport on the End Leg was carried out again, resulting in higher emissions attributed to the package.

For sources and further details on Vaayu's delivery model, see 6. Appendices, Appendix Q.

Logistics Infrastructure

Due to a lack of reliable data, the carrier's warehouse operations were excluded. Based on Vaayu's proprietary data, it was estimated that this made up a maximum of 2% of delivery emissions and therefore did not have a significant influence on the results of this analysis.

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[55] Bounce Rate or failed delivery attempt is when a delivery to the recipient was unsuccessful in the first instance.

4.5 Operational Footprint Methodology

Introduction

The Operational Footprint of Vinted was calculated in line with the GHG Protocol.

Scope 1 emissions were quantified using Vinted primary data on fuel consumption. Scope 2 emissions were calculated and tracked using the market-based and the location-based methods, in line with the Scope 2 technical guidance[56]. Scope 2 guidance recommends the dual reporting of both the market-based and the location-based methods when accounting for Scope 2.

As defined by the GHG Protocol[57], market-based emission factors refer to emissions from electricity providers that companies have chosen specifically (such as providers of 'green' or renewable electricity). In contrast, location-based emission factors reflect the average emission intensities of energy grids where the consumption occurs.

For the emissions from categories in Scope 3, including purchased goods and services, capital goods and other energy-related activities, GHG emissions intensity per euro/dollar[58] spent was used to calculate total emissions from financial data. Material waste emission factors from DEFRA UK[59] were used to calculate waste emissions. Emissions from business travel and employee commuting were computed using emission factors from DEFRA UK based on transport fuel type. Lastly, emissions from packaging and deliveries have been reported separately (see 4.3 Packaging Methodology and 4.4 Delivery Methodology).

For the full methodology, see 6. Appendices, Appendix R.

---

[56] See GHG Protocol, Scope 2 Guidance. Where applicable, if the process or supplier-specific emission factors were available, carbon emissions from purchased electricity were reported using location-based as well as market-based emission factors. In cases where market-based factors were unavailable, only location-based emission factors were utilised to report carbon emissions.

[57] GHG Protocol, Corporate Accounting and Reporting Standard.

[58] Kerkhof, A. C., Nonhebel, S., & Moll, H. C., 2009. Relating the environmental impact of consumption to household expenditures: An input–output analysis. Ecological Economics, 68(4), 1160-1170.
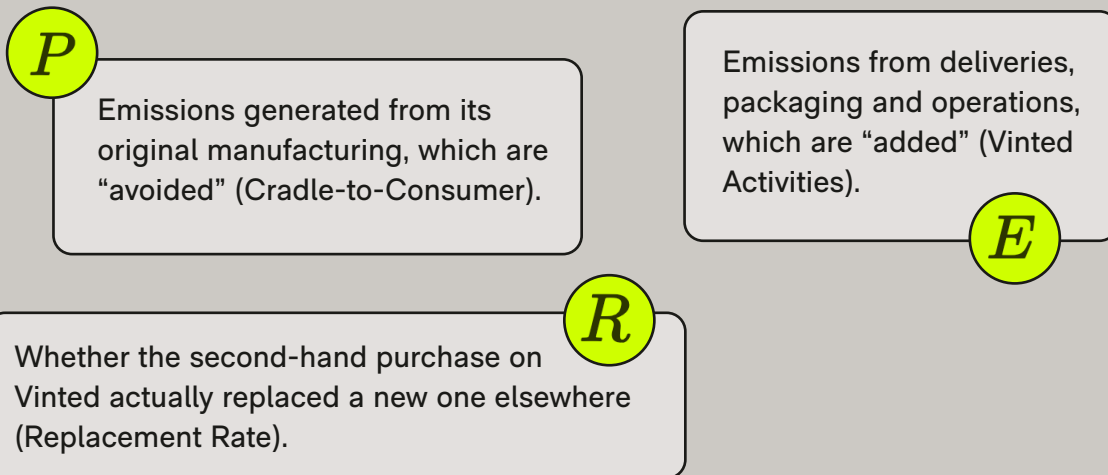
[59] GOV.UK, Greenhouse Gas Reporting: Conversion Factors 2020, 2020.

4.6 Avoided Emissions Methodology

Introduction

This section explains the avoided emissions calculation methodology. In the scope of this analysis, avoided emissions refer to the proportion of carbon emissions that is avoided (or "saved") due to customers purchasing second-hand products on Vinted instead of buying new elsewhere.

The avoided emissions of a second-hand product depend on the following factors:

P — Emissions generated from its original manufacturing, which are "avoided" (Cradle-to-Consumer).

E — Emissions from deliveries, packaging and operations, which are "added" (Vinted Activities).

R — Whether the second-hand purchase on Vinted actually replaced a new one elsewhere (Replacement Rate).

Taking these into account, Vinted's avoided emissions can be calculated using the following equation:

$$A_{\text{Avoided Emissions}} = (P_{\text{Cradle-to-Consumer}} \times R_{\text{Replacement Rate}}) - E_{\text{Vinted Activities}}$$

For the equation:

Production and distribution of the new products (Cradle-to-Consumer) came from Vaayu's LCA Modelling Engine. The calculations, data and sources are described in 4.2 Product Methodology.

Replacement Rate helps to quantify the 'substitutability' of the second-hand product with new. It determines the extent to which a second-hand product displaces the purchase of a new product. The Replacement Rate methodology is described in detail below.

Vinted's activities were the carbon emissions from the transport and packaging of products sold, and other Scope 1, 2 and 3 emissions of the business.

Replacement Rate

As multiple investigations in the literature have noted[60], buying a reused product might not completely substitute the production of a new product due to the following factors:

1 Second-hand products might just be an additional purchase.

3 There might be a difference in how regularly users wear new and second-hand products.

2 They might have a shorter lifespan than the new products due to lower physical durability or due to being fashionable for a shorter time period, changing the duration of how long an owner would like to wear the product for (emotional durability). Emotional durability can substantially differ between new and second-hand products. Online second-hand marketplaces might be encouraging the faster circulation of clothes, that is, users keeping clothes for less time before reselling.

When models have a high degree of uncertainty in LCA, emissions are typically overestimated rather than underestimated[61]. This conservative approach ensures that comparative claims remain robust even in a worst-case scenario.

The scientific approaches for Replacement Rates follow a similar methodology. Benefits are only attributed when it is certain that they apply, to ensure a conservative approach is taken. The Replacement Rate measures the likelihood of a transaction on Vinted displacing a first-hand purchase. The Replacement Rate does not accurately represent how many products purchased on Vinted were additional purchases. Other effects were expected to play an important role (e.g. see Impulse Buyers below).

Three different approaches to calculate a Replacement Rate were explored. Avoided Purchase Rate was chosen as the best suited Replacement Rate. The rationale for selecting the Avoided Purchase Rate over the alternatives is laid out in 6. Appendices, Appendix J.

[60] See Sandin, G. and Peters, G.M., 2018. Environmental impact of textile reuse and recycling–A review. Journal of cleaner production, 184, pp.353-365.

[61] WOLF, M.A., CHOMKHAMSRI, K., BRANDAO, M., PANT, R., ARDENTE, F., PENNINGTON, D., MANFREDI, S., DE CAMILLIS, C. and GORALCZYK, M., 2010. International Reference Life Cycle Data System (ILCD) Handbook-general guide for life cycle assessment-detailed guidance; Larsson Ivanov, O., Honfi, D., Santandrea, F. and Stripple, H., 2019. Consideration of uncertainties in LCA for infrastructure using probabilistic methods. Structure and Infrastructure Engineering, 15(6), pp.711-724.

Avoided Purchase Rate

The Avoided Purchase[62] Rate essentially quantifies whether buying the second-hand product on Vinted was an additional purchase or if it replaced the purchase of a new, first-hand fashion product.

108,829

Vinted buyer responses

The Avoided Purchase Rate was calculated based on responses from 108,829 Vinted buyers. They were asked the following question: *"If you had not found this product on Vinted, would you have bought this, or a similar product, brand new?"*

The equation to calculate this factor from the responses is as follows:

$$\text{Avoided Purchase Rate} = \frac{\text{Replacement Purchases}}{\text{Total}}$$

The **Replacement Purchases** are the number of purchases that have been classified as displacing the purchase of a new product.

The **total** is the number of surveyed buyers.

Then, to estimate the numerator for a particular product category, the goal was to account for responses that lead to an avoided purchase of a new product without it being an additional purchase. These are then calculated as follows:

$$\text{Responses avoiding purchase of a new product without it being an additional purchase} = \text{Selected 'Yes' responses} - \text{Impulse Buyers} + \text{Selected 'Maybe' responses}$$
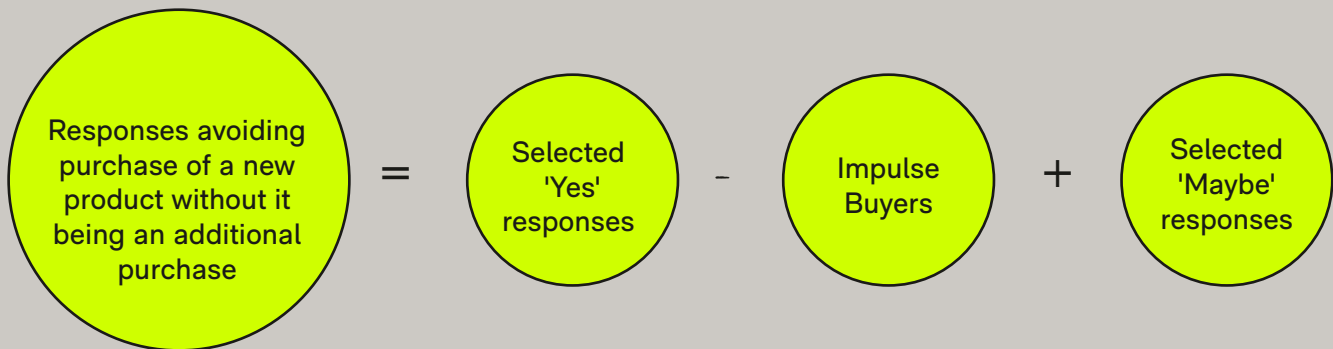
Where,

Yes

Selected 'Yes' responses were responses where there was reasonable certainty that these products led to the avoided purchase of a new product[63].

Maybe

Selected 'Maybe' responses were responses where the avoided purchase of a new product depended on different factors[64]. They added a degree of uncertainty to the estimation, and for this reason, an additional control question ("*Why are you not sure?*") was included to confirm the motivations behind the stated behaviour.

Impulse Buyers

In a stand-alone question[65], buyers were also asked about the main reason for purchasing a product on Vinted instead of brand new. Those who answered, "*I was just browsing Vinted and I liked this product*", were classified under impulse buyers. Their purchases were considered not to displace a first-hand purchase and, as such, were excluded from the calculation of the Avoided Purchase Rate. This also excludes self-reported purchases due to the rebound effect (see Rebound Effect below).

[63] See 6. Appendices, Appendix D, Q7.

[64] See 6. Appendices, Appendix D, 8.a. 8.

[65] See 6. Appendices, Appendix D, Q11.

This approach was slightly different from what is observed in the scientific literature and the displacement rate reported by other second-hand fashion platforms, where the numerator is a simple computation of total 'Yes' responses + half of 'Maybe' responses[66].

> *The rationale for adopting a modified approach that controls for overly positive responses was due to existing research which clearly shows that in some cases, even a 'Yes' response might not lead to an actual avoided purchase of a new product and vice-versa[67].*

The additional control question attempted to account for the true effect of users claiming a displaced first-hand purchase. It helped identify Vinted's users' underlying motivations for shopping second-hand and served to limit the degree of uncertainty in the calculation. The entire Purchase Survey can be found in 6. Appendices, Appendix D.

Alternative approaches that were studied can be found in 6. Appendices, Appendix J.

New Products

The production emissions of second-hand products are usually allocated entirely to the first owners. However, this was not the case for products that are immediately resold after they were newly purchased.

A second-hand product without a tag meant that the product has been used. Products in the "New With Tags" category mean they were not used, and so emissions are attributed to the previous owner (in this case, the Vinted seller). "New With Tags" products, therefore, do not result in avoided emissions.

In the absence of a model to accurately predict the substitution rate of a product labelled "New With Tags," and to avoid over-accounting of avoided emissions, no displacement was calculated for products with this condition.

[66] Nørup, N., 2019. An environmental assessment of the collection, reuse, recycling and disposal of clothing and household textile waste, Technical University of Denmark; Castellani, V., Sala, S. and Mirabella, N., 2015. Beyond the throwaway society: A life cycle based assessment of the environmental benefit of reuse. Integrated environmental assessment and management, 11(3), pp.373-382.

[67] Nørup, N., 2019. An environmental assessment of the collection, reuse, recycling and disposal of clothing and household textile waste, Technical University of Denmark.

Rebound Effect

The rebound effect[68] is defined as:

> *"The rebound effect deals with the fact that improvements in efficiency often lead to cost reductions that provide the possibility to buy more of the improved product or other products or services."*
>
> – Thiesen, J et al. (2008)

This effect manifests itself as overconsumption in the case of the Vinted marketplace. This is a potential negative impact of the marketplace that was also examined as part of this analysis. Purchases that are driven by the rebound effect are referred to as excess purchases in this analysis.

Impulse Buyers

A large number of Vinted buyers were users who casually shopped for fashion products without a direct utilitarian motivation (impulse buyers). These buyers regularly bought fashion products regardless of the platform, and would likely continue to purchase clothing if Vinted did not exist. However, these respondents would likely answer that they *'would not have bought the product otherwise'*.

In Vinted's case, 25% of respondents were identified as impulse buyers. However, a conservative approach was chosen that factors out impulse buys, resulting in a lower Replacement Rate. This was mainly due to the high level of uncertainty in quantifying the Replacement Rate for impulse buys.

[68] Thiesen, J., Christensen, T.S., Kristensen, T.G., Andersen, R.D., Brunoe, B., Gregersen, T.K., Thrane, M. and Weidema, B.P., 2008. Rebound effects of price differences. The International Journal of Life Cycle Assessment, 13(2), pp.104-114.

Section 5.
Results
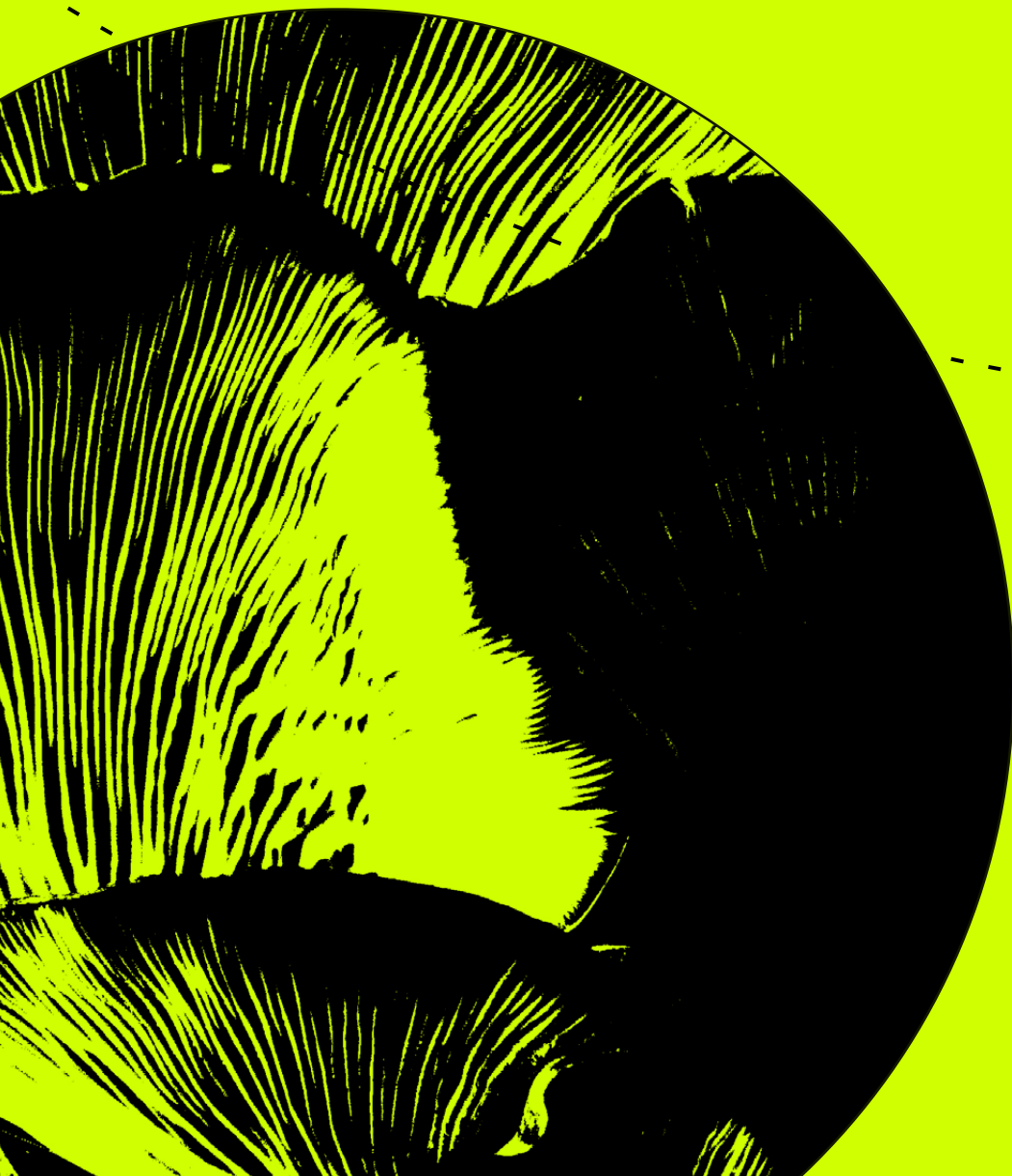
Results

This section describes the key findings from the analysis, together with additional insights on Vinted's member base and consumer behaviour from the user surveys' research.

5.1 Net Impact Results

Introduction

The net climate impact was calculated by estimating the total emissions avoided by the Vinted marketplace and subtracting the emissions generated by Vinted's activities in 2021. The net impact includes products purchased in all categories (see 4.2 Product Methodology and 6. Appendices, Appendix A for more details) and all types of transactions, including returns and purchases of products classified as "New With Tags".

↓

453 kt CO$_2$e

was the net avoided impact of Vinted's C2C marketplace in 2021

Net Impact of Vinted's Marketplace

Owing to the sizeable portion of Vinted's users who choose to purchase second-hand instead of buying new, considerable emissions of 748 kt CO_2e were avoided by Vinted.

The total net carbon emissions avoided by the Vinted marketplace in 2021 were 453 kt CO_2e; the equivalent of driving 3.6 billion kilometres[69].

The net carbon emissions avoided were calculated by taking the results from 5.2 Avoided Emissions Results (748 kt CO_2e) and subtracting the emissions generated by Vinted's operations, packaging and deliveries (295 kt CO_2e). Deliveries were by far the biggest contributor to Vinted's carbon footprint, while operations and packaging were negligible in comparison.

Net Impact of Vinted's Marketplace

t CO_2e

Total Packaging Emissions
+9,011

Total Delivery Emissions
+282,471

Total Operations Emissions
+3,478

Total Avoided Emissions of Vinted marketplace
-747,551

- 452,591 t
Total Net Impact of Vinted marketplace

0
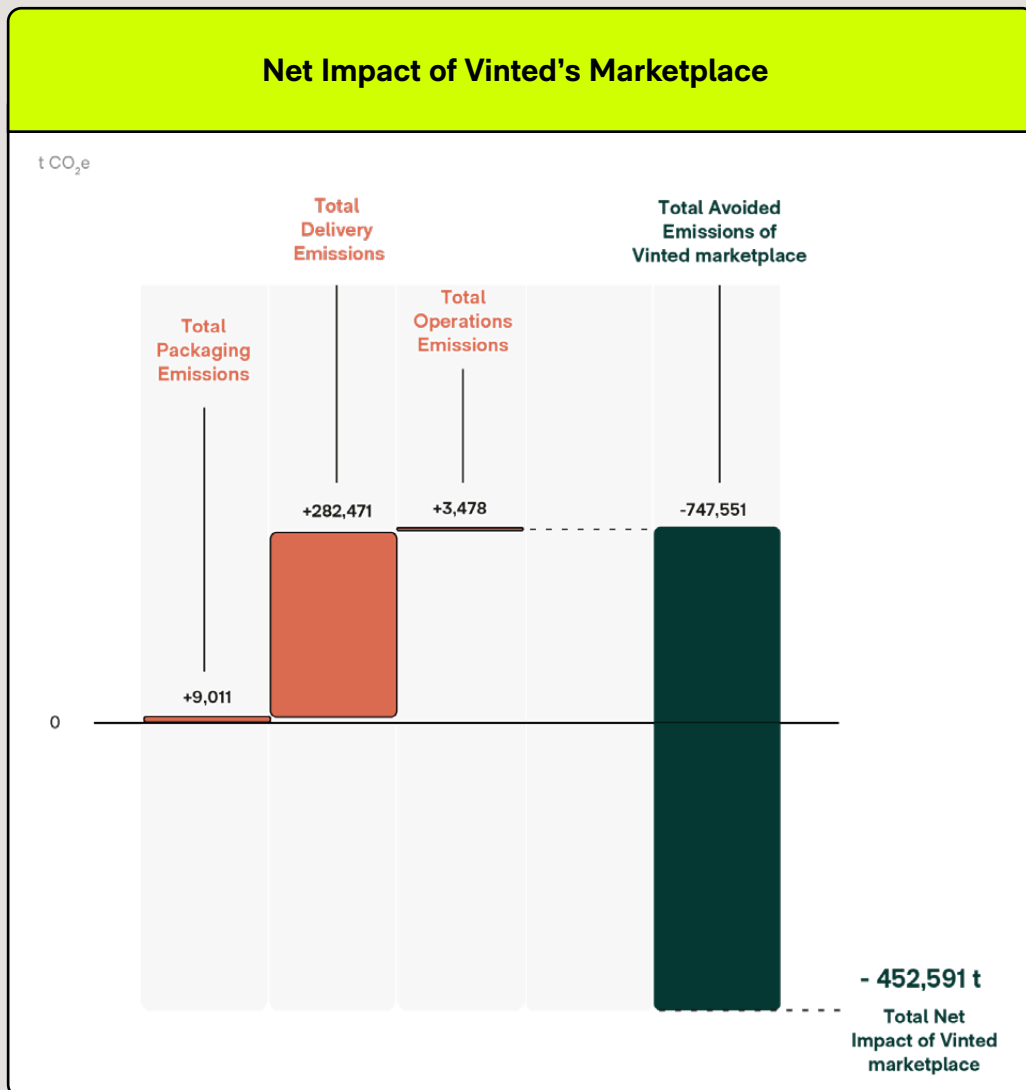
[69] European Environmental Agency (EEA), 2022., CO₂ performance of new passenger cars in Europe.

Net Impact per Second-Hand Product on Vinted's Marketplace

The average net climate impact per second-hand product was calculated in the same way and applied on a per transaction basis.

↓

1.8 kg CO$_2$e

On average[70], buying a second-hand fashion product on Vinted instead of buying new resulted in an emissions saving of 1.8 kg CO$_2$e; the equivalent of driving 15 kilometres.
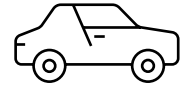
15 km

Net Impact per Second-Hand Product on Vinted's Marketplace

g CO$_2$e

Packaging Emissions

Delivery Emissions

Operations Emissions

Avoided Cradle-to-Consumer Emissions

+30.86

+977.33

+11.91

-2,796.05

0

- 1,775.95 g
Net Impact per Second-Hand Product

---
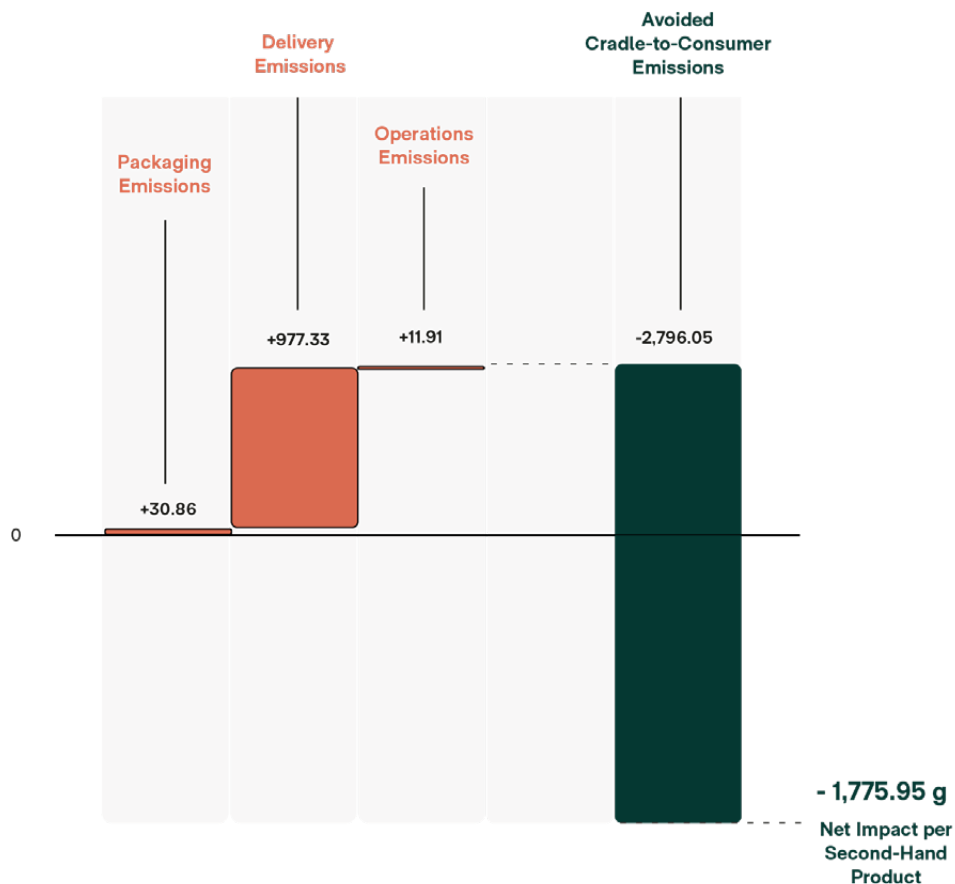
[70] The arithmetic mean is referred to as "average", as is common practice.

Accounting for Uncertainity

As described in 4.6 Avoided Emissions Methodology, many different factors could influence the calculation of avoided carbon emissions. The calculation necessitates an estimation of an accurate 'baseline' carbon footprint of a fashion product which is fundamentally hypothetical. This could result in uncertainty due to the variance in the estimated emissions generated from different product manufacturing processes. The main sources of uncertainty are elaborated on below.

The variance in manufacturing impact of new fashion products is shown to be very large (50%), due to the avoided emissions depending on the product the Vinted user would have hypothetically bought otherwise.

To account for this, a weighted average of a representative substitutable product was used based on Vaayu's data. It is possible, though, that users would choose a less carbon-intensive substitute. If most Vinted users chose such a lower-impact substitute, the Cradle-to-Consumer emissions would be 4 kg CO_2e less than the expected impact (which was the lower bound of the 68% confidence interval, see 4.2 Product Methodology).

Another source of uncertainty in the calculation was the variance in the Replacement Rate (39-47.5%). This uncertainty is inherent to observations gained from the surveys. The different approaches used to mitigate these uncertainties can be found in 5.2 Avoided Emissions Results.

An additional source of uncertainty came from clothing purchases in the "New With Tags" category, which also decreased the avoided emissions. This is because no avoided manufacturing emissions were accounted for, as it was assumed that these products displaced no new purchases since they had not previously been worn.

CO_2e
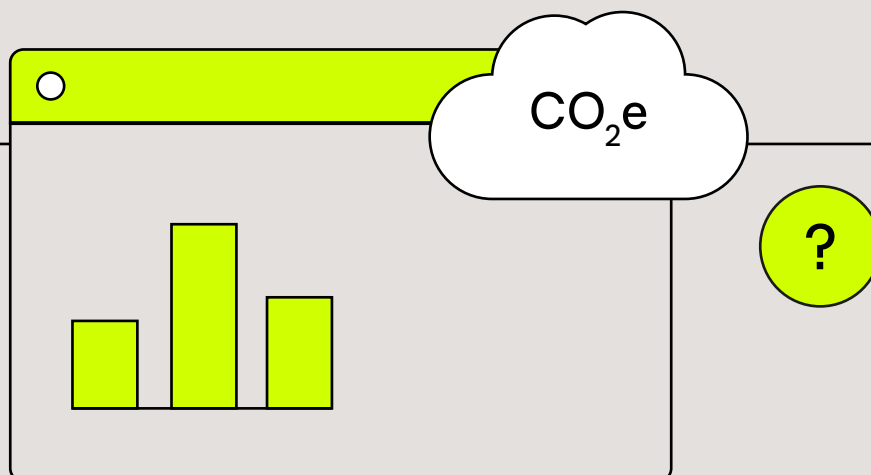
5.2 Avoided Emissions Results

This section summarises the total avoided emissions of shopping second-hand on the Vinted marketplace based on transactions in 2021, excluding Vinted's Operational Footprint. Purchases of "New With Tags" products were considered to have no displacement effect and, as such, didn't impact the total avoided emissions result.

Excluding the emissions of Vinted's own activities, Vinted users avoided 748 kt CO_2e by purchasing second-hand products instead of buying new.

On a per-product basis, this equates to 2.8 kg CO_2e of avoided emissions (before accounting for the emissions generated by Vinted's own activities).

$$A_{\text{Avoided Emissions}} = (P_{\text{Cradle-to-Consumer}} \times R_{\text{Replacement Rate}}) - E_{\text{Vinted Activities}}$$

1.8	=	(7.35	*	39%)	−	1.02

The most important factor for calculating avoided emissions was the Replacement Rate.

The section below summarises the results from the Replacement Rate calculation together with an explanation of the assumptions that were made during the analysis.

The Replacement Rate is the probability with which the alternate emissions-generating scenario would have happened if Vinted didn't exist.

Replacement Rate

The Avoided Purchase Rate was used to calculate the Replacement Rate. It was calculated for different product categories and estimated the proportion of users avoiding purchasing a new product. A Replacement Rate of 39% meant that 39 out of 100 people buying a second-hand product on Vinted would have avoided purchasing a new product (see 5.3 Vinted User Survey Results for details on how it was calculated).
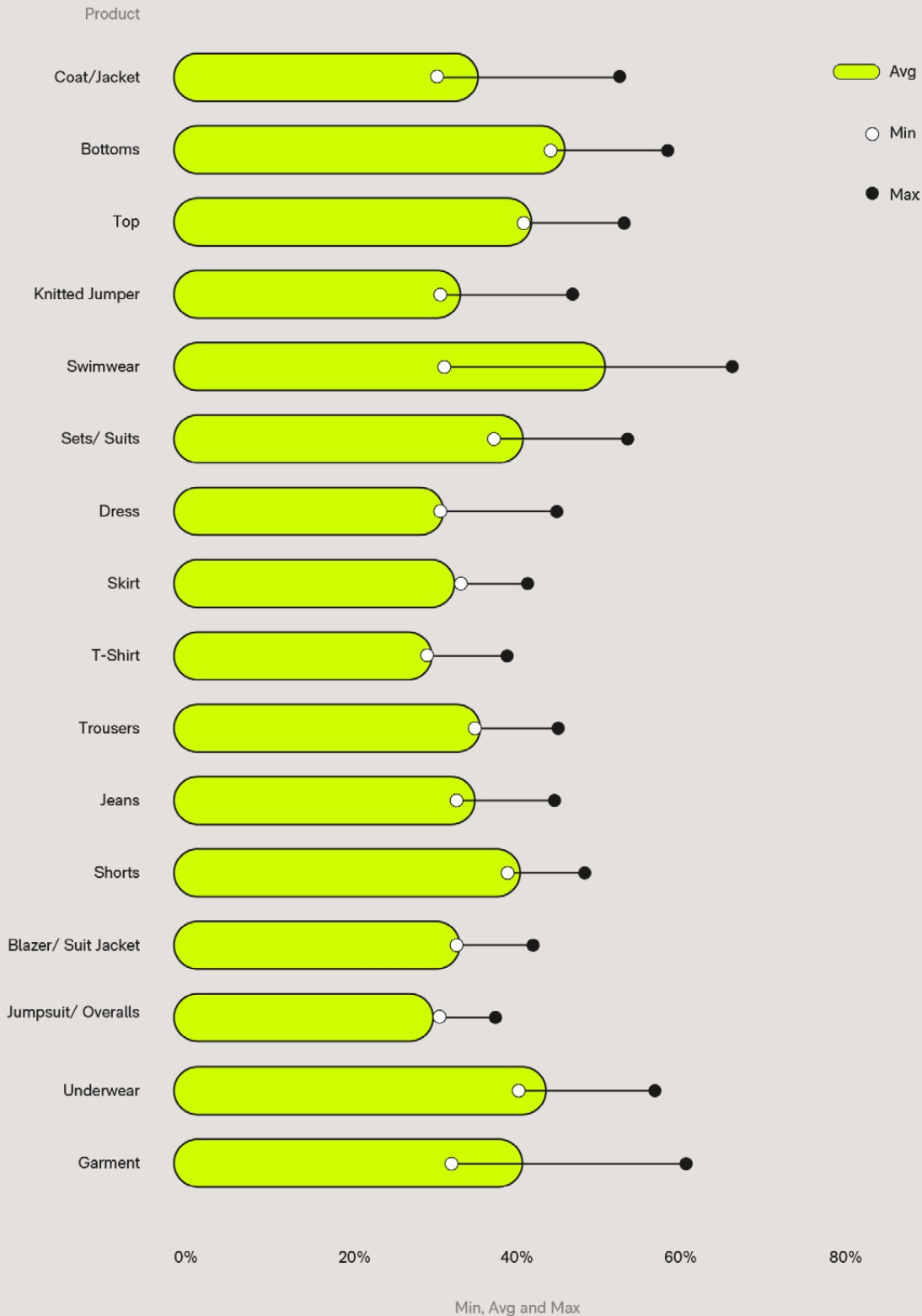
Product

- Coat/Jacket
- Bottoms
- Top
- Knitted Jumper
- Swimwear
- Sets/ Suits
- Dress
- Skirt
- T-Shirt
- Trousers
- Jeans
- Shorts
- Blazer/ Suit Jacket
- Jumpsuit/ Overalls
- Underwear
- Garment

Legend: Avg, Min, Max

X-axis: 0%, 20%, 40%, 60%, 80%

Min, Avg and Max

The average Replacement Rate was 39%. The weighted average across the product categories was calculated using over 200 million Vinted transactions.

The overall ranges of the Replacement Rate align very well with the ranges in the literature[71]. Vaayu's Replacement Rate methodology is more granular than those used in other literature and is therefore not directly comparable. In addition, other studies were conducted in different geographical regions or different settings (e.g. in-store sales), making a direct comparison harder.

The Replacement Rate approaches in the literature are highlighted in the below table. There was only one analysis that was conducted for online shopping[72], while all other research was done on offline shopping at second-hand stores. According to this analysis for Vinted, the average value of 39% was lower than the 57% calculated in the literature[73].

Replacement Rate in this paper and comparison with literature

Study	Mode of Sale	Replacement Rate Approach	Replacement Rate (only clothing)	Geography	No. of Respondents
Farrant et al. 2010	Offline	Avoided Purchase but grouping respondents in the questionaire	75%	Estonia	131
			60%	Denmark + Sweden	104
Farrant et al. 2010 (recalculated in Norup 2019 et al.)	Offline	Avoided Purchase	44 ± 21%	Estonia	131
		Avoided Purchase	41 ± 28%	Denmark + Sweden	104
Stevenson et al. 2013	Offline	Avoided Purchase	29%	Britain	266-1331
		Avoided Purchase	29%	England	NA
		Avoided Purchase	32%	Wales	NA
		Avoided Purchase	25%	Scotland	NA
	Online	Avoided Purchase	57%	Britain	261
Castellani et al. 2015	Offline	Avoided Purchase but only yes/no responses	47.25%	Gorgonzola, Italy	414
Norup et al. 2019	Offline	Avoided Purchase	59 ± 6%	Angola	1329
		Avoided Purchase	36 ± 1%	Malawi	986
		Avoided Purchase	38 ± 5%	Mozambique	1168
This paper	Online	Avoided Purchase	39%	France, Italy, Germany, UK, Netherlands, Belgium, Poland, Spain	108,829 (Buyers)

[71] Stevenson et al. 2013, Norup et al., 2019. An environmental assessment of the collection, reuse, recycling and disposal of clothing and household textile waste.

[72] Stevenson et al., 2013. Study into consumer secondhand shopping behaviour to identify the reuse displacement affect.

[73] There are two probable reasons. Firstly, the literature did not make a distinction between different types of products (only an overall value for clothing is calculated). And/or, secondly, the Avoided Purchase Rate calculated in this analysis is based on granular groupings of different Vinted user responses, which is different from other literatures' categorisation where a simple 'Yes', 'No' and 'Maybe' calculation was used.

Depending on the product category, significant variation in the Avoided Purchase Rate was observed. This is very much in line with the literature, which suggests using a product-specific Avoided Purchase Rate[74].

Specific categories such as coats, jackets, bottoms and shorts stand out as having a relatively high Replacement Rate. These products are likely bought due to their utility rather than emotional value. The categories most likely to replace a new purchase and have a large initial manufacturing footprint are also the ones that avoid the most emissions.

The weighted average of the Avoided Purchase Rate was 39%, calculated according to the number of transactions per product category. This meant that, on average, 39% of Vinted transactions avoided purchasing a new fashion product. The motives driving the purchase of the remaining 61% of products were not analysed further.

Another way to interpret this is, on average, for every 2.56 pieces of clothing bought on Vinted, the purchase of one new piece of clothing was avoided.

Listings on the Vinted marketplace of product sets (bundles of multiple products) were treated as single products due to data constraints. This resulted in an underestimation of avoided emissions in these cases. The emissions avoided due to the purchase of sets would be higher, due to the higher product manufacturing footprint than that of single products. However, as mentioned, a conservative approach was taken due to the absence of complete data.

As part of the study, alternative approaches to calculating the Replacement Rate were explored, and details on these as well as the reason for selecting Avoided Purchase Rate can be found in 6. Appendices, Appendix J.

2.56

For every 2.56 pieces of clothing bought on Vinted, the purchase of one new piece of clothing was avoided

[74] Stevenson, A. and Gmitrowicz, E., 2012. Study into consumer second-hand shopping behaviour to identify the re-use displacement effect. Waste Res. Act. Prog.(WRAP); Nørup, N., Pihl, K., Damgaard, A. and Scheutz, C., 2019. Replacement ates for second-hand clothing and household textiles–A survey study from Malawi, Mozambique and Angola. Journal of Cleaner Production, 235, pp.1026-1036.

Uncertainity in Avoided Purchase Rate

A source of uncertainty in the Avoided Purchase Rate was the social desirability of whether Vinted users choose to buy second-hand instead of first-hand. An additional factor is that respondents were asked to state with certainty what their behaviour would have been in a hypothetical scenario, which carries some inherent uncertainty. Enhancing the robustness of the results, an additional control question was asked. Using this question, answers were corrected for factors such as social desirability, and it was found that 25% of respondents answered more positively than is likely their true behaviour.

Questions were framed as neutrally as possible to ensure the less desirable outcome was not obvious. Respondents who were uncertain about their behaviour were asked further questions to pinpoint their likely behaviour better.

In addition, the robustness of the survey responses was tested. Details on this Statistical Analysis are outlined in 6. Appendices, Appendix G.

Lower Lifetime and Usage of Second-Hand Products

It is probable that the lifetimes and usage for second-hand products were lower than for new products[75]. The Ownership Period Ratio and Usage Rates quantify this. They were then ultimately used to estimate the avoided emissions. On the other hand, for Avoided Purchase Rate, the difference between the lifetime or wears of a Vinted product versus a new product was not directly included in the computations.

The result was that the Vinted products might have been discarded sooner, but Vinted shoppers still avoided the purchase of a new product, at least temporarily. After that, the Vinted buyer may have bought a new product or another second-hand product. Refer to 6. Appendices, Appendix J for the Ownership Period Ratio and Usage Rate values.

[75] Laitala & Klepp, 2021. Clothing Longevity: The Relationship Between The Number of Users, How Long and How Many Times Garments are Used.

Additional Circulation Due to Vinted

There is a possibility that Vinted, through its ease of use, increased the rate at which products change hands. This additional circulation would result in greater carbon emissions. Since the transport and logistics data was available and accounted for in each transaction, the negative impact of additional circulation was taken into account. However, the methodology did not take into account the possible shortened usage period.

Rebound Effect

The rebound effect manifests itself as overconsumption in the case of the Vinted marketplace. This is a potential negative impact of the marketplace that was also examined as part of this analysis. Purchases that were driven by the rebound effect are referred to as excess purchases.

According to the qualitative assessment, it is assumed that a maximum of 30% of purchases made via Vinted's marketplace were excess purchases (see 4.6 Avoided Emissions Methodology, Impulse Buyers). Overconsumption was not separately analysed; however, it was implicitly measured through the Replacement Rate based on the number of purchases displacing a first-hand purchase. The excess purchases were a subset of the transactions where no replacement was detected. There was no estimate available based on quantitative data.

In the context of Vinted, excess purchases lead to additional carbon emissions due to the overall transaction without avoiding the production of a new product. This parameter became more important since a large proportion of Vinted's users seemed to be motivated by buying cheaper products.

Overall, while a significant number of excess purchases were made on Vinted, the impacts of the transactions motivated by intent to use the product surpassed the negative impacts of overconsumption.

Conclusion

Although the methodology of this analysis was conservative, the findings demonstrated that shopping second-hand on Vinted avoided emissions in comparison to buying new. While excess purchases were made on Vinted and there was a certain level of uncertainty, the positives outweighed the negatives. Purchases made for practical product use surpassed purchases made in excess.

Overall, Vinted users avoided 748 kt CO2e in 2021 (before accounting for emissions generated from Vinted's own operations), which, per product, equated to 2.8 kg CO2e of avoided emissions. This avoided the emissions equivalent to driving 3.6 billion kilometres in an average car in Europe[76].

Using the Avoided Purchase Rate, the average Replacement Rate was 39% (the weighted average across the product categories was calculated using over 200 million Vinted transactions). Another way to interpret this is, on average, 39% of transactions on Vinted avoided the purchase of a new fashion product, or for every 2.56 pieces of clothing bought on Vinted, the purchase of one new piece of clothing was avoided.

[76] European Environmental Agency (EEA), 2022., CO_2 performance of new passenger cars in Europe.

5.3 Vinted User Survey Results

Introduction

8

This section highlights user behaviour insights based on over 350,000 survey responses across 8 European markets. The extent of this reach and response rate ranks the survey as the largest worldwide second-hand clothing purchase behaviour analysis to date.

+ 350,000

survey responses

The analysis of general statistics reveals a significantly greater response rate from female Vinted users and a relatively even split of respondents across different age groups. The highest response rate across all surveys was observed in Italy, followed by France, Spain, the Netherlands and Belgium. Detailed information on the user survey results can be found in 6. Appendices, Appendix H, Vinted User Survey Results.

Key Findings

Usage of Pick-Up and Drop-Off (PUDO)

PUDO was the preferred delivery method on Vinted. Both the Purchase and Sale Surveys contained a section dedicated to PUDO shipments where the objective was to collect a primary dataset on the users' different modes of transport and the impact of the journeys to a PUDO serving multiple purposes. Understanding and quantifying the different travel patterns of Vinted users enabled higher accuracy of PUDO shipment emissions calculations.

While it is observed that the majority of buyers (55%) and sellers (58%) used their personal cars to travel to and from PUDOs, a considerable proportion (>30%) did so by foot, which is correlated to the area's PUDO density. In addition, a large variety of preferred modes of transport is noted across countries. While Belgium, France, Italy and the UK have the highest car usage rates, >50% of respondents in Poland and Spain preferred walking. Close to a third of respondents in the Netherlands took bicycles.

See the tables below for a full summary of the results.

Which mode of transport do you use to go to the Pick-Up/Drop-Off point?

%	BE	DE	ES	FR	IT	NL	PL	UK
Car	63%	57%	37%	68%	61%	38%	46%	63%
Walking	19%	25%	54%	23%	29%	18%	45%	32%
Bicycle	8%	11%	1%	3%	3%	34%	3%	1%
Bus	3%	2%	3%	2%	2%	0%	3%	2%
Electric scooter or bicycle	3%	1%	1%	1%	1%	7%	1%	0%
Motorcycle or scooter	1%	0%	2%	3%	3%	1%	0%	0%
Metro, tram or train	2%	3%	2%	1%	1%	1%	1%	1%
Shared car or carpool	1%	0%	1%	1%	1%	0%	0%	1%

Which mode of transport do you use to go to the Pick-Up/Drop-Off point?

%	BE	DE	ES	FR	IT	NL	PL	UK
Car	67%	59%	36%	69%	63%	42%	45%	65%
Walking	18%	26%	59%	24%	28%	17%	49%	32%
Bicycle	8%	10%	1%	3%	3%	31%	3%	1%
Bus	3%	1%	1%	1%	1%	8%	1%	0%
Electric scooter or bicycle	0%	0%	1%	0%	3%	1%	0%	0%
Motorcycle or scooter	2%	2%	2%	2%	1%	0%	2%	2%
Metro, tram or train	1%	3%	1%	1%	0%	0%	0%	0%
Shared car or carpool	0%	0%	0%	0%	0%	0%	0%	0%

13 min

PUDO

Home

For almost a quarter of participants, the whole PUDO journey (to and from) took 13 minutes on average.

1 in 5 (20%) users were buying or selling fashion products on Vinted out of social or environmental concerns.

I prefer buying second-hand items because its cheaper than brand new	47%
I was just browsing Vinted and I liked this item / impulse buy	25%
I prefer buying second-hand items out of principle	20%
I prefer buying second-hand items because its so cheap there is no financial risk	7%

1 in 5

(20%) of users were buying or selling fashion products on Vinted out of social or environmental concerns
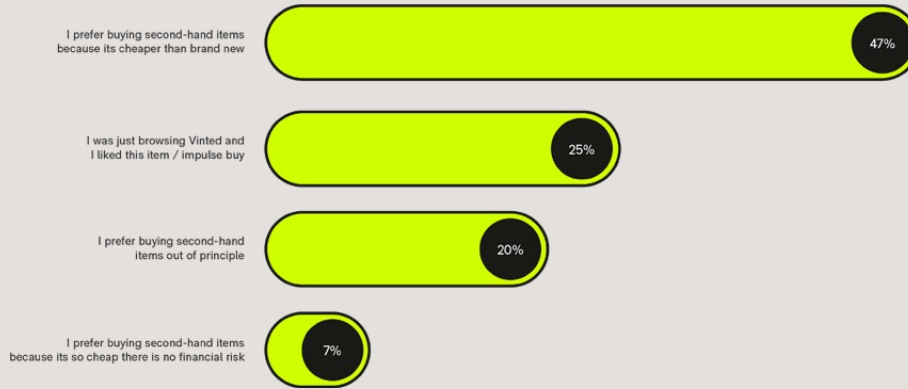
The proportion of consumers driven by a sustainability mindset was notably higher in countries like Germany (29%) and the Netherlands (27%).

What is the main reason you purchased this item on Vinted instead of buying it brand new?

%	BE	DE	ES	FR	IT	NL	PL	UK
I prefer buying second-hand items because its cheaper than new	50%	40%	45%	50%	48%	47%	43%	45%
I was just browsing Vinted and I liked this item / impulse buy	19%	26%	26%	18%	32%	19%	33%	29%
I prefer buying second-hand items out of principle	22%	29%	22%	23%	14%	27%	14%	20%
I prefer buying second-hand items because its so cheap there is no financial risk	9%	5%	8%	9%	5%	7%	10%	6%

Similar trends can also be seen with sellers where they were asked about their main motivation for selling clothes on Vinted. Social or environmental reasons were one of the most significant reasons after economic motivation. The sustainability outcome was that 18% of users believed reselling is sustainable and saved resources. In contrast, the social reason was gratification obtained by someone else making use of this product instead.

Another insight that stands out in relation to Vinted users' environmental consciousness was the commitment to extending their clothing life via alternative channels. Vinted sellers had a clear preference for prolonging their products' lifetime by passing them to family and friends and giving to charity, which increased the probability of these being reused or recycled[77,78]. Less than 1% of respondents reported that they would rather throw away their clothing products (irrespective of whether purchased on Vinted) in regular waste. This suggests an important mindset shift, with Vinted users viewing clothes as a valuable asset that should be kept in circulation instead of being quickly disposed of.

If you did not manage to sell this item on Vinted, what would you have done with it?

Try to resell it through another second-hand online platform	24%
Give it to family / friends	19%
Give it to a charity shop	19%
Keep it in my wardrobe unused	13%
Throw it in a clothing bin	8%
Try to resell it through second hand physical store	4%
Keep wearing it / using it	3%
Give it to a company that recycles fashion	2%
Throw it in a regular waste container	1%
I don't know / I'm not sure	7%

38%
of respondents prolonged product lifetime by passing them on to family, friends and/or charity

<1%
of respondents reported that they would rather throw away their clothing products

[77] It is possible that this number is underestimated due respondents over-reporting good behaviour (the "social desirability bias").

[78] Studies show that large amounts of textile waste end up in regular waste in Europe (Kohler et al., 2021), where they are less likely to be reused or recycled.

Comparing these values to the literature suggests that Vinted users are more conscious of sustainability than the average consumer. The percentage of textiles placed on the market that is later separately collected for reuse and recycling (collection rate) is commonly studied to understand this behaviour. According to a survey conducted in the Netherlands in 2018[79], the collection rate of textiles ranges from 4.5% in Latvia to 45% in the Netherlands. This means that a large proportion of textiles are not separately collected. In that same study, 58% of the textiles that ended up in regular household waste were reusable (28%) or recyclable (30%). Our survey suggests a collection rate of over 90% for Vinted users.

Affordability

A high share of buyers (47%) indicated they were using Vinted for its affordability, with a majority of buyers (53%) specifying that they were likely or very likely to buy clothes that are new, depending on the price. However, it's worth noting that at the same time, 1/5 of buyers on Vinted would still purchase second-hand regardless of the cost of new alternatives. This provided a clear indication of other important purchase motivators (e.g. the environmental concern outlined previously) and the desire to find unique products, and highlights the crucial role of resale platforms in driving circular fashion attitudes.

1 in 5

(20%) of buyers on Vinted would still purchase second-hand regardless of the price of new alternatives

Imagine that you could buy this item brand new, for almost the same price as second-hand, what would you do?

I would prefer to buy it brand new	37%
I am likely to buy it brand new	32%
Maybe, I'm still not sure	12%
I'm likely to still buy it second hand	14%
I still prefer to buy it second hand	6%
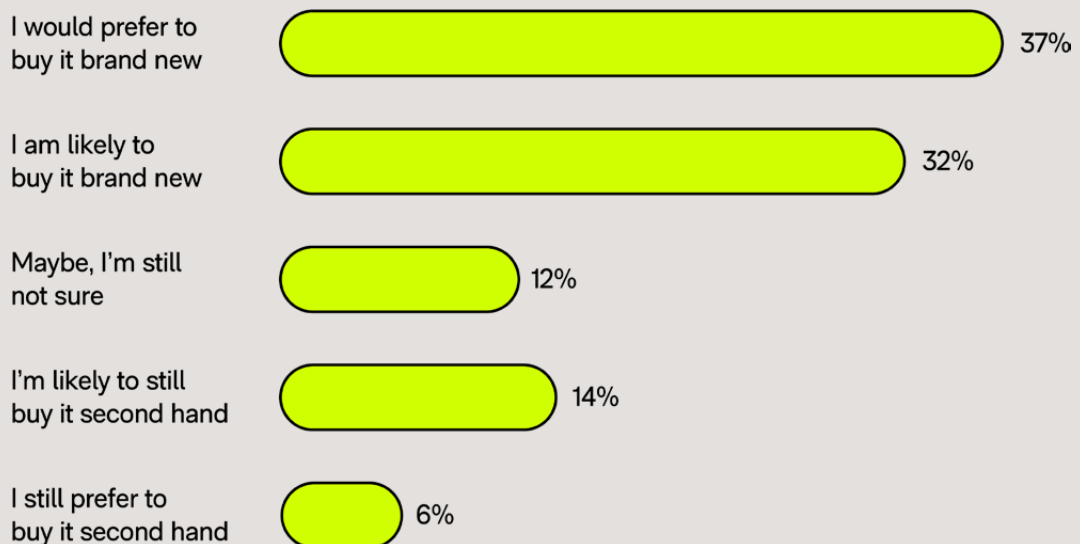
[79] Kohler et al., 2021. Circular EconomyPerspectives in the EU Textile sector.

9%
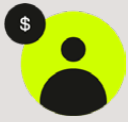
of sellers used their income from Vinted to directly fund new clothing purchases

Only 9% of sellers used their sales to directly fund the purchase of new clothing.

With the economic gains obtained through the Vinted marketplace, 9% of users seemed likely to buy new clothes, 5% new non-clothing products and close to 40% were likely to reinvest in a second-hand purchase, either on Vinted (30%) or elsewhere (8%). This can be seen in the below figure.

Shop more on Vinted	29.99%
I have not yet decided	27.03%
Save the money	20.69%
Buy another second-hand item, not similar to this	5.90%
Buy another new item, not similar to this	5.35%
Buy other non-clothing items (i.e. food, toys,..)	5.15%
Buy a similar new item	3.31%
Buy a similar second-hand item	2.57%
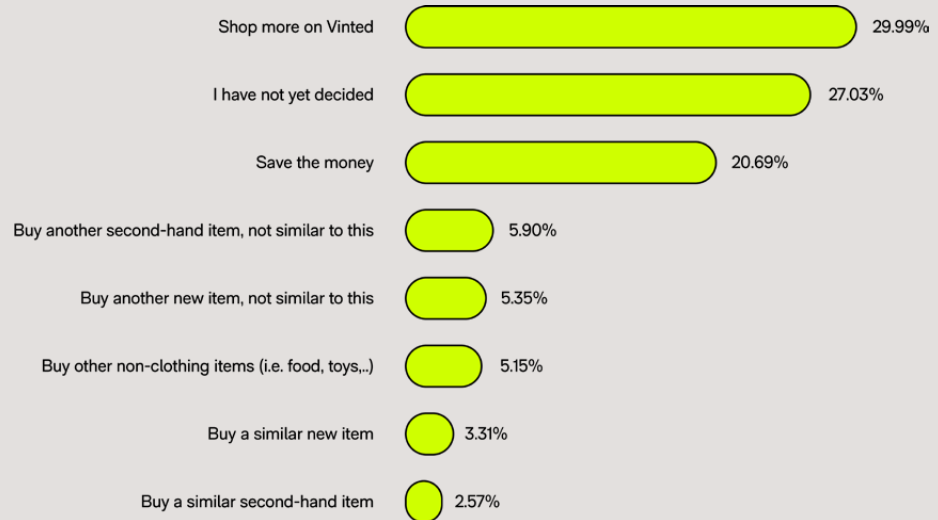
These users could also influence the Replacement Rate, especially if the clothing purchases were additional. Interestingly, the overall average Replacement Rate is not too far off, reaching approximately 39%.

In order to gain a deeper understanding of users' preferences and motivations to take part in Vinted's ecosystem, sellers were asked about their chosen alternatives to selling on the marketplace. The responses show that over 65% of sellers wouldn't have resold their products without Vinted. It can also be seen that about 20% of Vinted sellers would potentially dispose of the product or leave it unworn. This supports the role the Vinted marketplace plays in keeping clothes in circulation.

>65%

of sellers wouldn't have resold their products without Vinted

Try to resell it through another second-hand platform	24%
Give it to family/friends	19%
Give it to a charity shop	19%
Keep it in my wardrobe, unused	13%
Throw it in a clothing bin	8%
I don't know/ I'm not sure	7%
Try to resell it through a second-hand	4%
Keep wearing/using it	3%
Give it to a company that recycles fashion	2%
Throw it in the regular waste container	1%

5.4 Packaging Results

Introduction

This section summarises the total carbon emissions of the packaging used by sellers on the Vinted marketplace that was calculated using Vaayu's packaging estimation model. On average, packaging (including the primary packaging material and tape) made up a very small share of the overall carbon impact (3.12%) per transaction.

Vinted sellers were asked about their use of packaging in the first survey done in May 2022. Responses revealed that sellers heavily reused packaging that was intended for single use. Approximately 62% of the users responded that they had reused packaging for the delivery of their product. Single-use packaging that was reused multiple times had a positive climate impact (and reduced waste). Consequently, this type of packaging had no associated emissions since it was allocated to the first use. This was an unexpected and positive outcome of the analysis, emphasising Vinted users' influence on packaging emissions.

The above scenario should not be confused with the use of reusable packaging. Reusable packaging specifically refers to packaging types that are designed for reuse.

3.12%

of the carbon impact of each transaction comes from its packaging

>17.15 kt CO$_2$e

was prevented by Vinted sellers reusing packaging; the equivalent of driving 140 million kilometres[80]

140 million km

Using reused packaging instead of new lowered emissions by **70%▾**
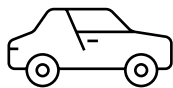
Primary Packaging Material

The average footprint of primary packaging material per package is illustrated below. This was based on estimated proportions using data from a logistics service provider and responses from the Sale Survey. The materials and packaging types were weighted according to user responses from the Sale Survey. The average carbon emissions of packaging per product came to 30.86 g CO$_2$e, which is considered to be very low, mainly due to the high packaging reuse rate of 62%.

By reusing packaging, Vinted users prevented more than 17.15 kt CO$_2$e. This equated to 70% lower emissions than would have been generated by using new packaging.

[80] European Environmental Agency (EEA), 2022., CO$_2$ performance of new passenger cars in Europe.

Average climate change impact per Vinted package (without tape)

Average Impact g CO_2e

Total Reused (68.38%)

Reused corrugated cardboard box	Reused padded kraft paper mailer	Reused kraft paper mailer	Reused unpadded LDPE mailer	Corrugated cardboard box	Padded kraft paper mailer	Kraft paper mailer	Unpadded LDPE mailer
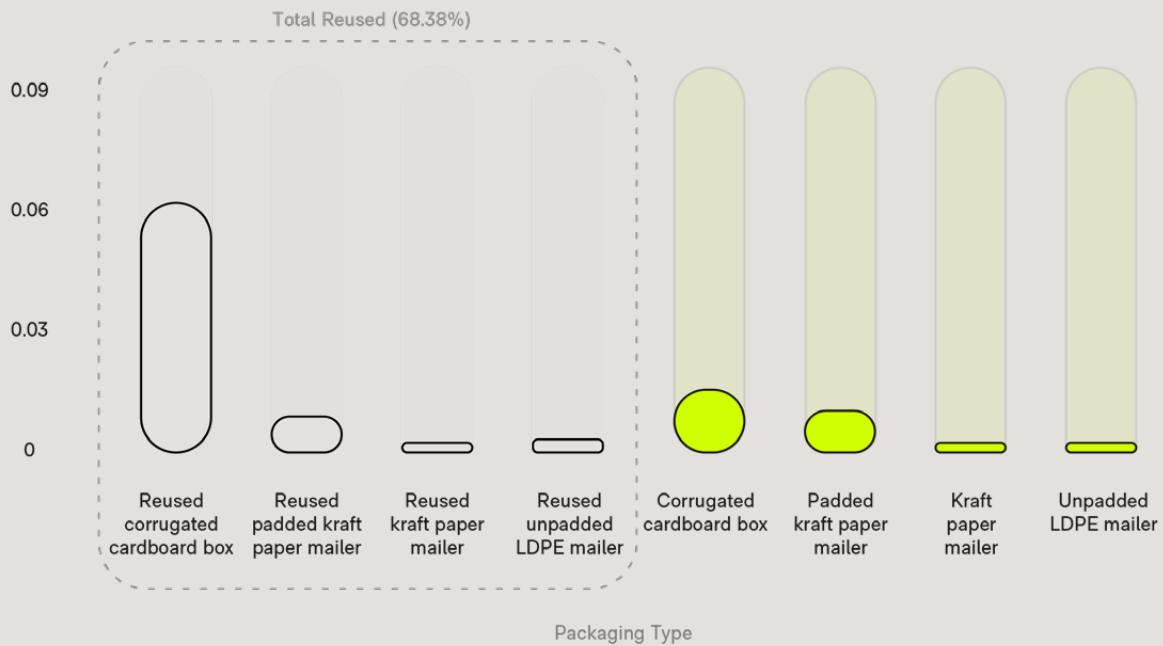
Packaging Type

Cardboard boxes were generally the most commonly used packaging type used by sellers. See below for the full list of packaging types analysed across transactions, as well as the percentage used by sellers.

Estimated proportions of packaging type and materials for medium and large shipments (8000-16000 cm³) and small shipments (3000-5000 cm³)

Share

Package Sizes

The footprint of the main material for different package sizes is outlined in the following two tables. Of the various individual packaging options, cardboard had the highest emissions. This is due to the high amount of material used to make a cardboard box. In contrast, mailing envelopes had a higher volumetric efficiency and contained less air, meaning less space was 'wasted' per package.

Emissions of medium and large shipments (without tape)

| Condition | Type | kg CO_2eq per package volume (cm³) and material | | | Material[1] |
		8000 cm³	10000 cm³	16000 cm³	
New	Cardboard	0.182 kg	0.192 kg	0.219 kg	Corrugated cardboard
Reused	Cardboard	0 kg	0 kg	0 kg	

[1] Source: European database for corrugated board

Regarding mailers, unpadded kraft paper mailers had lower emissions than unpadded Low-Density Polyethylene (LDPE) mailers. However, a paper mailer with LDPE padding had higher emissions than both kraft paper mailers and unpadded LDPE mailers due to the bubble wrap of the padding.

Emissions of small shipments

| Condition | Type | kg CO_2eq per package volume (cm³) and material | | Material[1] |
		3000 cm³	5000 cm³	
New	Paper and plastic	0.064 kg	0.095 kg	Unbleached kraft paper mailer padded with LDPE bubble wrap
Reused	Paper and plastic	0 kg	0 kg	
New	Paper bag/ envelope	0.016 kg	0.025 kg	Unbleached kraft paper mailer
Reused	Paper bag/ envelope	0 kg	0 kg	
New	Plastic bag	0.022 kg	0.032 kg	LDPE mailer
Reused	Plastic bag	0 kg	0 kg	

[1] Source: Plastics Europe, Pilfold 2013, Storaenso.

Secondary Packaging Material

Usually, packaging tape is a negligible part of the overall packaging footprint. However, Vinted marketplace users indicated in the Sale Survey that large amounts of packaging were reused. While the reuse of the primary package material resulted in lower emissions than would have been generated by new packaging, it is assumed that sellers used more packaging tape to get the packages ready to send (for a second or third time, for example).

While the overall packaging footprint was lower than expected, the tape was responsible for a higher proportion of the packaging emissions than usual. There was, however, a large degree of uncertainty due to the need for more evidence on the amount of tape being used per package.

The average footprint of tape used per shipment type for the two scenarios is illustrated in the figure below. The emissions of the packaging tape used with boxes was slightly higher than with mailers, primarily due to the larger package volume. The range between the conservative and expected quantity of tape used for mailers was significant due to the large potential for overusing tape.

Carbon footprint of packaging tape used per shipment type

Emissions g CO_2e

Scenario[1]

○ Conservative

● Expected

[1]Because the calculation estimated the probability distribution of data, two scenarios intended to show a range have been included. The most likely scenario is the "best guess", while the conservative scenario estimates a lower packaging footprint.
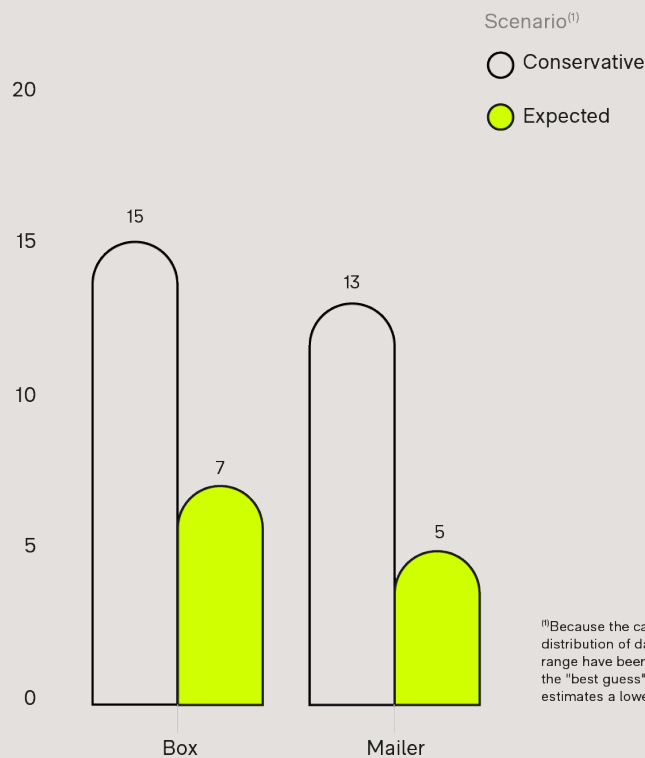
Estimated tape used per shipment type

(eg. For boxes and mailers of all sizes, this is the climate change impact of the packaging tape used)

The emissions of packaging tape per shipment was 8.2 g CO_2e (which corresponds to 2.5 g of tape used). This was 20% of the total packaging footprint for an average shipment. Due to the uncertainty in the calculation, the emissions could be as high as 19 g CO_2e (for 5.71g of tape used), which would consist of the majority of an average shipment's packaging footprint, at 58%.

The expected packaging footprint per shipment (with multiple products) was 40.90 g CO_2e. This is illustrated in the below figure.

Carbon footprint per average package for main and accessory packaging materials

Emissions CO_2-eq in grams
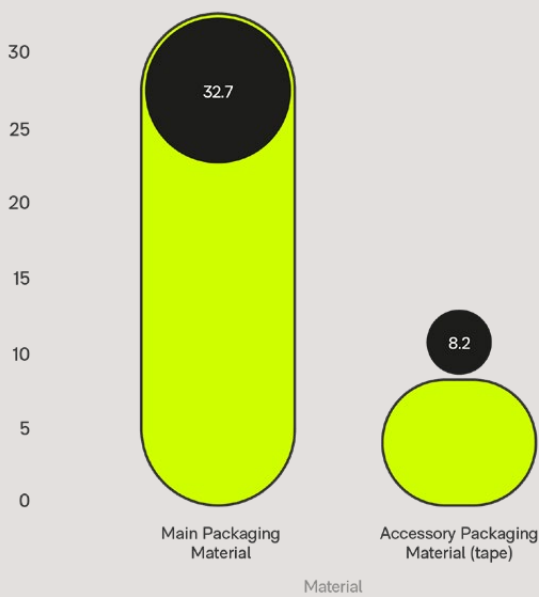
Conclusion

Looking at the bigger picture, packaging generally had a rather small carbon footprint. However, due to the size of Vinted's operations, it was estimated that the total emissions from packaging (including the package types and tape) was 9.01 kt CO_2e. Packaging tape contributed 1.81 kt CO_2e to the total packaging footprint.

The contribution of the primary materials was 80%, while tape made up the rest. Within the primary packaging materials, the highest emissions came from new cardboard packaging (estimated at 0.2 kg CO_2e on average). Within single-use packaging, the use of mailers, especially kraft paper mailers, had lower emissions when compared to cardboard boxes. New kraft paper mailers were estimated at around 0.02 kg CO_2e on average, which is approximately 10% of a new cardboard box.

It was also estimated that utilisation of reused packaging by Vinted users prevented 17.15 kt CO_2e.

The relative impact of secondary packaging materials was higher compared to regular e-commerce transactions due to the high rates of packaging reused by Vinted users. This increases the proportional footprint of secondary packaging materials, where no reuse was assumed.

5.5 Deliveries Results

Introduction

This section summarises the emissions generated by deliveries from the Vinted marketplace. Using Vaayu's API, more than half a billion Vinted transactions were computed for 2021 and 2022. For 2021 data, historical shipment information was used, while for 2022, live tracking links were analysed.

As expected based on Vinted's business model, deliveries are the single largest hotspot, contributing to 96% of the company's Operational Footprint.

The emissions of the different stages of deliveries were examined separately, allowing for a comparison.

96%

Deliveries
are the single largest hotspot, contributing to 96% of Vinted's Operational Footprint

First and Last Legs

The First and Last Legs of deliveries are either Transportation Legs to and from Pick-Up and Drop-Off (PUDO) or home deliveries. These two legs make up for a large share of the impact (43%).

PUDO

Vinted's buyers and sellers use a network of PUDOs to deliver packages. PUDOs are most effective in urban environments. On average, the carbon footprint of a Vinted delivery to PUDO was 1.1 kg CO_2e.

In certain countries such as Spain, Italy and Poland, usage was highly concentrated in a few areas with high population densities. In Spain, the top 100 areas with the largest number of Vinted sales made up 41% of all transactions made in the country. In Poland, the concentration was twice as high when compared with Spain, with the top 50 areas contributing up to 41% of the transactions).

The high geographical concentration of Vinted users greatly reduced the PUDO impact since these users live in urban areas where the distance to a PUDO is shorter. For example, in Italy, Spain and Poland, the estimated median distance to a PUDO was less than 250 meters.

France had the highest estimated distance to a PUDO when compared with all other analysed countries, with 2.3 km being the average distance travelled. This was calculated based on the average population density of Vinted users' homes, which is relatively low since Vinted has a high penetration in both rural and urban areas. This directly translates to a fairly large estimated impact from PUDO journeys in France.

The average emissions for the First Leg, which involves sellers travelling to PUDO to deliver their packages, was calculated at 182.84 g CO_2e.

The average emissions for the Last Leg, where buyers travelled to a PUDO to pick up their packages, was estimated to be 182.92 g CO_2e. The average distance from a user's home to the PUDO was 2.3 km.

On the Last Mile, deliveries through PUDOs generated only 21% of the emissions of comparable home delivery.

Home Deliveries

On average, the carbon footprint of a Vinted delivery to home was 1.77 kg CO_2e.

Deliveries to Vinted users' homes had significantly higher emissions than deliveries to PUDO. The Last Leg of home deliveries had almost five times the impact as an average PUDO delivery at 875.53 g, which was estimated to have a footprint of 182.92 g CO_2e and included both the transport from the consolidation centre and collection from PUDO.

The high emissions associated with home deliveries are due to carrier consolidation centres being located much farther from homes than PUDOs are. The delivery trucks have to travel much larger distances to each house, whereas the packages are transported in bulk to PUDOs. In addition, within the PUDO model, only a part of the journey was attributed to package collection as it was indicated in the survey that Vinted users couple their PUDO journey with other errands (see 4.4 Delivery Methodology, First and End Leg Transport).

Mid Legs

The average emissions of the Mid Leg of deliveries was estimated to be 730 g CO_2e, which is lower than other legs of the journey. The main reason for this was the much higher efficiency with which carriers could structure the Mid Leg transport. The factors considered[81] during the modelling of the Mid Leg journey included but were not limited to:

Distance	Mode of transport	Average load factor
The fuel type used	The fuel efficiency of vehicles	Emission Intensity of the fuel combustion

An additional leg from the consolidation centre to the PUDO was taken into account in the Mid Leg calculations. This leg of the journey had a very small footprint, estimated to be 5.61 g CO_2e.

[81] Reference taken from DEFRA UK.

Package Volume Results

A significant share of Vinted packages were relatively small. This had a positive impact on Mid Leg deliveries. However, it also meant that the number of products in packages was low.

13% of the shipments facilitated by Vinted for 2021 contained more than one product. The impact allocated to individual fashion products is significantly lower for these shipments.

Delivery Routes

1.28 kg CO$_2$e

were the carbon emissions for an average Vinted delivery

On average, an individual Vinted delivery had a climate change impact of 1.28 kg CO$_2$e. However, this varied depending on the distance and mode of transport, and deliveries across longer distances generally had a much larger carbon footprint.

Results were grouped by origin and destination country, and the average delivery emissions were calculated. Differences in emissions between carriers in this model were largely due to externalities such as PUDO prevalence and the average distance between origin and destination.

International shipments were the most carbon-intensive, as seen below.

Route	Avg. CO$_2$e (kg)
International	1.63 kg
Domestic	1.20 kg

Domestic deliveries within the same country were the most common delivery type. Buyers primarily purchased products from domestic sellers rather than purchasing from international sellers. The most popular routes and their emissions are shared below.

Most Popular Routes

The routes used most frequently by Vinted users.

2.23 kg CO$_2$e
UK → UK

2.05 kg CO$_2$e
FRA → FRA

2.61 kg CO$_2$e
DE → DE

1.94 kg CO$_2$e
NL → NL

1.92 kg CO$_2$e
POL → POL
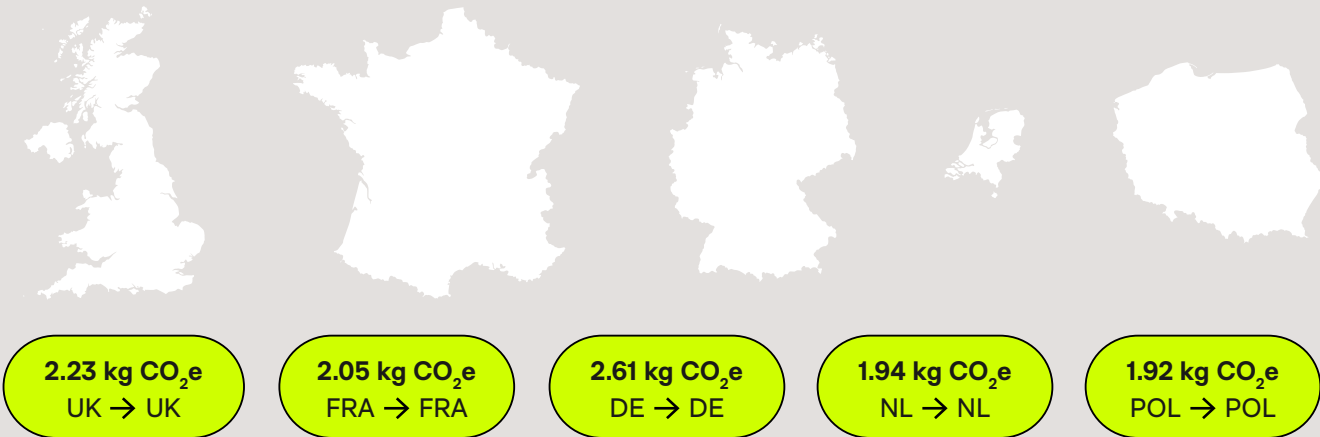
(kg CO$_2$e per package)

On average, the carbon footprint of an individual Vinted delivery was 1.28 kg CO_2e. Compared to other parts of Vinted's operations, deliveries had the largest impact, contributing to 96% of Vinted's total Operational Footprint. In 2021, the total emissions generated by Vinted shipments was 282 kt CO_2e.
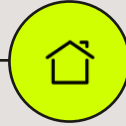
$\times$ **1.6**

Deliveries directly to home emitted 1.6 times more than PUDO deliveries.

For the Vinted marketplace, the total emissions generated by a shipment to PUDO were significantly lower than those to home. Deliveries directly to home emit 1.6 times more than PUDO deliveries, with PUDO deliveries saving 62% (1.77 kg CO_2e vs 1.1 kg CO_2e).

Emissions in CO_2e g

| 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

● Average First Leg Impact   ◉ Average Mid-Leg Impact   ○ Average End Leg Impact
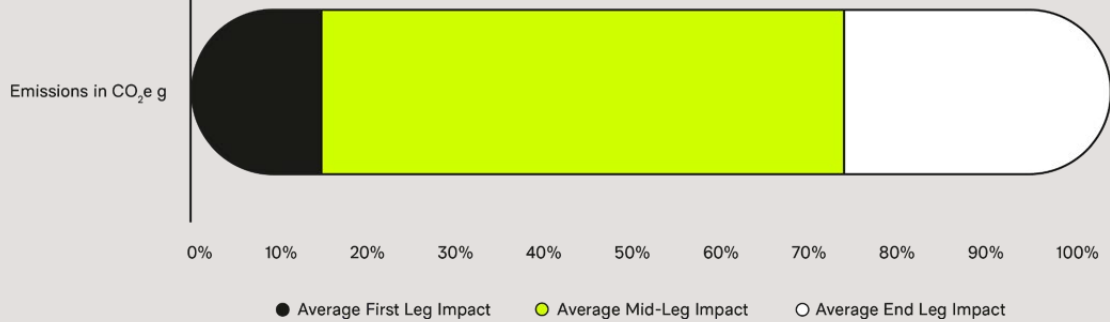
The following table shows the carbon emissions for each part of the journey of an average delivery to both PUDO and to home.

Climate Change Impact (g CO_2e)

	PUDO Drop off	PUDO to Consolidation Center	Mid-Leg	Consolidation Center to PUDO (only for PUDO deliveries)	PUDO Pickup or Consolidation Center to Home	Bounce leg	Total
	170.24	9.49	718.79	9.76	356.49	5.84	1270.60

Portion of Journey
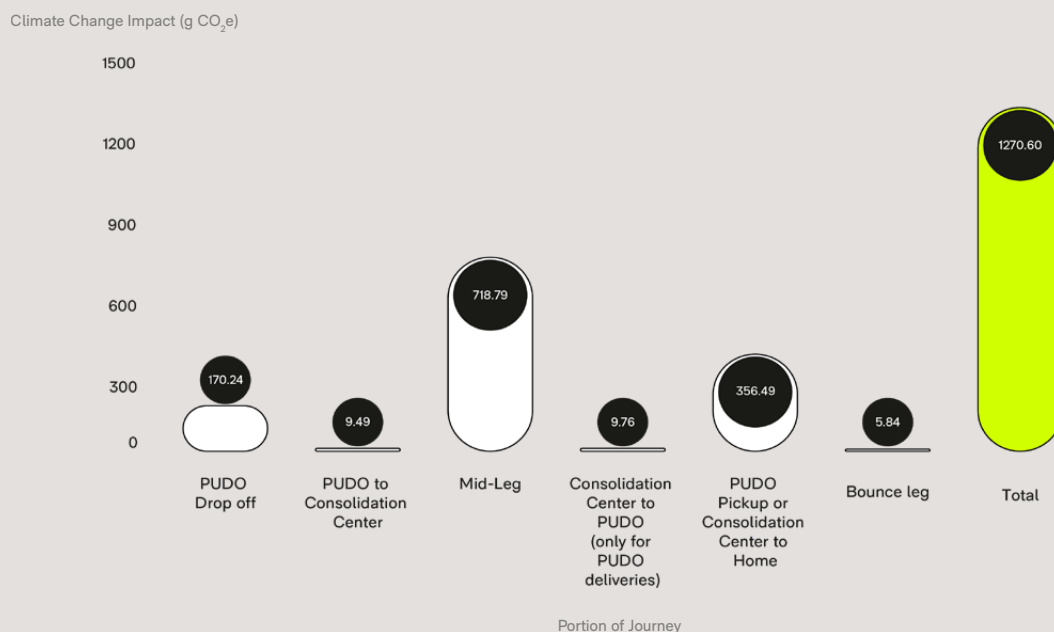
5.6 Operational Footprint Results

99%
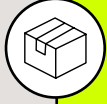
of Vinted's emissions come from indirect emissions along the value chain (Scope 3)

Introduction

This section summarises the results of Vinted's Operational Footprint for 2021. The majority (99%) of Vinted's emissions come from indirect emissions along the value chain (Scope 3), including delivery, packaging and employee travel. Overall, deliveries make up 96% of Vinted's Operational Footprint.

About the Results

Vinted's Scope 1 emissions come from company-purchased petrol and diesel. In contrast, Scope 2 emissions refer to the emissions attributed to office heating and the electricity used for both offices and data centres.

The activities that contribute to Vinted's Scope 3 emissions are:

○ Purchased goods and services

○ Capital goods

○ Energy-related activities not included in Scope 1 or Scope 2

○ Waste generated in operations

○ Business travel

○ Employee commuting

○ Packaging*

○ Deliveries*

*Related to purchases on Vinted and described in 3.3 Packaging Scope and 3.4 Deliveries Scope above.

Below is a summary of Vinted's GHG emissions within Scopes 1, 2 and 3.

Summary of GHG emissions of Scopes 1, 2 and 3

Scopes	2021 (in tonnes CO_2e)	2020 (in tonnes CO_2e)
Scope 1	0.322	0.47
Scope 2 (location based)	597.63	460.00
Scope 2 (market based)	340.93	298.96
Scope 3 (including packaging and deliveries)	294,618.37	-
Total (location based)	295,216.33	-
Total (market based)	294,959.63	

Below is a breakdown of Vinted's GHG emissions by activity per Scope, including fuel (Scope 1), operational waste (Scope 3) and office heating (Scope 2).

Breakdown of GHG emissions by activity

Scopes	Activity	2021 (in tonnes CO₂e)	Share of operational footprint per activity (2021, in %)	2020 (in tonnes CO₂e)
Scope 1	Company funded petrol	0.24	0.00%	0.30
	Company funded diesel	0.07	0.00%	0.15
Scope 2	Heating in offices	329.81	0.11%	279.90
	Electricity use in offices and data centers (market-based)	11.11	0.00%	19.04
Scope 3	Purchased goods and services, including capital goods	2,145.52	0.73%	-
	Energy related activity	576.67	0.20%	-
	Waste from operations	0.07	0.00%	-
	Business travel and employee commuting	414.3	0.14%	-
	Packaging	9,010.68	3.05%	-
	Deliveries	282,471.14	95.77%	-
Total (market-based):		294,959.63		

*Impact of 2020 Scope 3 is unavailable.

**The shares of the operation footprint per activity from 2020 were not calculated due to unavailability of Scope 3 impacts.

Conclusion

Overall, nearly 99% of Vinted's total organisational greenhouse gas emissions for 2021 fell under Scope 3 activities. 96% of Vinted's GHG emissions were attributed to deliveries from transactions on Vinted's marketplace, followed by packaging and then purchased goods and services, including capital goods.

Section 6.
Appendices

Glossary

The following terms are used throughout the report and are explained in more detail below.

- **Application programming interface (API):** A way for two or more computer programs to communicate with each other.

- **Average:** The arithmetic mean in this analysis is referred to as "average", as is common practice. The mean is the sum of all values divided by the number of values.

- **Avoided emissions:** Avoided emissions are emission reductions that occur outside of a product's life cycle or value chain, but as a result of the use of that product .

- **Avoided Purchase Rate:** A Replacement Rate calculation approach based on the whether or not the user would have instead purchased a new fashion product in place of the pre-owned product.

- **Bounce Rate:** Bounce Rate or failed delivery attempt is when a delivery to the recipient was unsuccessful during the first delivery attempt.

- **Characterisation:** A step of impact assessment where environmental exchanges are quantified in terms of a common unit for a particular impact category, allowing aggregation into an indicator. E.g. Methane emissions are quantified in terms of carbon dioxide equivalents, which is a unit for the impact category, climate change.

- **Characterisation factors:** A factor derived from the characterisation model that allows translation of environmental exchanges into a common unit of the category indicator. For instance, non-fossil methane has a characterisation factor of 28 for climate change, which allows its conversion to carbon dioxide equivalents.

- **Chi-square:** The Chi-square test is used to find if there is any correlation among nonnumeric variables that are frequently used in statistical studies.

- **Climate change impact:** Also known as global warming potential or carbon footprint. One of the impact categories covered in life cycle assessment.

- **Consequential life cycle assessment (LCA):** Life cycle assessment (LCA) is a methodology commonly used by sustainability professionals to calculate the overall environmental performance of a product or a service along every stage of its life. Traditional (attributional) LCA methods track the performance of a single product (e.g. a T-shirt) over time based on past data, whereas consequential LCA is better for estimating the impacts of decisions within a system, like buying second-hand instead of new. This is because it includes external market effects that can significantly influence the result, like changing customer behaviour or average use.

Cradle-to-Consumer: Cradle-to-Consumer refers to the carbon impact of a product from the moment it's produced to the moment it is delivered to the customer.

Customer Relationship Management (CRM) software: Customer Relationship Management (CRM) software is technology that supports a business with its customer administration and interaction. CRMs help automate business and sales processes, and improve customer experience and communication.

Efficiency factor: A ratio of some measure of performance to an expected value.

End-of-life: The life cycle stage of the product when it has completed its useful life.

Geodesic distance: Geodesic distance is a simple measure of distance with the shortest path between two points, "as the crow flies".

Greenhouse gas (GHG): Greenhouse gases (GHGs) are gases in the atmosphere that trap heat, contributing to global warming and climate change.

Greenhouse Gas Protocol (GHG Protocol): The Greenhouse Gas Protocol (GHG Protocol) establishes global standardised frameworks to measure and manage GHG emissions from private and public sector operations, value chains and mitigation actions.

Greenhouse Gas (GHG) Protocol Corporate Standard: The GHG Protocol Corporate Standard (Corporate Accounting and Reporting Standard) offers best-practice guidance on the calculation of emissions from an organisation (referred to as the 'reporting company'), based on the reporting company's supply chain activities. These emissions are typically divided into Scope 1, 2 and 3.

Hashed user identifier (UID): A unique anonymous code that identifies an user.

Inter-hub transport: Inter-hub transport is the transport between waypoints in the Mid Leg. Waypoints are geographical points that a shipment went through during the delivery — often a distribution centre or a package handling facility, etc.

Life cycle assessment (LCA): Compilation and evaluation of inputs, outputs and potential environmental impacts of a product system throughout its life cycle.

Operational control: As per the GHG Protocol, operational control is defined as the scenario where a business or one of its subsidiaries has the full authority to introduce and implement its own operating policies.

Operational footprint: CCF refers to the organisational greenhouse gas (GHG) emissions inventory of a business, encompassing the climate change impact of an organisation's activities decisions including all indirect emissions as well as the more obvious direct emissions.

Overuse factor: Refers to the usage of more packaging than is theoretically required.

Ownership Period (Ratio): A Replacement Rate calculation approach based on the ratio of the time buyers are using the fashion product in question as compared to the time buyers generally use the product.

Pick-Up and Drop-Off (PUDO): A location, often a local shop or retail outlet, that offers a parcel Pick-Up and Drop-Off service as part of a wider network of these locations.

Primary dataset: The resultant data that is collected from a sample of respondents that took a survey.

Replacement Rate: A ratio determining the substitutability of pre-owned products with new ones, in order to calculate the benefits of reuse.

Scope 1 emissions: Forming part of the Greenhouse Gas (GHG) Protocol Corporate Standard, Scope 1 emissions are those emissions that are owned or controlled by a company.

Scope 2 emissions: Forming part of the Greenhouse Gas (GHG) Protocol Corporate Standard, Scope 2 emissions are those emissions that are caused indirectly by a company through the purchase and use of energy.

Scope 3 emissions: Forming part of the Greenhouse Gas (GHG) Protocol Corporate Standard, Scope 3 emissions are emissions that are a consequence of the activities of a company but occur from sources not owned or controlled by it.

System boundaries: The interface between a product system and the environment system or other product systems.

Trip Chaining factor: Trip Chaining is a travel pattern that combines a commuter's daily commitments (non-work-related stops) into one simple trip (home to work or work to home). Trip Chaining is used to calculate the proportion of emissions that need to be allocated based on the proportion of a journey dedicated to a PUDO trip.

Vaayu's LCA Modelling Engine: Vaayu's proprietary automated modelling system, modified specifically for Vinted's use case to compute complicated life cycle impact assessments. The LCA Modelling Engine uses a quantification of Replacement Rates to determine the calculation of the Avoided Purchase Rate.

Vaayu's Product Life Cycle Assessment (LCA) Database: Vaayu's Product Life Cycle LCA Database consists of over 600,000 datapoints and is the largest dedicated garment LCA database to date.

Glossary for Deliveries Model

1. Carrier Inefficiency: Ratio between the origin to destination geodesic distance and the legs distance for a given carrier

$$CI = LD \, / \, GD$$

Where:

- ○ CI: Carrier inefficiency
- ○ GD: Geographic distance
- ○ LD: Legs distance

A perfect delivery would have a Carrier Inefficiency of **1**, for other deliveries it can climb up to more than **100**. The Carrier Inefficiency is not linear, it depends on the carrier and is correlated with the geodesic distance.

2. PUDO: Also called **Pick-Up or Drop-Off** point and **CDP** or **Collection or Drop-Off point**. It's a shop/store/boutique/supermarket where users can drop off and/or pick up shipments.

3. Circuity: Also called **driving distance**. It's the ratio between the **geodesic distance** and the actual distance travelled taking the terrain into account.

4. Crawler: A piece of code that tracks a shipment from one or multiple carriers' tracking pages.

5. Geodesic Distance: Also called Euclidean distance, as the crow flies or beeline. It is the shortest straight line distance between 2 points on a map.

6. Leg: A group of 2 waypoints. A shipment going from A to C through B will have the following 2 legs:

- A $\longrightarrow$ B
- B $\longrightarrow$ C

7. Waypoint: Geographical point where a shipment went through during the delivery. Often a distribution centre, a package handling facility, etc.

8. Limiting Factor: Determines whether the emissions will be allocated based on weight or volume as limited by the maximum constraints of the delivery vehicle.

9. Carrier: A customer logistics provider.

10. Last Mile: The very End Leg of a journey from the last consolidation centre of a carrier to the destination.

11. Home: The origin or destination of a transaction. Usually the Vinted user's place of residence.

12. Postal code: The area to which a postal code refers to.

Appendix A: Mapping Vinted Product Categories

This section details the complete mapping of Vinted product categories against Vaayu's product taxonomy. For 85% of fashion products, and 66% of all categories resold through Vinted, an exact equivalent Cradle-to-Consumer impact was calculated. This was used in the calculation of the Replacement Rate and the quantification of the avoided emissions from first-hand product manufacturing.

Vinted Product Category	Product
Blazers	Blazer/ Suit Jacket
Suits Blazers	
Boys Pants	Bottoms
Girls Pants	
Boys Coats	Coat/Jacket
Girls Coats	
Men Outerwear New	
Dresses	Dress
Girls Dresses	
Jeans	Jeans
Men Trousers/Jeans	
Jumpsuits UK	Jumpsuit
Boys Sweaters	Knitted Jumper
Girls Sweaters	
Men Pullover Sweaters	
Pullovers Sweaters	
Boys Themed Costumes	Sets/Suits
Costumes Girls New	
Special Outfits Costumes	
Specialised Clothing Costumes	
Themes Costumes New	
Twins Boys New	
Twins Girls New	

Vinted Item Category	Product
Shorts Capri Pants	Shorts
Shorts Capris	
Girls Skirts	Skirt
Skirts	
Boys Swim	Swimwear
Boys Swimwear	
Girls Swim	
Men Swimwear	
Swimwear	
Men Tops T-Shirts	T-Shirt
Tops T-Shirts	
Boys Shirts	Top
Girls Shirts	
Men Trousers	Trousers
Trousers	
Girls Underwear	
Lingerie	Underwear
Underwear	

Appendix B: Overview of Clothing Categories

Categories Included

Bikini Set	Polo Shirt
Blazer/Suit Jacket	Rain Coat
Blouse	Robe/Kimono
Bodysuit	Sets/Suits
Bomber/Varsity Jacket	Shirt
Bottoms	Shorts
Bra	Skirt
Briefs	Sleepsuit
Camisole/Tank	Socks
Cape/Poncho	Sports Bra
Cardigan	Sports/Technical/Outdoor Jacket
Coat	Sports/Technical Shorts
Coat/Jacket	Sports/Technical Skirt
Denim Jacket	Sports/Technical Trousers
Denim Shorts	Suit Jacket & Suit Trousers
Dress	Sweater vest
Full Body Underwear	Swimwear
Garment	Swimwear Bottoms
Harem Trousers	Swimwear Set
Hooded Sweatshirt	Thong
Jacket	Tights
Jeans	Top
Jumpsuit	Tracksuit
Jumpsuit/Overalls	Trousers
Knitted Jumper	T-Shirt
Leggings	Underwear
Night Dress	Underwear Set
Overalls	Waistcoat/Gilet
Parka	

Appendix C: Use Survey

Section 1: General product

1. **Who did you purchase this product for?**

- a. Myself
- b. Spouse/partner
- c. My child
- d. Relative
- e. Friend
- f. None of the above / other
- g. I don't remember this product

→ If purchased for someone other than themselves or their own child (b, d,e, f) or doesn't remember the product (j) → Cancel survey: **Thank you for your answers! You cannot continue this survey because we are interested in your experience with this product.**

2.

Do you still own this product?

- a. Yes
- b. No → Skip *Section 2: Wears*, jump to *Section 3: Discard product*

Section 2: Wears

Instruction:

Now, please think about the time you normally wear this product.

3. **Which of the following times of the year do you wear this product? Please select all that apply**

- a. I wear this during summer
- b. I wear this during winter
- c. I wear this during spring/autumn (similar weather conditions)
- d. I wear it all year round
- e. I wear it only on a special occasion
- f. I haven't worn this product

4. Think of the period during which you wore the product. On average, how often did you wear this product?

a. [..] times a week [Select the number]

b. Less often than once a week, namely [..] times a month [Select the number]

c. Less often than once a month, namely [..] times a year [Select the number]

d. I wore it once

e. I haven't worn this product

f. Don't know

5. Think of a similar type of product that you bought new first-hand (i.e. without a previous owner), how often did you wear that product?

a. [..] times a week [Select the number]

b. Less often than once a week, namely [..] times a month [Select the number]

c. Less often than once a month, namely [..] times a year [Select the number]

d. I haven't worn this product

e. I wore it once

f. I don't own a similar first-hand product

g. Don't know

Now please think about what you will do with the product you bought on Vinted in the future.

6. For how much longer do you plan to wear this product?

Please select the corresponding number, 0 meaning you are not planning to wear it at all.

a. I am planning on wearing this product for another [...] years and [...] months.

b. Don't know

7. **How often do you expect to wear this product in the future, on average?**

a. [..] times a week [Select the number]

b. Less often than once a week, namely [..] times a month [Select the number]

c. Less often than once a month, namely [..] times a year [Select the number]

d. I won't wear this product anymore

e. Don't know

8. **How much longer do you think this product can still be used for until it'll get worn out?**

Please select the corresponding number, 0 meaning you think it's already worn out.

a. I think this product can be used for another [...] years and [...] months until it'll get worn out.

b. Don't know

Section 3: Discard Product

9. **What was, or would likely be, the main reason for you to get rid of this product? Please select all that apply**

a. It's worn out

b. It doesn't fit properly anymore

c. It's out of fashion

d. I don't like it anymore

e. I don't need it anymore

f. I'm not wearing it

g. Not enough space in my wardrobe

h. I like to update my clothes regularly

i. Other

j. Don't know

10. **What did you do, or what are you planning on doing, with this product when you want to get rid of it?**

a. Re-sell it on Vinted

b. Re-sell it through another second-hand online platform

c. Re-sell it through a second-hand physical store

d. Give it to family, friends

e. Give it to charity

f. Give it to a company that recycles fashion

g. Throw it in a clothing waste container

h. Throw it in the regular waste

i. Other

j. Don't know

Section 4: Demographics

11. **How old are you?***

a. Younger than 14 years old

b. 14-18

c. 19-24

d. 25-34

e. 35-44

f. 45-54

g. 54+

12.

Gender: how do you identify?

a. Male

b. Female

c. Non-binary

d. Prefer to self-describe:___

e. Prefer not to answer

Appendix D: Purchase Survey

Demographics

Q1. Are you:

Single answer only

Male

Female

Non-binary

Prefer to self-describe: _____

Prefer not to say

Q2. What is your age?

Single answer only

Below 18 years old *(Terminate)*

18 – 25 years old

26 – 35 years old

36 – 45 years old

46 – 55 years old

56 – 65 years old

Above 65 years old

PUDO Shipments

The next questions will be asking about your usual pick-up / drop-off point when buying products on Vinted.

Q3. Which mode of transportation do you primarily use to go to the pick-up / drop-off point?

If you use more than one mode of transportation, select the one that covers the most distance.

Single answer only

Car

Shared car / carpool

Motorcycle / scooter

Electric scooter / electric bicycle

Bus

Metro / tram / train

Bicycle

Walking

Other, please specify: _____

Now, we need you to think about **three locations.**

We will refer to them as Point A, Point B and Point C in the next questions.

Point A - The place you **usually** leave from, to go to the pick-up / drop-off point

Point B - Your **usual** pick-up / drop-off point

Point C - The place where you **usually** go to, after the pick-up / drop-off point

Q4. When you left Point A, was it only for the sole purpose of going to the pick-up / drop-off point? or was it part of a bigger trip?

Bigger Trip (e.g. "I was going to work but I stopped by the pick-up / drop-off point first")

Single answer only

The trip was for the sole purpose of going to the pick-up / drop-off point (Skip to Q7)

It was part of a bigger trip, I had other things to do alongside going to the pick-up / drop off.

Q5. By how long did going to the pick-up / drop-off point increase your transportation time from Point A to Point C?

E.g. "I usually get to work in 10 minutes, but since I had to go to the pick-up / drop-off, it added +5 minutes to my transportation time"

Single answer only

It added less than 3 minutes

Around 5 minutes

Around 7 minutes

Around 13 minutes

Around 21 minutes

It added more than 30 minutes

Other, please specify:_____

Q6. How long was your transportation time in total?

Total transportation time from when you left Point A to go to Point B then to Point C.

Single answer only

Less than 3 minutes

Around 5 minutes

Around 7 minutes

Around 13 minutes

Around 21 minutes

More than 30 minutes

Other, please specify:_____

Avoided Purchase Rate

For the next few questions, we will be asking you about [input product] that you bought on Vinted.

Single answer only

Yes, definitely *(Skip to Q12)*

Likely *(Skip to Q12)*

Maybe, I'm not sure *(Ask Q8a)*

Unlikely *(Skip to Q8b)*

No, definitely not *(Skip to Q8b)*

Q7. If you had not found this product on Vinted, would you have bought this, or a similar product, brand new?

Please select the main reason why you are not sure to buy it brand new.

Single answer only

It depends on the price *(Skip to Q10)*

It depends on the model / size *(Skip to Q11)*

I don't really need this product enough to buy it brand new *(Skip to Q12)*

I was just browsing on Vinted, I'm not sure to buy it brand new *(Skip to Q12)*

It depends on other factors, please specify: _____ *(Skip to Q12)*

Q8a. Why are you not sure?

Q8b. Why not?

Please select the main reason why you would not buy it brand new.

Single answer only

> I was just browsing on Vinted, I hadn't planned on buying this product beforehand *(Skip to Q12)*
>
> Buying it brand new would have been too expensive *(Ask Q10)*
>
> I know that this model / size is not available anymore *(Skip to Q11)*
>
> Out of principle, I try not to buy brand new clothing products anymore *(Skip to Q12)*
>
> Other reasons, please specify: _____ *(Skip to Q12)*

Q9. Imagine that you could buy this product brand new, for almost the same price as second-hand, what would you do?

Single answer only

> I would prefer to buy it brand new
>
> I am likely to buy it brand new
>
> Maybe, I'm still not sure
>
> I am likely to still buy it second-hand
>
> I still prefer to buy it second-hand

Q10. Imagine that your preferred model / size is available, would you buy it brand new?

Single answer only

> Yes, definitely
>
> Likely
>
> Maybe, I'm still not sure
>
> Unlikely
>
> No, definitely not

Q11. What is the main reason you purchased this product on Vinted instead of buying it brand new?

Single answer only

I was just browsing Vinted and I liked this product / impulse buy

I prefer buying second-hand products out of principle

I prefer buying second-hand products because it's cheaper than brand new

I prefer buying second-hand products because it's so cheap, there's no financial risk

Other reasons, please specify: _____

Q12. If Vinted or other online trading platforms did not exist, would you have gone to a physical store to buy this product (or a similar product) second-hand?

Single answer only

Yes, definitely

Likely

Maybe, I'm not sure

Unlikely

No, definitely not

Q13. If you had not found this product on Vinted, would you have bought this product (or a similar product) second-hand somewhere else?

Single answer only

Yes

No

Appendix E: Sale Survey

Demographics

Q1. Are you:

Single answer only

Male

Female

Non-binary

Prefer to self-describe: _____

Prefer not to say

Q2. What is your age?

Single answer only

Below 18 years old *(Terminate)*

18 – 25 years old

26 – 35 years old

36 – 45 years old

46 – 55 years old

56 – 65 years old

Above 65 years old

PUDO Shipments

The next questions will be asking about your usual pick-up / drop-off point when selling products on Vinted.

Q3. Which mode of transportation do you primarily use to go to the pick-up / drop-off point?

If you use more than one mode of transportation, select the one that covers the most distance.

Single answer only

Car

Shared car / carpool

Motorcycle / scooter

Electric scooter / electric bicycle

Bus

Metro / tram / train

Bicycle

Walking

Other, please specify: _____

Now, we need you to think about **three locations.**

We will refer to them as Point A, Point B and Point C in the next questions.

Point A - The place you **usually** leave from, to go to the pick-up / drop-off point

Point B - Your **usual** pick-up / drop-off point

Point C - The place where you **usually** go to, after the pick-up / drop-off point

Q4. When you left Point A, was it only for the sole purpose of going to the pick-up / drop-off point? or was it part of a bigger trip?

Bigger Trip (e.g. "I was going to work but I stopped by the pick-up / drop-off point first")

Single answer only

> The trip was for the sole purpose of going to the pick-up / drop-off point *(Skip to Q7)*

> It was part of a bigger trip, I had other things to do alongside going to the pick-up / drop off.

Q5. By how long did going to the pick-up / drop-off point increase your transportation time from Point A to Point C?

E.g. "I usually get to work in 10 minutes, but since I had to go to the pick-up / drop-off, it added +5 minutes to my transportation time"

Single answer only

> It added less than 3 minutes

> Around 5 minutes

> Around 7 minutes

> Around 13 minutes

> Around 21 minutes

> It added more than 30 minutes

> Other, please specify:_____

Q6. How long was your transportation time in total?

Total transportation time from when you left Point A to go to Point B then to Point C.

Single answer only

Less than 3 minutes

Around 5 minutes

Around 7 minutes

Around 13 minutes

Around 21 minutes

More than 30 minutes

Other, please specify:_____

Sale Price & "New With 'Tags'

For the next few questions, we will be asking you about *[input product]* that you sold on Vinted.

Q7. How did you acquire this product?

Single answer only

I bought it brand new in a physical store

I bought it brand new online

I bought it second-hand in a physical store / flea market

I bought it second-hand on Vinted

I bought it second-hand on another platform / website

I received it as a gift

I don't remember

Other, please specify: _____

Q8. At around what price did you buy this product?

Single answer only

I bought this product for __ euros

Q9. How long have you had the product before selling it?

Single answer only

Less than a month

1-3 months

4-7 months

8-11 months

1-2 years

3-5 years

More than 5 years

I don't know / I'm not sure

Q10. Approximately, how often did you wear this product before selling it?

Single answer only

I haven't worn this product

I wore it once

Daily

Several times in a week

Once a week

Several times in a month

Once a month

Several times in a year

Once a year

Less than once a year

I don't know / I'm not sure

Q11. What are you planning to do with the money you made from this sale?

Please select all that apply

Shop more on Vinted

Buy a similar new product

Buy a similar second-hand product

Buy another new product, not similar to this

Buy another second-hand product, not similar to this

Buy other non-clothing products (i.e. food, toys, etc.)

Save the money

Other, please specify: _____

I have not yet decided *(Exclusive choice)*

Q12. If you did not manage to sell this product on Vinted, what would you have done with it?

Single answer only

Try to resell it through another second-hand online platform

Try to resell it through a second-hand physical store

Give it to a charity shop

Give it to family / friends

Give it to a company that recycles fashion

Keep wearing / using it

Keep it in my wardrobe, unused

Throw it in a clothing bin

Throw it in the regular waste container

I don't know / I'm not sure

Other, please specify: _____

Appendix F: Random Survey

Demographics

Q1. Are you:

Single answer only

- Male
- Female
- Non-binary
- Prefer to self-describe: _____
- Prefer not to say

Q2. What is your age?

Single answer only

- Below 18 years old *(Terminate)*
- 18 – 25 years old
- 26 – 35 years old
- 36 – 45 years old
- 46 – 55 years old
- 56 – 65 years old
- Above 65 years old

Purchase Behaviour for New products

Q3. In the last 12 months, how often have you purchased clothes (new or pre-owned) online versus in-store?

Single answer only

- I purchase clothes exclusively online
- I purchase more often online than in-store
- I purchase equally online and in-store
- I purchase more often in-store than online
- I purchase clothes exclusively in-store (Skip to Q4)

Q3a. When purchasing brand new clothes online, which of the following delivery methods do you prefer to use?

Single answer only

- Delivery to home address
- Delivery to specified address (i.e. workplace, etc.)
- Using pick-up / drop-off points
- Others, please specify:_____

Q4. Think of the last time you bought clothes in-store, which mode of transportation did you primarily use to go there?

If you used more than one mode of transportation, select the one that covered the most distance.

Single answer only

- Car
- Shared car / carpool
- Motorcycle / scooter
- Electric scooter / electric bicycle
- Bus
- Metro / tram / train
- Bicycle
- Walking
- Other, please specify: _____

You're almost finished with the survey! Now, we need you to think about **three locations.**

We will refer to them as Point A, Point B and Point C in the next questions.

Point A - The place you **usually** leave from, to go do your clothes shopping

Point B - Your **usual** store where you do your clothes shopping

Point C - The place you **usually** go to, after you do your clothes shopping

Q5. When you left point A, was it only for the sole purpose of shopping in the store? or did this trip also serve other purposes?

Other purposes (e.g. "I went shopping for clothes in the store and also went out for dinner with friends")

Single answer only

- The trip was for the sole purpose of going to the store (Skip to End)
- It served other purposes, I had other things to do alongside shopping at the store.

Q6. By how long did going to the store increase your transportation time from Point A to Point C?

E.g. "I would have arrived at the restaurant to meet my friends for dinner within 10 minutes, but since I dropped by the store, it added +5 minutes to my transportation time"

Single answer only

It added less than 3 minutes

Around 5 minutes

Around 7 minutes

Around 13 minutes

Around 21 minutes

It added more than 30 minutes

Other, please specify:_____

Appendix G: Survey Statistics

The number of surveys sent out by survey type and the country where the user resides are counted in the tables below.

Iteration 1: May 2022

Table Definitions:

- **Use Survey < 9 months:** This represents the Purchase Surveys sent up to 9 months after the purchase of a product.

- **Use Survey > 9 months:** This represents the Purchase Surveys sent during a period of more than 9 months, and up to 18 months, after the purchase of a product.

ISO Country code	Survey Type	Count
BE	Purchase Survey	15,270
BE	Use Survey < 9 months	45,974
BE	Use Survey > 9 months	28,178
BE	Sale Survey	7,355
DE	Purchase Survey	41,047
DE	Use Survey < 9 months	150,386
DE	Use Survey > 9 months	92,172
DE	Sale Survey	19,910
ES	Purchase Survey	11,496
ES	Use Survey < 9 months	34,326
ES	Use Survey > 9 months	21,039
ES	Sale Survey	5,800
FR	Purchase Survey	96,645
FR	Use Survey < 9 months	424,039
FR	Use Survey > 9 months	259,895
FR	Sale Survey	48,941
IT	Purchase Survey	10,641
IT	Use Survey < 9 months	33,839
IT	Use Survey > 9 months	20,740
IT	Sale Survey	4,795

ISO Country code	Survey Type	Count
UK	Purchase Survey	55,081
UK	Use Survey < 9 months	39,031
UK	Use Survey > 9 months	23,923
UK	Sale Survey	9,379
NL	Purchase Survey	16,025
NL	Use Survey < 9 months	46,430
NL	Use Survey > 9 months	28,457
NL	Sale Survey	7,620
PL	Purchase Survey	39,178
PL	Use Survey < 9 months	114,985
PL	Use Survey > 9 months	70,475
PL	Sale Survey	16,543
Total	**Purchase Survey**	**285,383**
Total	**Use Survey < 9 months**	**889,010**
Total	**Use Survey > 9 months**	**544,879**
Total	**Sale Survey**	**120,343**

Number of surveys received by survey type and country where the user resides.

ISO Country code	Survey Type	Count
BE	Purchase Survey	871
BE	Use Survey < 9 months	1,322
BE	Use Survey > 9 months	838
BE	Sale Survey	755
DE	Purchase Survey	1,502
DE	Use Survey < 9 months	3,659
DE	Use Survey > 9 months	2,292
DE	Sale Survey	1,429
ES	Purchase Survey	816
ES	Use Survey < 9 months	1,449

ISO Country code	Survey Type	Count
ES	Use Survey > 9 months	804
ES	Sale Survey	736
FR	Purchase Survey	5,780
FR	Use Survey < 9 months	12,908
FR	Use Survey > 9 months	8,361
FR	Sale Survey	5,018
IT	Purchase Survey	801
IT	Use Survey < 9 months	2,099
IT	Use Survey > 9 months	1,011
IT	Sale Survey	719
NL	Purchase Survey	713
NL	Use Survey < 9 months	1,224
NL	Use Survey > 9 months	773
NL	Sale Survey	684
PL	Purchase Survey	1,661
PL	Use Survey < 9 months	3,175
PL	Use Survey > 9 months	1,865
PL	Sale Survey	1,344
Total	**Purchase Survey**	**12,144**
Total	**Use Survey < 9 months**	**25,836**
Total	**Use Survey > 9 months**	**15,944**
Total	**Sale Survey**	**10,685**

Iteration 2: Autumn 2022

Number of surveys sent per survey type

Survey Type	Total Sent
Purchase	1,203,241
Sale	981,240
Random	252,702

Main survey sample size per country

Survey Type	DE	ES	FR	IT	NL	PL	BE	UK
Purchase	88,225	161,433	253,413	198,976	159,556	135,154	103,242	103,242
Sale	20,480	34,354	39,309	45,255	34,685	13,213	32,703	32,703
Random	77,227	127,198	163,540	181,062	148,614	81,121	101,239	101,239

Number of surveys received by survey type and country where the user resides.

ISO Country code	Survey Type	Count
BE	Purchase	10,215
BE	Sale	10,673
BE	Random	3,171
DE	Purchase	4,873
DE	Sale	6,607
DE	Random	1,337
ES	Purchase	17,301
ES	Sale	20,470
ES	Random	3,590

ISO Country code	Survey Type	Count
FR	Purchase	24,153
FR	Sale	21,088
FR	Random	3,678
IT	Purchase	27,940
IT	Sale	39,460
IT	Random	6,551
NL	Purchase	10,519
NL	Sale	12,160
NL	Random	2,216
PL	Purchase	8,359
PL	Sale	8,535
PL	Random	910
UK	Purchase	5,455
UK	Sale	9,014
UK	Random	2,285
FR	Purchase	24,153

Appendix H: Vinted User Survey Results
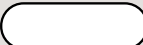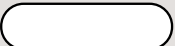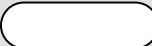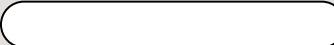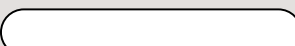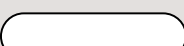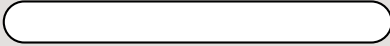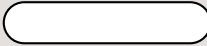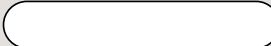
Summary
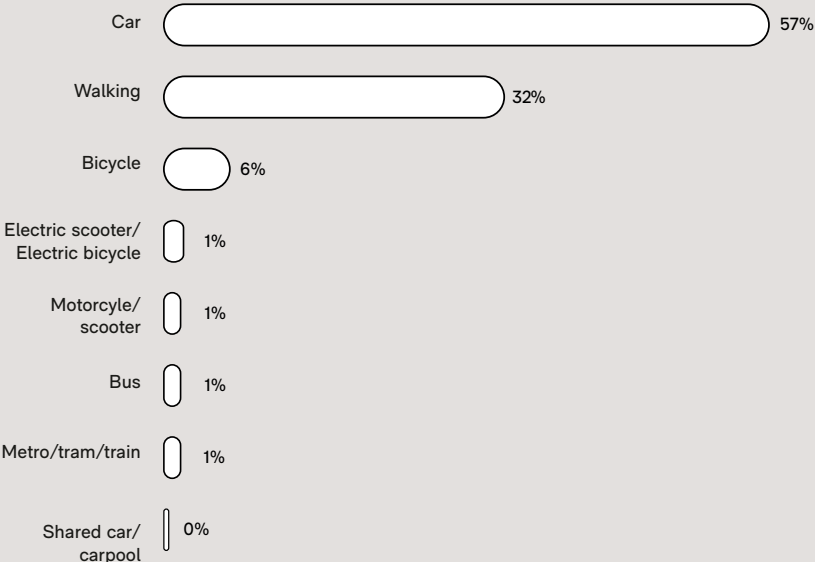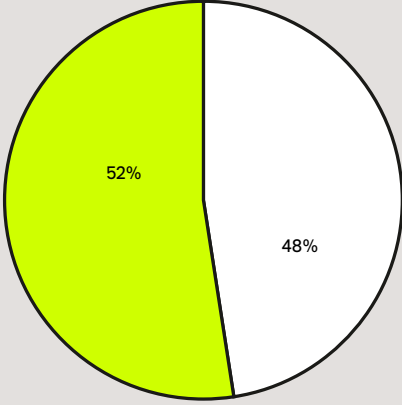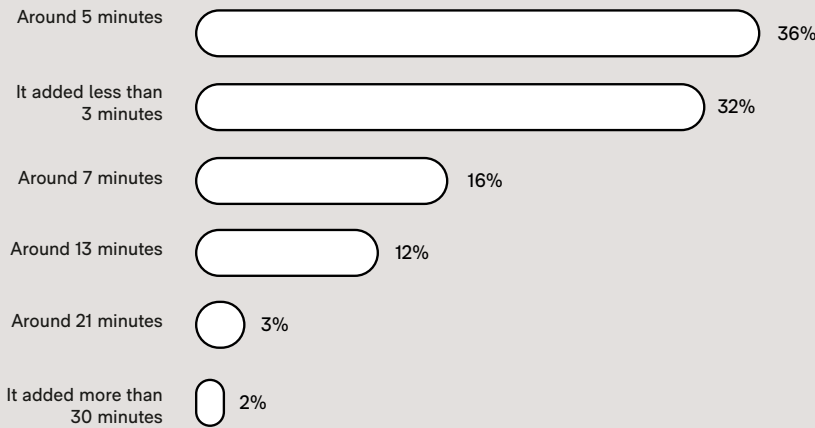
This Appendix contains the results from the responses to each question in the three surveys outlined in the above sections:
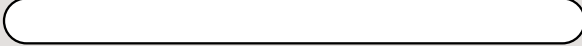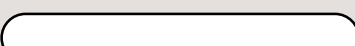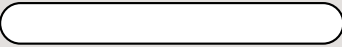
Purchase Survey

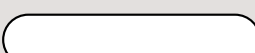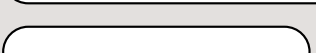| Question	Responses
Q3. Which mode of transportation do you primarily use to go to the pick-up / drop-off point?	Car — 55% Walking — 31% Bicycle — 6% Bus — 2% Electric scooter/ Electric bicycle — 2% Motorcyle/scooter — 2% Metro/tram/train — 1% Shared car/carpool — 1%
Q4. When you left Point A, was it only for the sole purpose of going to the pick-up / drop-off point? or was it part of a bigger trip?	48% / 52% ○ It was part of a bigger trip, I had other things to do alongside going to the pick-up / drop off ○ The trip was for the sole purpose of going to the pick-up / drop off point
Q5. By how long did going to the pick-up / drop-off point increase your transportation time from Point A to Point C?	It added more than 30 minutes — 2% Around 21 minutes — 4% Around 13 minutes — 12% Around 7 minutes — 15% Around 5 minutes — 35% It added less than 3 minutes — 32%
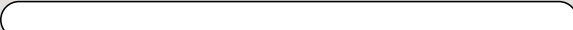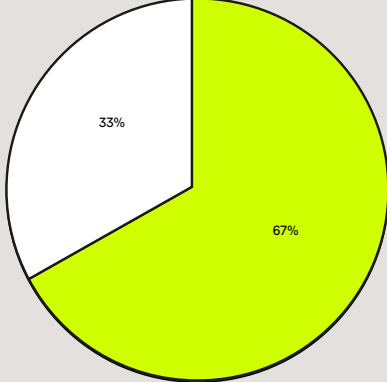
Question	Responses
Q6. How long was your transportation time in total?	More than 30 minutes — 15% Around 21 minutes — 18% Around 13 minutes — 23% Around 7 minutes — 15% Around 5 minutes — 18% Less than 3 minutes — 11%
Q7. If you had not found this product on Vinted, would you have bought this, or a similar product, brand new?	No, definitely not — 17% Unlikely — 21% Maybe, I'm not sure — 23% Likely — 24% Yes, definitely — 15%
Q8a. Why are you not sure?	It depends on the price — 53% I don't really need this item enough to buy it brand new — 27% I was just browsing on Vinted, I'm not sure to buy it brand new — 13% It depends on the model/size — 7%
Q8b. 'Why would you not buy it brand new?	Buying it brand new would have been too expensive — 51% Out of principle, I try not to buy brand new clothing items anymore — 22% I was just browsing on Vinted, I hadn't planned on buying this item beforehand — 20% I know that this model/size is not available anymore — 7%

Question	Responses
Q9. Imagine that you could buy this product brand new, for almost the same price as second-hand, what would you do?	I would prefer to buy it brand new — 37% I am likely to buy it brand new — 32% Maybe, I'm still not sure — 12% I am likely to buy it second hand — 14% I still prefer to buy it second hand — 6%
Q10. Imagine that your preferred model / size is available, would you buy it brand new?	No, definitely not — 11% Unlikely — 23% Maybe, I'm not sure — 32% Likely — 21% Yes, definitely — 13%
Q11. What is the main reason you purchased this product on Vinted instead of buying it brand new?	I prefer buying second-hand items because they're cheaper than brand new — 47% I was just browsing Vinted and I liked this item/impulse buy — 25% I prefer buying second-hand items out of principle — 20% I prefer buying second-hand items because they're cheap and there is no financial risk — 7%
Q12. If Vinted or other online trading platforms did not exist, would you have gone to a physical store to buy this product (or a similar product) second-hand?	No, definitely not — 16% Unlikely — 24% Maybe, I'm not sure — 21% Likely — 23% Yes, definitely — 15%

Question	Responses
Q3. Which mode of transportation do you primarily use to go to the pick-up / drop-off point?	Car — 57% Walking — 32% Bicycle — 6% Electric scooter/ Electric bicycle — 1% Motorcyle/ scooter — 1% Bus — 1% Metro/tram/train — 1% Shared car/ carpool — 0%
Q4. When you left Point A, was it only for the sole purpose of going to the pick-up / drop-off point? or was it part of a bigger trip?	52% — It was part of a bigger trip, I had other things to do alongside going to the pick-up / drop off 48% — The trip was for the sole purpose of going to the pick-up / drop off point
Q5. By how long did going to the pick-up / drop-off point increase your transportation time from Point A to Point C?	Around 5 minutes — 36% It added less than 3 minutes — 32% Around 7 minutes — 16% Around 13 minutes — 12% Around 21 minutes — 3% It added more than 30 minutes — 2%

Question	Responses
Q6. How long was your transportation time in total?	More than 30 minutes — 13% Around 21 minutes — 18% Around 13 minutes — 24% Around 7 minutes — 16% Around 5 minutes — 19% Around 3 minutes — 10%
Q11. What are you planning to do with the money you made from this sale?	Shop more on Vinted — 29.99% I have not yet decided — 27.03% Save the money — 20.69% Buy another second-hand item, not similar to this — 5.90% Buy another new item, not similar to this — 5.35% Buy other non-clothing items (i.e. food, toys,..) — 5.15% Buy a similar new item — 3.31% Buy a similar second-hand item — 2.57%
Q12. If you did not manage to sell this product on Vinted, what would you have done with it?	Try to resell it through another second-hand platform — 24% Give it to family/friends — 19% Give it to a charity shop — 19% Keep it in my wardrobe, unused — 13% Throw it in a clothing bin — 8% I don't know/ I'm not sure — 7% Try to resell it through a second-hand — 4% Keep wearing/using it — 3% Give it to a company that recycles fashion — 2% Throw it in the regular waste container — 1%

Question	Responses
Q3a. When purchasing brand new clothes online, which of the following delivery methods do you prefer to use?	Delivery to home address — 56% Using pick-up / drop-off points — 36% Delivery to specific address (i.e. workplace, etc.) — 13%
Q4. Think of the last time you bought clothes in-store, which mode of transportation did you primarily use to go there?	Car — 13% Walking — 12% Metro/tram/train — 6% Bus — 5% Bicycle — 4% Motorcycle/scooter — 1% Electric scooter/Electric bicycle — 1% Shared car/carpool — 1%
Q5. When you left Point A, was it only for the sole purpose of shopping in the store? or did this trip also serve other purposes?	33% 67% ○ It served other purposes, I had other things to do alongside shopping at the store ○ The trip was for the sole purpose of going to the store
Q6. By how long did going to the store increase your transportation time from Point A to Point C?	It added more than 30 minutes — 25% Around 21 minutes — 14% Around 13 minutes — 20% Around 7 minutes — 11% Around 5 minutes — 16% It added less than 3 minutes — 14%

General Stats

Iteration 2 (November 2022)

Responses: Country Breakdown

A breakdown of responses per country for the three survey types is presented below. Across all main surveys, Italian users proved to be the most responsive.

Random Survey Country
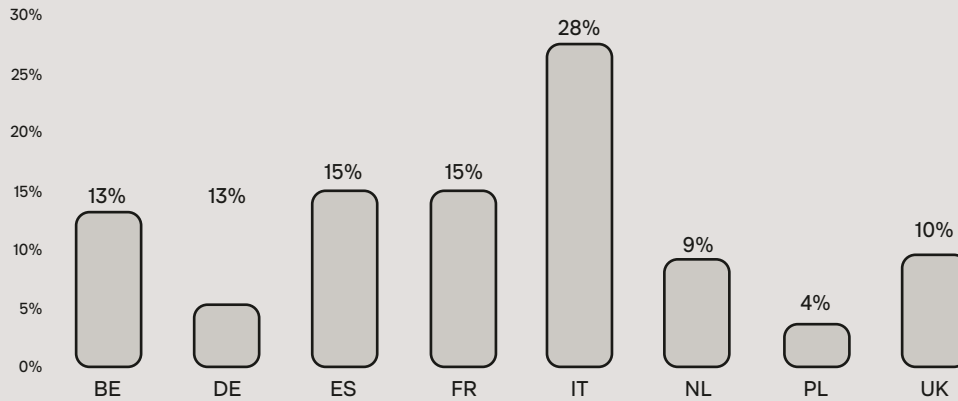
Purchase Survey Country
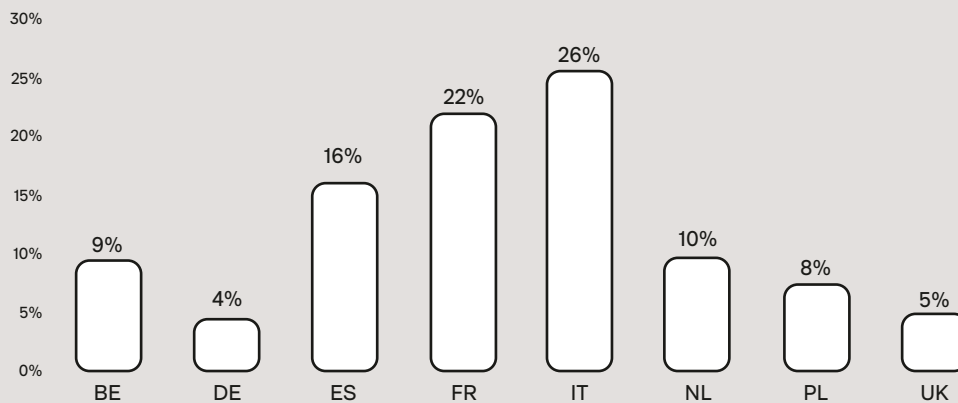
Sale Survey Country
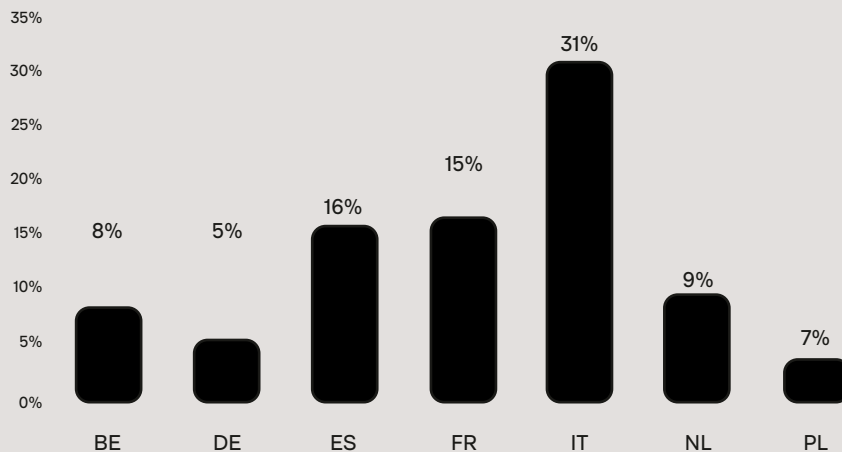
Responses: Gender Breakdown

Breakdown of respondents according to their gender is illustrated below for the three survey types. 86% of the main survey respondents overall were female, demonstrating a significantly greater response rate from the female audience.

General Stats: Gender

Breakdown of respondents according to their genders for the three survey types
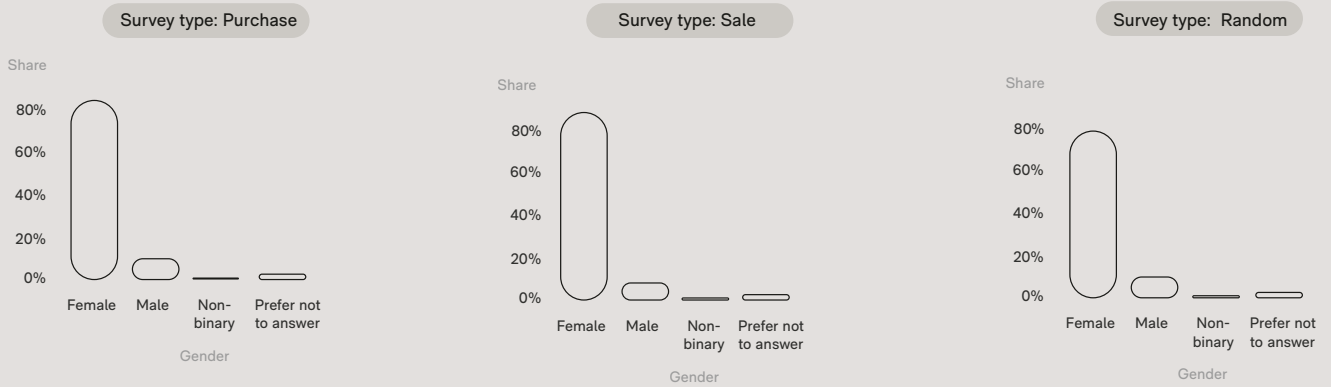
Responses: Age Breakdown

The age-wise breakdown of respondents for the three survey types are plotted below. Vinted's most engaged age demographic was 35-44 year-olds, closely followed by 25-34 year-olds and then the 46-55 age bracket. The data here suggests that, while there was a relatively close engagement rate across all age groups overall, the three young/mid-age brackets were the most actively engaged.

General Stats: Age

Breakdown of respondents according to their age for the three survey types
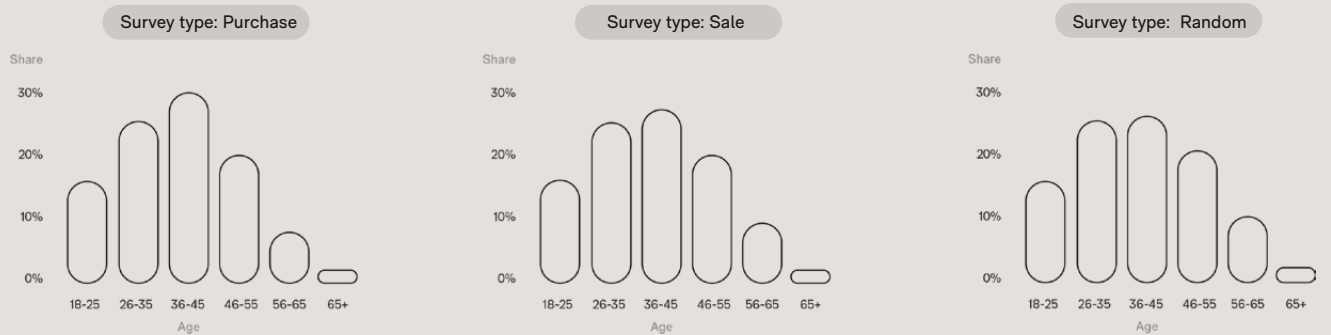
Survey Response Rates

Pilot Survey Iteration 1 (May 2022)

The main survey was preceded by a pilot survey campaign, which consisted of three independent surveys conducted on 10th of April 2022, each with questionnaires sent to 25,000 users respectively, so in total to 75,000 different users.

The response rate of each survey varies significantly, not only from survey to survey but also from country to country.

Response rates in pilot Vinted surveys May 2022 in %

Survey Type	BE	DE	ES	FR	IT	NL	PL	UK	Avg
Purchase	4.89%	3.00%	6.75%	6.33%	7.04%	4.09%	1.92%	0.25%	3.89%
Use	1.85%	1.02%	2.91%	1.79%	0.00%	1.37%	0.83%	0.22%	1.43%
Sale	13.31%	8.41%	16.67%	13.12%	22.20%	11.29%	7.10%	1.50%	10.20%

Pilot Survey Iteration 2 (November 2022)

The pilot survey campaign consisted of three independent surveys (Buyers, Sellers and Random) and ran in the period 28th Oct - 4th Nov, each with questionnaires sent to 13,700 users respectively — 41,100 different users in total.

The link to each pilot survey was sent from Vinted's user (customer) relationship management (CRM) software to buyers and sellers via the Vinted in-app inbox. In order to include information on the transaction in the survey, the survey link was re-routed to a custom-made survey portal utilising Typeform to ensure the parameters were enriched with specific information about the transaction, including hashed user identifier (UID), product title, product description, product category and time of purchase. The invite contained a link to an English-language survey as well as a survey in the native language of the country of the user. In total, the survey was translated and sent out in seven languages.

The vast majority of transactions in 2021 took place in France, Germany, Poland, the United Kingdom, Belgium, Netherlands, Spain and Italy. So, to make a representative statement about the entire Vinted platform and analyse the behaviour of users, the distribution of surveys to these countries was sufficient.

The response rate of each pilot survey varied significantly, not only from survey to survey but also from country to country. They are outlined below while an explanation of the different survey types is also presented later in this section.

Pilot survey response rate per country Iteration 2

Response rates in pilot Vinted surveys Nov 2022

Survey Type	DE	EN	ES	FR	IT	NL	PL
Purchase	3%	3%	5%	9%	6%	5%	5%
Random	7%	9%	12%	15%	17%	13%	8%
Sale	4%	6%	6%	8%	9%	7%	2%

It was not possible to conduct a robust analysis including certain key groups, such as the fashion product categories, due to there being a high number of values within each group, making the sample sizes too small if they were broken down by this categorisation.

This was one of the main reasons why a much larger population base was needed across all surveys for the main survey campaign.

Main Survey (Iteration 1, May 2022)

The main survey encompassed 2,226,015 users across the three surveys. The aim was to analyse users who purchased different types of clothing. The distribution of questionnaires sent was not equal for all three surveys, and it significantly leaned towards the surveys sent to buyers, particularly to the Use Survey, given the fact that the main calculations for avoided emissions were conducted based on the findings from this survey:

Survey Type	Total Sent
Purchase	436,337
Use	1,634,648
Sale	1,550,30

The response rate of the main survey was similar to the response rates of the pilot surveys:

Survey Type	DE	ES	FR	IT	NL	PL	UK	Total/ Share	Responses	Rate
Use absolute	7,039	3,035	27,360	4,409	3,336	6,149	5,124	56,452		
Use %	4.02%	1.02%	2.91%	1.79%	0.00%	1.37%	0.83%	0.22%		
Purchase absolute	1,884	1,154	8,399	1,126	1,296	2,020	5,452	21,331	93,919	4.67%
Purchase %	2.23%	5.60%	3.61%	5.98%	4.86%	2.91%	3.34%	4.07%		
Sale absolute	1,755	1,051	7,011	1,115	1,293	1,714	2,197	16,136		
Sale %	5.94%	13.43%	8.85%	16.86%	12.94%	7.37%	5.87%	10.18%		

Main Survey Iteration 2 (November 2022)

The main survey encompassed 2,437,183 users across the three surveys. The aim was to analyse users who purchased different types of clothing. The distribution of questionnaires sent was not equal for all three surveys, and it significantly leaned towards the surveys sent to buyers, given the fact that the main calculations for avoided emissions were conducted based on the findings from this survey:

Survey Type	Total Sent
Buyers	1,203,241
Sellers	981,240
Random	252,702

Appendix I: Survey Results (Additional Insights)

This section offers additional user behaviour insights based on the analysis of the survey results from iteration one, carried out in May 2022.

Emotional Durability

50-60% of Vinted buyers intended to wear the fashion product they bought for a maximum of one to two years[82]. User responses also indicate that emotional durability — any reason to get rid of a product before it's physically worn out — plays a large role in how long they keep and use a product before selling it on the Vinted platform.

For 45-50% of users, the main reason to sell a product on Vinted was that it no longer suits their style preferences rather than the product being physically worn out[83].

Selling Products Before they are Worn Out

It appears that clothing products were being sold or disposed of a long time before they were physically worn out. To elaborate on this statistic, let's consider the seller's responses when they were asked the reason for selling a particular product in the figure below. The majority (half) of the respondents sold the product because of emotional durability, which included the responses such as 'I don't wear it' or 'I don't like it'. Physical durability as the reason to sell was only 0.12%.

Share of responses to the question 'Why did you decide to sell this particular item?

Share of responses

Reasons for sale
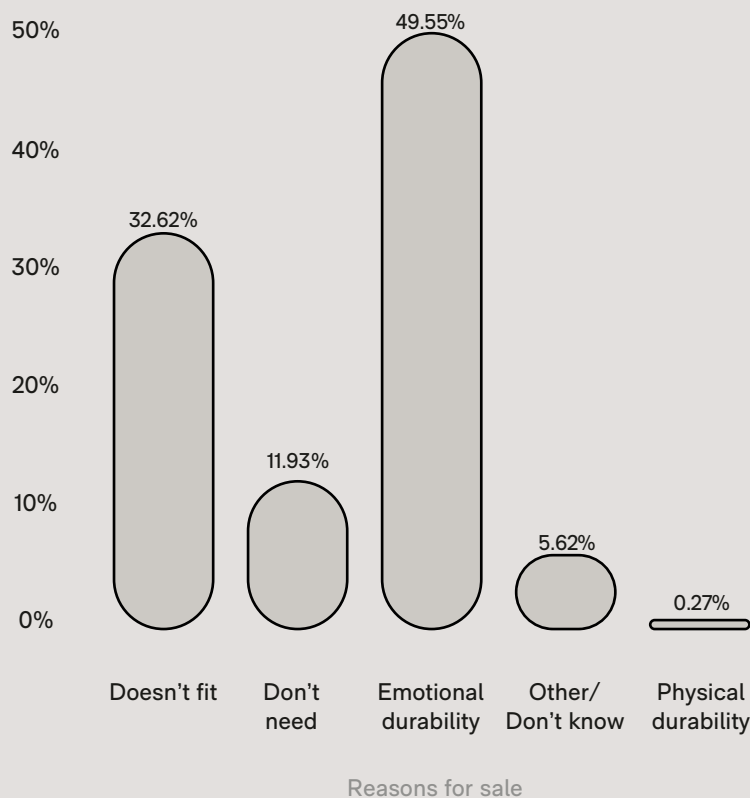
[82] Average ownership period is around 4.8 years based on existing studies (Laitala & Klepp 2020, Laitala et al. 2018). However, anecdotal evidence and more recent reports (e.g. Ellen MacArthur Foundation) suggest that average ownership is declining.

[83] The responses under the emotional durability included answers such as 'I don't wear it', 'I don't like it' or 'It's out of fashion'.

The above hypothesis can also be verified with other statistics obtained from the surveys. For instance, when buyers were asked how much longer they were planning to wear this product, about 30% responded less than a year but only 20% of the respondents thought that their purchases would get worn out within a year. Around 64% of the respondents answered that they expected their purchase to last more than a year. Furthermore, the majority of the products purchased on Vinted were in good or very good condition. These statistics are presented in the following three figures.

Share of responses to the question 'For how much longer do you plan to wear this item?

Share of responses

Planned ownership in years
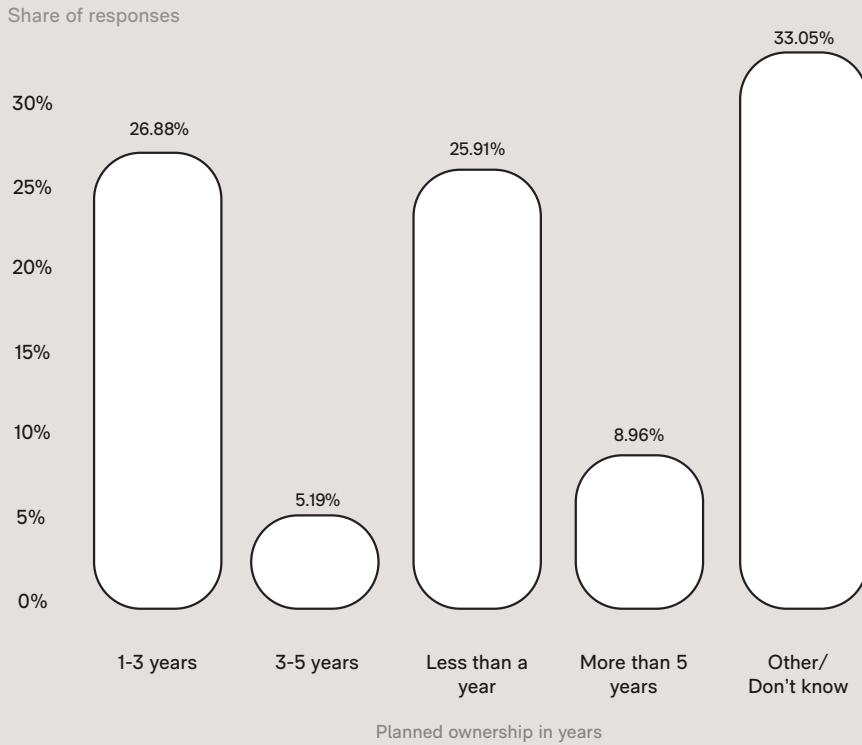
Shares of responses to the question 'How much longer do you think this item can still be used for until it will get worn out?'

Share of responses

Expected physical durability in years

Planned ownership in years
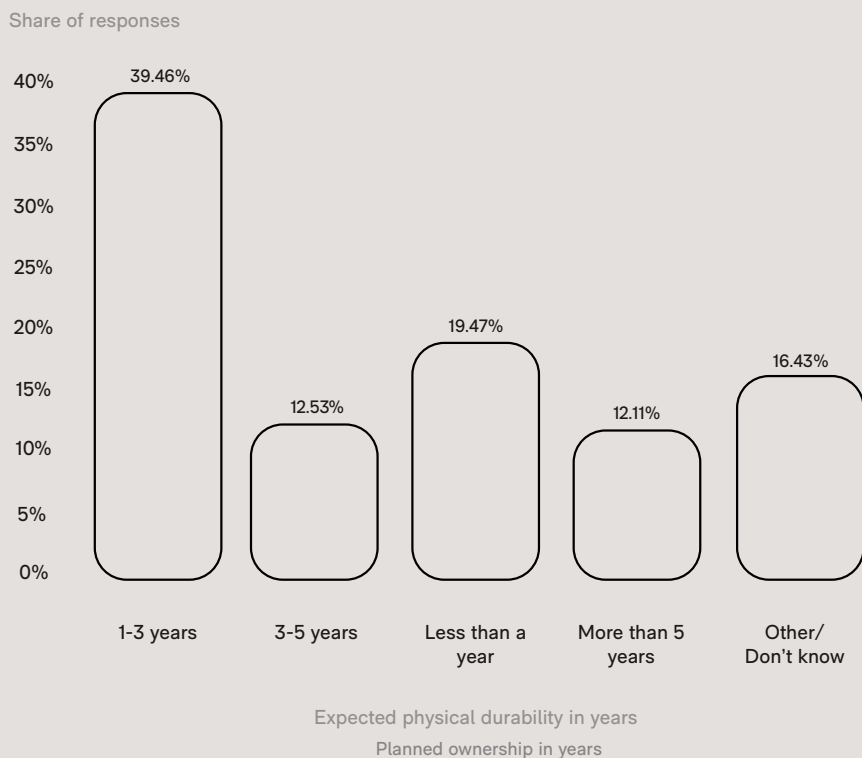
Item condition for the three survey types

Survey type: Purchase

Share

60%

40%

20%

0%

a. New with tags b. New c. Very Good d. Good e. Satisfactory

Item condition

Survey type: Use

Share

60%

40%

20%

0%

a. New with tags b. New c. Very Good d. Good e. Satisfactory

Item condition

Survey type: Sale

Share

60%

40%

20%

0%

a. New with tags b. New c. Very Good d. Good e. Satisfactory

Item condition
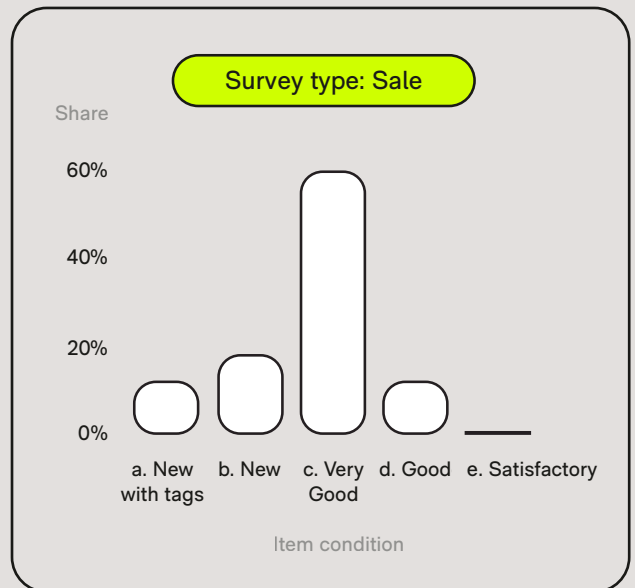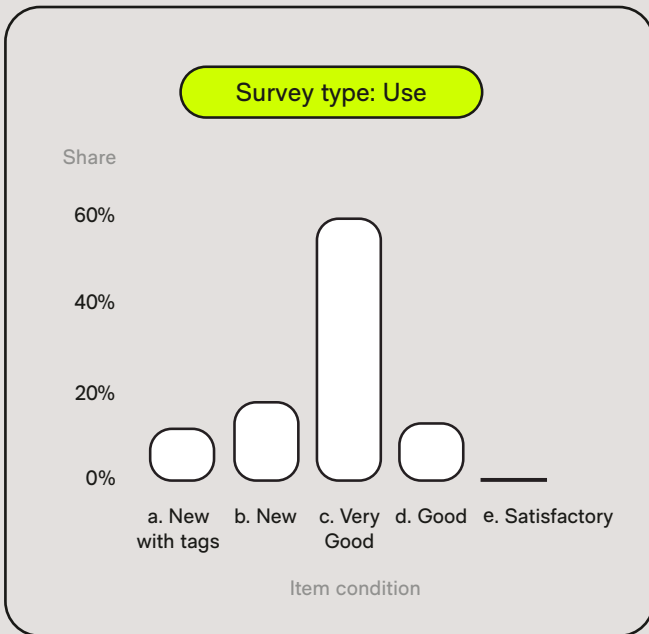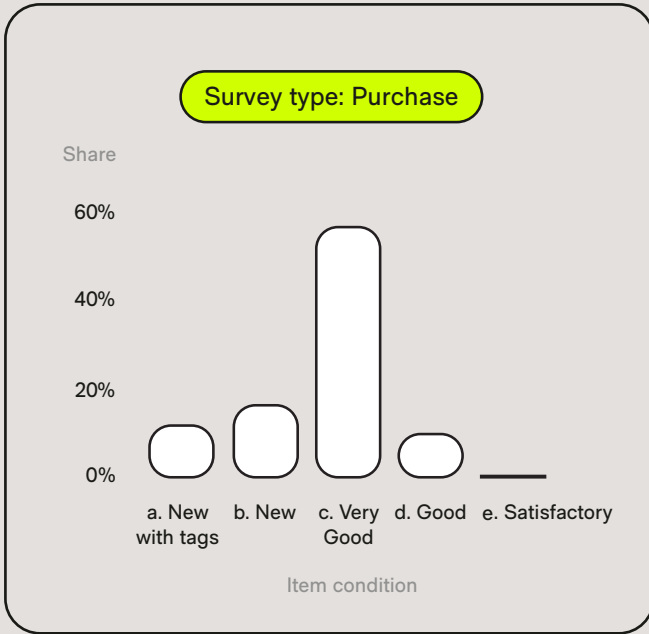
Another interesting statistic is that close to 20% of the Buyers responded that physical durability will be the reason for them getting rid of their clothing purchased on Vinted but this value doesn't align with the above two figures. The probable reason behind this could be users expecting good behaviour from themselves in the future. This value (20%) is also much different than physical durability as the reason to sell for Sellers (0.12%). Where it seems clear that the majority of the products will be sold before they are worn out. Following is the figure from the Use Survey but a similar trend was observed from the Purchase Survey as well.

Share of responses to the question 'How much longer do you think this item can still be used for until it will get worn out?'

Share of responses

Reason behind planned disposal
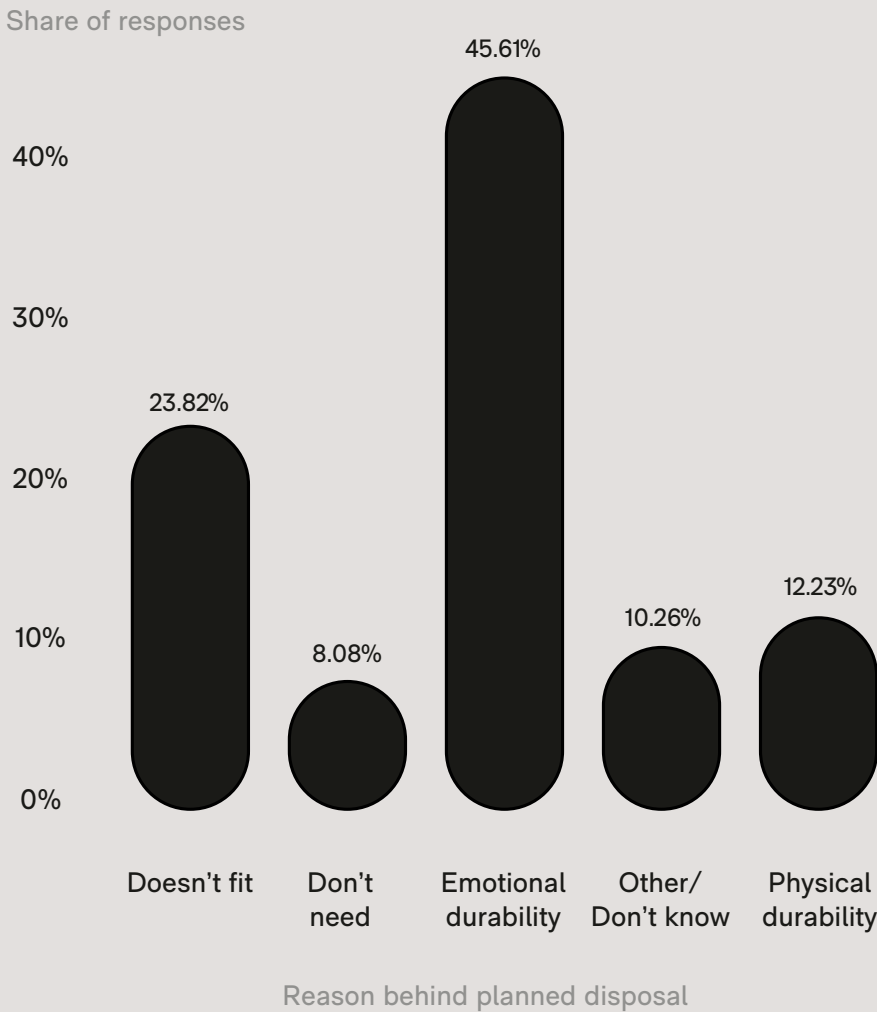
Finally, another statistic for this section is the average product lifetime for Vinted buyers versus the lifetime of products obtained from the literature. This can be seen in 6. Appendices, Appendix J. It can be seen that the lifetime from the literature is consistently higher than the lifetime of the product with the Vinted users. In some cases even more than twice.

Appendix J: Ownership Period Ratio and Usage Rate

Three different approaches to calculate a Replacement Rate that were commonly used in the literature were explored: Ownership Period, Usage Rate and Avoided Purchase Rate. This section provides detail on how each metric was calculated and the rationale for selecting the Avoided Purchase Rate as the primary approach in this analysis.

Ownership Period Ratio Methodology

The Ownership Period Ratio calculates the fraction of time buyers have a Vinted product in their wardrobe as compared to the time buyers typically have a product in their wardrobe according to the averages explored in literature. Therefore, when using the Ownership Period Ratio as a Replacement Rate, the carbon emissions were avoided for the relative amount of time a product was used. It can also be seen as avoided emissions due to the lifetime extension of a product. So, the fraction of lifetime use of a Vinted fashion product as compared to the average first life can be seen as emissions avoided. It can be calculated using the following equation:

$$\text{Ownership Period Ratio} = \frac{\text{Ownership Period for Vinted product}}{\text{Average time in wardrobe from literature}}$$

Where,

- **Ownership Period Ratio** for Vinted product: How long the buyer already had this item (time since purchase) + question 6 from the Use Survey: How long are they planning to wear it.

- For the **average time from literature**, the average of the different product categories from these two studies was used: Cooper et al. 2013 and Global Wardrobe Audit (Nielsen Company) as cited in Laitala et al. 2018. These two were chosen since they were comparatively recent, covered most of the product categories and had similar values for product categories. Both were based on user surveys.

Usage Rate Methodology

The Usage Rate calculates the ratio between the usage for a new article versus an article bought on Vinted. It follows a similar logic to the Ownership Period Ratio calculation, however, it compares the usage obtained from the Vinted product instead of the time in the wardrobe. As one would expect, the Usage Rate and the Ownership Period Ratio were found to be highly correlated in the literature (Laitala & Klepp 2021). The usage factor is calculated using the following equations:

$$\text{Usage Rate} = \frac{\text{No. of wears from Vinted product}}{\text{Lifetime expected wears}}$$

$$\text{No. of wears from Vinted product} = \text{Time in wardrobe for Vinted item} \times Q3 \times Q4$$

$$\text{Lifetime expected wears} = \text{Average lifetime in literature} \times Q3 \times Q5$$
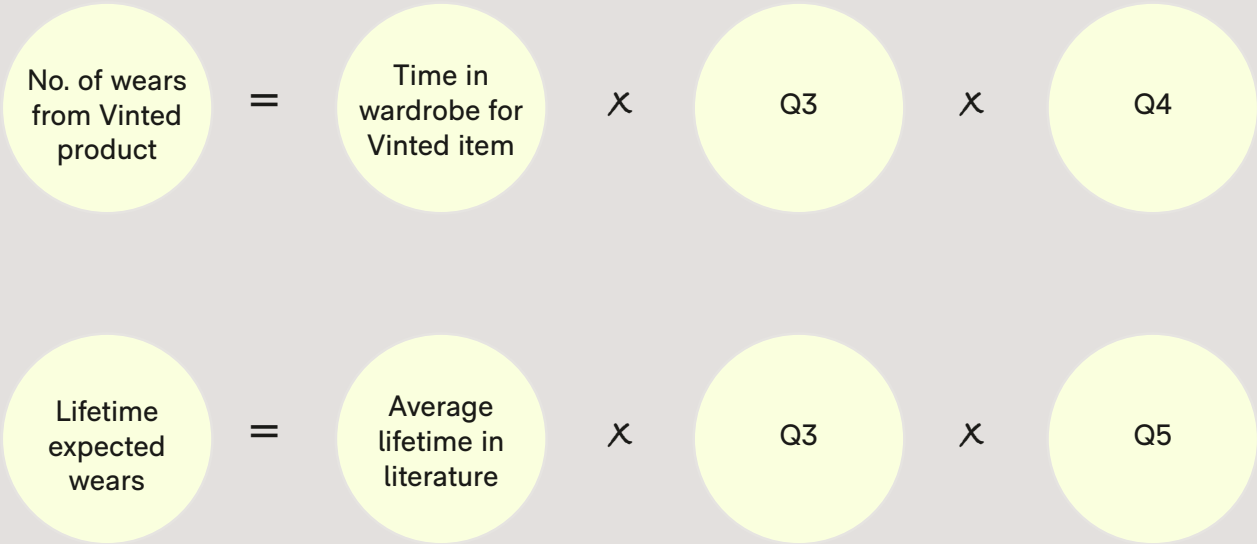
Where the following were the responses from the Use Survey sent out to Vinted buyers:

- **Question 3:** Number of months/years a product is worn
- **Question 4:** Times per month a product is worn
- **Question 5:** Times per month a similar first-hand product is worn

Results

The calculated rates of Ownership Period Ratio and usage are shown in the table below. They were not used for further calculations in the Replacement Rates. The data demonstrates that the Usage Rate is consistently lower than the Ownership Period Ratio, although both these rates were found to be correlated in the literature (Laitala & Klepp 2021). The reason behind this is that it is hard to determine since there are variations due to seasonal wears between the product types and uncertainties in the user predictions. The uncertainties are more significant for the usage versus the Ownership Period Ratio. This is due to buyer lifetime in Ownership Period Ratio estimation being partially calculated using the Vinted transactional data. Additionally, there can be added uncertainties in predicting the usage during the Ownership Period.

Ownership Period Ratio and Usage Rate for different product categories

Product	Ownership Period Ratio	Usage Rate
Blazer/Suit Jacket	46-37%	19-23%
Bottoms	38-39%	20-25%
Coat/Jacket	28-49%	39-60%
Dress	43-61%	18-29%
Jeans	67-71%	35-51%
Jumpsuit	62%	36%
Knitted Jumper	38-58%	20-41%
Shorts	67-72%	43-68%
Skirt	42-59%	28%
T-Shirt	65-67%	30-36%
Top	48%	22-28%
Trousers	50-55%	26-49%
Underwear	98-107%	59-70%

The seller's lifetime was not used in calculating the Ownership Period Ratio mainly since it is probable that Vinted users are keeping products in their wardrobe less than the average person. They might be circulating it more. This could lead to an overestimation of the lifetime extension. In this analysis, average product lifetimes in the literature were used since the goal is to compare the average lifetime per product with the average lifetime of a Vinted product. A comparison of the Ownership Periods for Vinted Buyers and the literature is seen below.

Comparison of ownership periods of different clothing items for Vinted buyers and the literature
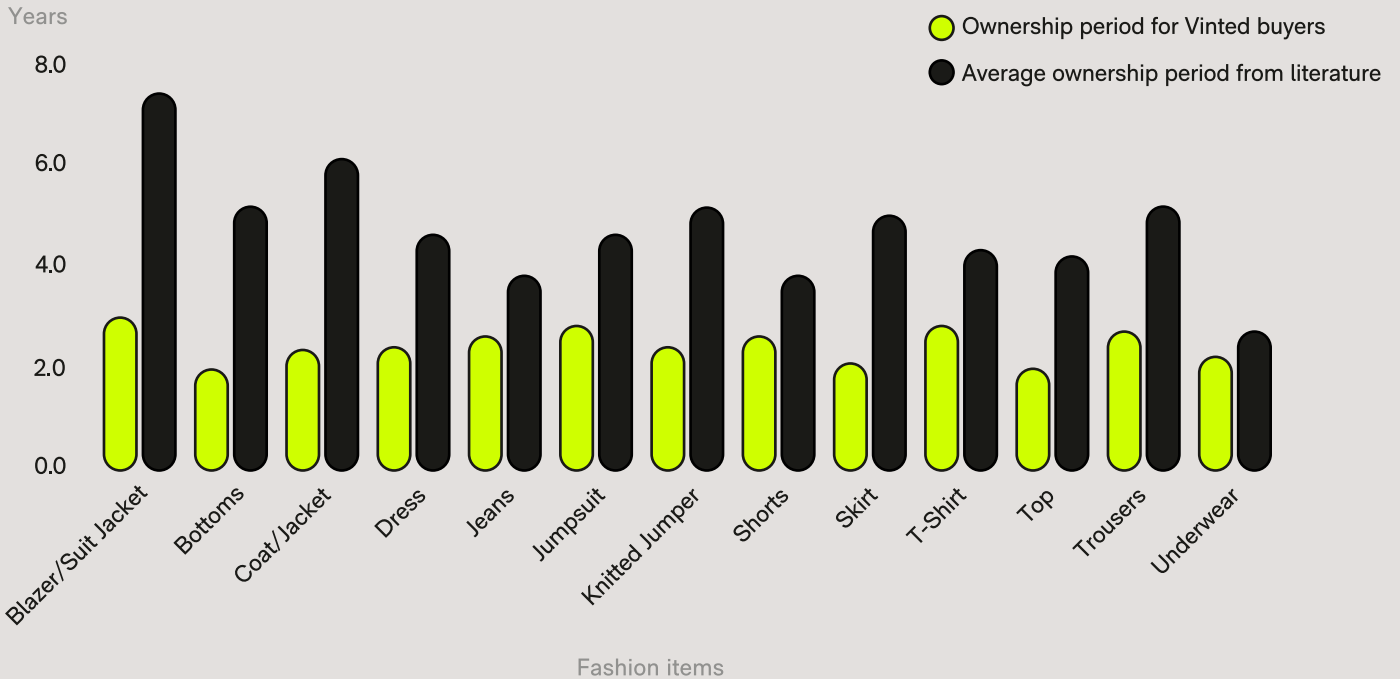
Why the Avoided Purchase Rate Was Used as the Replacement Rate

The Avoided Purchase Rate was chosen because of the robustness of the model. Both the Usage Rate and the Ownership Period Ratio are reliant on literature values that had a very high variance and were not specific to categories. The Avoided Purchase Rate, on the other hand, allowed the calculation using only Vaayu's primary dataset. It is the most robust method largely due to its sample size.

Appendix K: Avoided Purchase Rate

This section provides detail on the methodology applied to the calculation of the Avoided Purchase Rate, as well as the statistical analysis performed in order to account for the uncertainties associated with the calculation of the Avoided Purchase Rate.

Section 1: Methodology

This rate factor essentially quantifies whether a product is an additional purchase or if it replaces the purchase of a new, first-hand product. It does this by posing a question to the user and then using the responses to calculate the rate.

This is question 7 from the Purchase Survey:

"If you had not found this product on Vinted, would you have bought this, or a similar product, brand new?"

The equation to calculate this factor from the responses is the one below:

$$\text{Avoided Purchase Rate} = \frac{\text{Responses avoiding purchase of a new product, without it being an additional purchase}}{\text{Total no. of responses to the question}}$$

Then, to estimate the numerator for a particular product category, "Responses leading to the substitution of first-hand products":

$$\text{Responses avoiding purchase of a new item without it being an additional purchase} = \text{Selected 'Yes' responses} - \text{Impulse Buyers} + \text{Selected 'Maybe' responses}$$
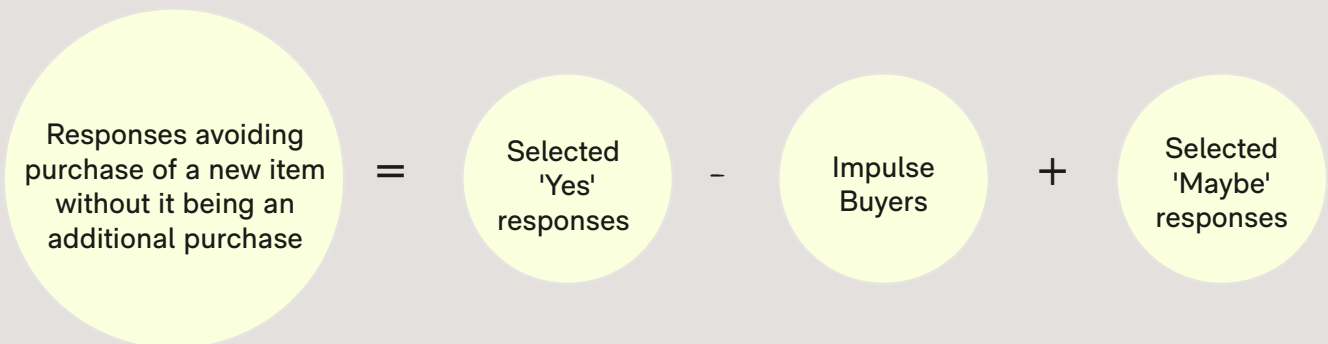
Where,

- Selected 'Yes' responses: There were responses where it was reasonably certain that these products lead to the avoided purchase of a new product[84].

- Selected 'Maybe' responses: These were responses where the avoided purchase of a new product depends on different factors[85]. They add some amount of uncertainty to the estimation.

- Impulse buyers: As an additional control question, users were asked what the motivation was for buying the product[86]. Those who answered "I was just browsing Vinted and I liked this product" were classified under impulse buyers. Their purchases were considered not

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[84] See 6. Appendices, Appendix D, Q7.
[85] See 6. Appendices, Appendix D, 8.a. 8b
[86] See 6. Appendices, Appendix D, Q11.

to displace a first-hand purchase and, as such, were excluded from the calculation of the Avoided Purchase Rate. This also excludes self-reported purchases due to the rebound effect.

Excerpt of relevant questions from the Purchase Survey:

Q7. If you had not found this product on Vinted, would you have bought this, or a similar product, brand new?

Single answer only

Yes, definitely *(Skip to Q12)*

Likely *(Skip to Q12)*

Maybe, I'm not sure *(Ask Q9a)*

Unlikely *(Skip to Q9b)*

No, definitely not *(Skip to Q9b)*

Q8a. Why are you not sure?

Please select the main reason why you are not sure to buy it brand new.

Single answer only

It depends on the price *(Skip to Q10)*

It depends on the model / size *(Skip to Q11)*

I don't really need this product enough to buy it brand new *(Skip to Q12)*

I was just browsing on Vinted, I'm not sure to buy it brand new *(Skip to Q12)*

It depends on other factors, please specify: _____ *(Skip to Q12)*

Please select the main reason why you would not buy it brand new.

Single answer only

Q8b. Why not?

I was just browsing on Vinted, I hadn't planned on buying this product beforehand *(Skip to Q12)*

Buying it brand new would have been too expensive *(Ask Q10)*

I know that this model / size is not available anymore *(Skip to Q11)*

Out of principle, I try not to buy brand new clothing products anymore *(Skip to Q12)*

Other reasons, please specify: _____ *(Skip to Q12)*

Q10. Imagine that you could buy this product brand new, for almost the same price as second-hand, what would you do?

Single answer only

I would prefer to buy it brand new

I am likely to buy it brand new

Maybe, I'm still not sure

I am likely to still buy it second-hand

I still prefer to buy it second-hand

Q11. Imagine that your preferred model / size is available, would you buy it brand new?

Single answer only

Yes, definitely

Likely

Maybe, I'm still not sure

Unlikely

No, definitely not

Q12. What is the main reason you purchased this product on Vinted instead of buying it brand new?

Single answer only

I was just browsing Vinted and I liked this product / impulse buy

I prefer buying second-hand products out of principle

I prefer buying second-hand products because it's cheaper than brand new

I prefer buying second-hand products because it's so cheap, there's no financial risk

Other reasons, please specify: _____

Q13. If Vinted or other online trading platforms did not exist, would you have gone to a physical store to buy this product (or a similar product) second-hand?

Single answer only

Yes, definitely

Likely

Maybe, I'm not sure

Unlikely

No, definitely not

Q14. If you had not found this product on Vinted, would you have bought this product (or a similar product) second-hand somewhere else?

Single answer only

Yes

No

Section 2: Statistical Analysis

Uncertainties in the calculations:

There might be significant uncertainties in the calculations of each of the Replacement Rates. Since these rates determine the avoided emissions directly, it is crucial to discuss them.

Uncertainties in predictions of lifetimes and wears:

The source of this uncertainty is that users don't accurately remember when the product was acquired or how often they have been wearing it, as observed by Klepp et al 2020, especially if the product cannot be linked to a particular life event. Using the transactional data from Vinted, it was possible to get the exact acquisition date. However, uncertainties remain in the predictions of usage for past and future, as well as future Ownership Period. For

instance, Klepp et al 2020 saw around 25% difference in the lifetime usage for a garment depending on which questions from the survey were used for estimations.

Uncertainties in the literature values:

The average product lifetimes are taken from the literature to calculate the lifetime and Usage Rates (Cooper et al. 2013, Laitala et al. 2018). These investigations likely have insignificant uncertainties themselves due to the reasons mentioned above, so naturally, these affect the estimations as well.

In order to estimate the intervals inside which the values of spot Replacement Rates probably fall, two grouping variables were chosen: Vaayu taxonomy classes and countries which took part in the survey.

Replacement Rates across Vaayu categories

Class	Replacement Rate
Underwear	45.80%
Garment	43.21%
Coat/Jacket	38.14%
Bottoms	48.65%
Top	43.49%
Knitted Jumper	35.42%
Swimwear	52.79%
Sets/Suits	43.26%
Full Body Underwear	50.16%
Dress	33.03%
Skirt	34.60%
T-Shirt	31.76%
Trousers	37.77%
Jeans	37.15%
Shorts	42.80%
Blazer/Suit Jacket	35.29%
Jumpsuit/Overalls	31.80%
Underwear	45.80%

Replacement Rates across countries

Country	Replacement Rate
Belgium	41.07%
Germany	41.60%
Spain	41.75%
France	37.69%
Italy	36.13%
The Netherlands	40.72%
Poland	33.31%
United Kingdom	39.07%

To estimate how certain the findings are, the first condition to be met is that the data is normally distributed around the mean.

The Shapiro-Wilks test for normality was used.

Test for normal distribution has a result that is followed by the following rules:

- If $p \leq 0.05$: then the null hypothesis can be rejected (i.e. the variable is NOT normally distributed).

- If $p > 0.05$: then the null hypothesis cannot be rejected (i.e. the variable MAY BE normally distributed).

And resulting table shows normality values in the rightmost column:

Rate	Parameter	Mean	Std	Ci low	Ci high	Normality value
Adjusted Replacement rate	Country code	0.45	0.06	0.36	0.51	0.83
Adjusted Replacement rate	Product catalogue code 3	0.45	0.09	0.39	0.53	0.20

Using the above, it's clear that the normality condition is met for both variables.

The next step is to calculate the number of variations in Replacement Rates for both datasets. First, the average values (column "mean" in a table) were calculated, and then, based on the mean, the standard deviation, or margin of error between the values, could be calculated.

From the table above it's clear that the standard deviation, denoted as "std" is a bit lower for countries than for Vaayu's categories.

The confidence intervals were calculated for both groups, respectively. It was conducted by using the probability of 68% (or 2 standard deviations in a normal distribution plot), and the confidence intervals are denoted as ci_low (lower boundary) and ci_high (higher boundary).

Consequently, Vaayu's researchers can say with 68% confidence that the Replacement Rates, given the existing data, fall in a range between 0.39 and 0.50 for all countries.

Appendix L: Lifetimes from Literature

For an average time from literature, the average of the different product categories from these two studies will be used: Cooper et al. 2013 and Global Wardrobe Audit (Nielsen Company) as cited in Laitala et al. 2018. These two were chosen since they were the ones covering most of the product categories, comparatively recent and had similar values.

Product Categories	Average Lifetime in Years
T-shirts	4.3
Blouses/Shirts	4.2
Jumpers/Sweaters	5.15
Suits	8.7
Jeans	3.85
Trousers/Pants	5.15
Skirts	5
Dresses	4.6
Jackets/Blazers/Coats	6.1
Underwear/Lingerie	2.73

Appendix M: PUDO Density Model

PUDO Density Model

To calculate the distance travelled by the buyers to pick up their package, the distance from Home-to-PUDO was estimated. The PUDO Density Model bases its distance estimate on the density of PUDO in the postal code of the recipient.

An illustration of the PUDO density model
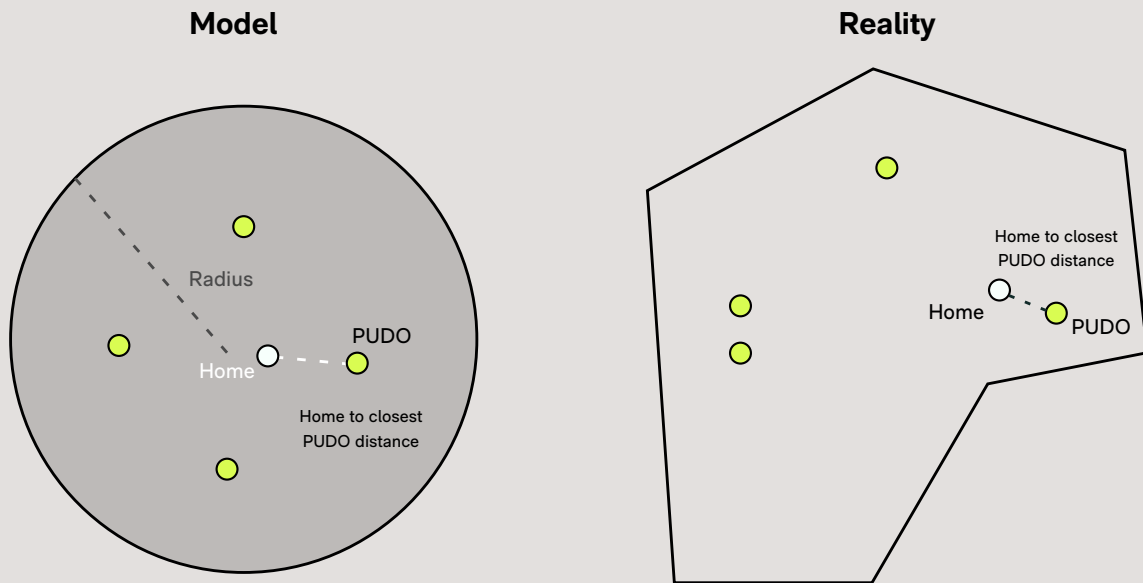
To calculate the average distance from any point within the postal code to the closest PUDO, a Monte Carlo simulation was run. For any possible number of PUDO within a postal code (up to 300), PUDO were placed within a circle. For the set number of iterations (2 million), a random point in the circle was chosen and the distance between it and the PUDO was measured. An average of the resulting distances was then taken as the distance for the given PUDO density. This model was then scaled up to each postal code area. The postal codes were all treated as circles. Thus, the area was taken and divided by 2 to get the radius, which was then multiplied by the radius in the simulation.

Since 60% of all PUDO journeys were made in France, and that was by far the largest single share of PUDO journeys, the specific factors chosen for France are described.

Homes were assumed to be within the postal code of the PUDO. This model does not apply to the United Kingdom, however, since postal codes in the UK are very granular, each indicating around 15 addresses. In this case, the PUDO was likely not in the same postal code as the home. As a proxy, other countries' median distances were used.

Another constraint of this model is that it only works for countries where Vinted has reached significant enough market penetration for all the PUDO used by Vinted. For France, there were a total of 19,000 PUDO in the dataset for the carrier Chronopost, which was more than they reported.

All of Vinted's 2021 shipments where either their destination or origin was a PUDO were used to calculate the PUDO density.

The area of a postal code was calculated using

geographical data from Nominatim. Nominatim has borders for 40% of journeys in France. These journeys were randomly distributed, thus the result was considered to be representative of the French distribution of journeys. For all postal codes where no area was available, the country's average PUDO distance was used.

The median geodesic PUDO journey distance in France was found to be 2.5km. This includes both the trip to the PUDO and back, measured as the crow flies. The 25th percentile was at 1km and the 75th percentile was 4km.

To the geodesic distance calculated by the PUDO Density Model, a circuity factor of 1.3 was applied. The average circuity factor was calculated using data obtained by Ballou et al 2002.

The geodesic distance was counted twice to account for both ways of the journey.

Mode of transport

The PUDO models considered the emissions of different modes of personal and public transport. Walking and cycling were considered to have no emissions. For other modes of transport, the emissions associated with electricity or combustible fuel were considered. For shared or public transport, emissions were divided by average passenger utilisation.

Non-PUDO Drop-Off

These were assumed to be PUDOs as a proxy, as further data was not available. 27% of shipments in 2021 were not dropped off at a PUDO.

Consolidation Centre to PUDO

The journey from the consolidation centre to the PUDO can be optimised well when compared with home deliveries since the delivery journey was done only once for multiple deliveries. The constraining factor was the capacity of the delivery vehicle and therefore an allocation based on mass and volume was used for this process.

An average light goods vehicle was assumed as a mode of transport, as they are most commonly used for this transport step (DEFRA). This was a worst-case assumption since, especially in urban areas, other modes of transport are becoming more common.

Data on 100,000 shipments carried out for Vinted by Chronopost in 2022 was used to determine the distance between PUDO and consolidation centres. The 80th percentile value of 43 kilometres was used. This data was from the French carrier Chronopost, chosen because of the reliability of the data provided. The value differs significantly between countries. Through manual sampling of 500 shipments of other carriers, it could be verified that more than 70% of shipments lie below that value. This makes 43km a sufficiently conservative estimate.

Appendix N: Comparison of PUDO vs Home Delivery

This section describes the comparison of the analysis of the deliveries to the buyer's home as well as to a PUDO.

Climate impact breakdown per leg

Business to Home

Business to PUDO

PUDO to PUDO

	■ PUDO Drop-Off	□ PUDO/ Warehouse to Consolidation Centre	■ Mid Leg	□ Consolidation Centre to Home/PUDO	■ PUDO Pick-Up
Business to Home	-	0.96%	43.14%	55.91%	-
Business to PUDO	-	1.58%	79.34%	0.79%	18.56%
PUDO to PUDO	0.63%	15.76%	67.22%	0.63%	15.76%
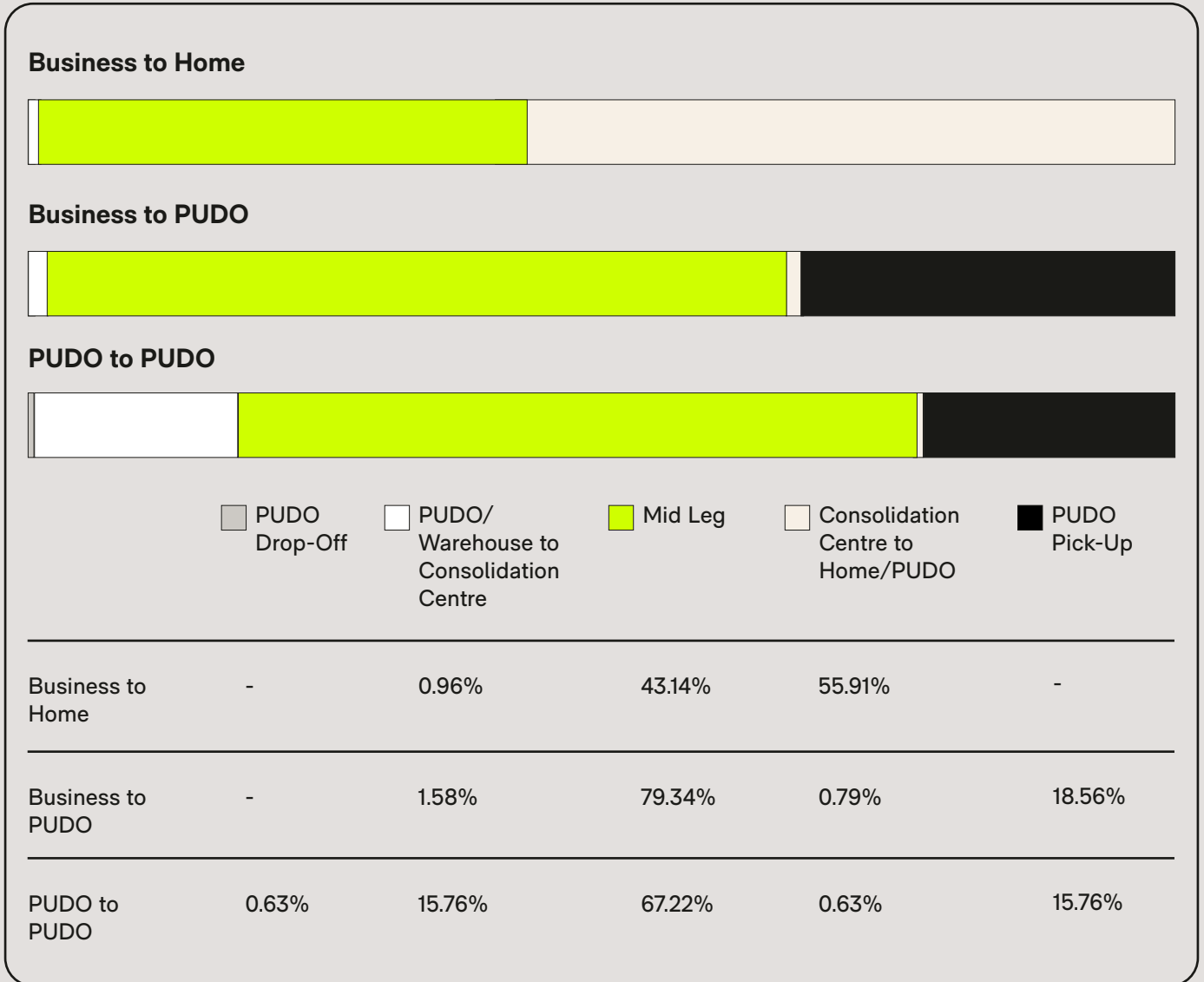
This is a comparison between business-to-home, business-to-PUDO and PUDO-to-PUDO deliveries, highlighting the contribution of the individual stages of the delivery to the total emissions of a delivery.

The First Leg (Pick-Up) when a delivery was from a business was very small, which is why it is hardly visible in these charts.

Last Mile Comparison

When solely comparing the End Leg (Last Mile) of home delivery to PUDO delivery, the benefit of PUDOs becomes very clear. A typical shipment directly to a customer's home generated 4.8 times more emissions than a comparable delivery via PUDO.

Appendix O: Most Emission Intensive Routes

Due to the large distances within the United States, domestic deliveries in the US are the most impactful route in our results. Within Europe, an outsized share of the impact came from international shipments

Most emission intensive routes

Route	Average CO_2e
US <> US	5.62 kg
ES <> NL	4.71 kg
ES <> BE	4.21 kg
ES <> IT	4.15 kg
FR <> PT	4.14 kg
IT <> NL	3.89 kg
IT <> BE	3.66 kg

Appendix P: First-Hand Distribution Model

This appendix describes the methodology behind the distribution of first-hand (new) products.
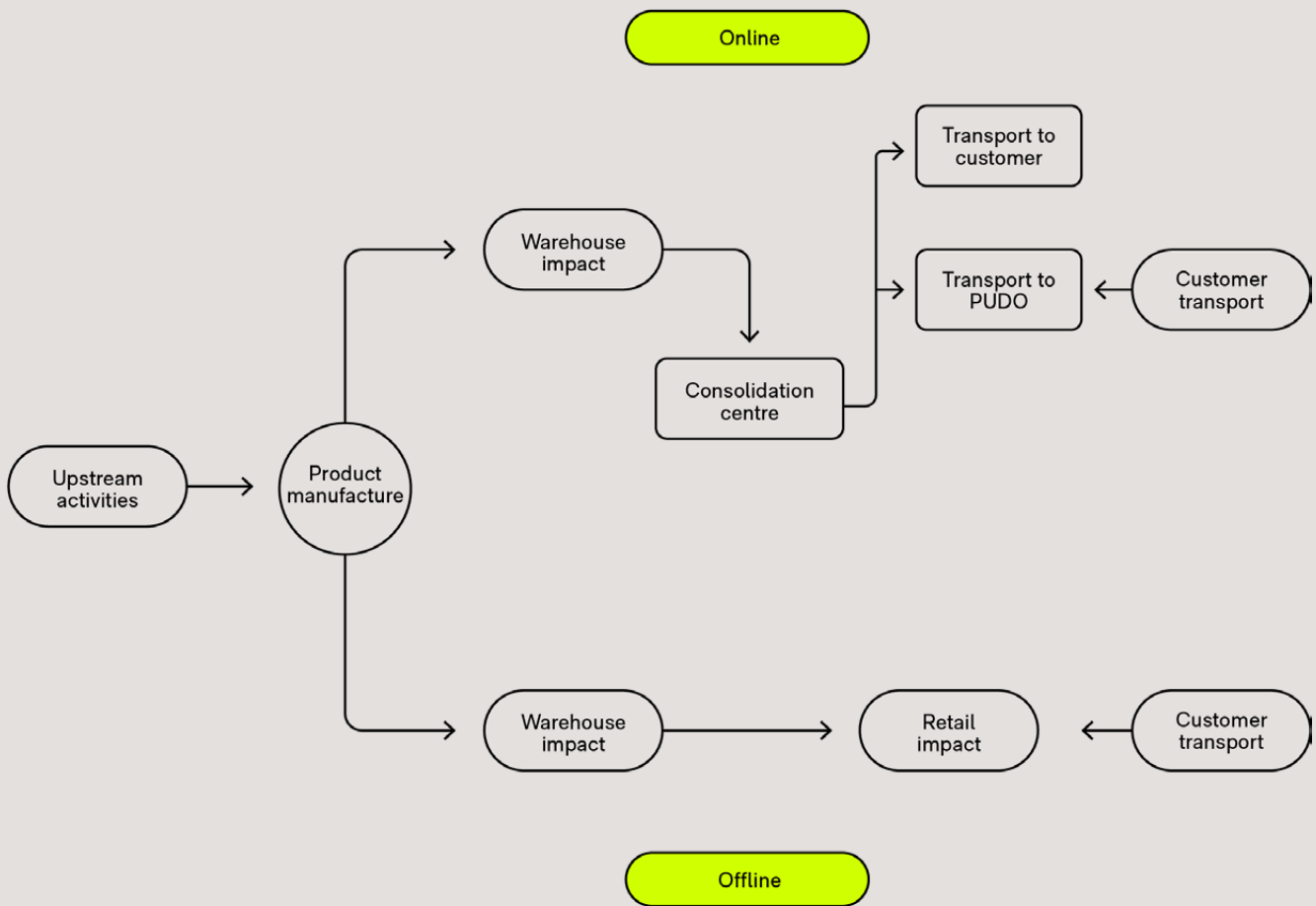
The downstream distribution model covers all the impacts that take place after product assembly up until the point where the product is received by the customer. The model is conceptualised in five phases, taking inputs from the **PEFCR guidelines**[87] on distribution models.

The downstream distribution route has two possible end-routes namely online and offline distribution, with online distribution further sub-divided into **direct-to-customer** and **PUDO** options. The offline distribution pathway assumes the sale of the product taking place at a physical retail store, where the customer would have to travel to the store to buy a particular product.

Phase 1: Product assembly to port

This phase covers the emissions from transportation from the point of assembly/manufacture of the garment to the airport/seaport where the product is shipped.

This was assumed to be covered by truck transportation for a distance of 500 km (Shadia Moazzem et.al., 2021).

[87] See the Product Environmental Footprint Category Rules, Apparel and Footwear.

Phase 2: Transport from origin country to destination country

Then the product is further transported from the seaport/airport to the destination country by ship or plane. A statistical split of the world's major textile exporters was used to define the probability of a garment being produced in a particular country. These were considered to be the origin countries.

The destination countries were assumed to be the Netherlands, specifically the port of Rotterdam, for transport via sea, whereas for transport via air the destination country was assumed to be France, specifically Paris. (Impro textiles, 2014).

The probability of a product being transported by either sea or air was also taken from Impro. Textile 2014, with the probability of air transport being 8% and that of sea transport being 92%.

Phase 3: Local Transportation to warehouse and warehousing emissions

Once the product reaches its destination port, it is further transported to a warehouse. The mode of transport here is assumed to be via truck with a variable distance of between 80-600 km (Impro textiles, 2014, Shadia Moazzem et.al., 2021).

Emissions from warehousing were calculated using a standard dimension of an automated warehouse (Bottani et.al., 2019), with a total floor area of 5200 m2 and usable storage area of 13%.

Heating and cooling factors, lighting factors as well as emissions from material handling equipment were considered for a storage density of 6 pallets/m2 and storage time of 5 weeks.

Phase 4: Emissions after warehouse, transport to customer

The distinction between the online and offline distribution routes start here, with the product being transported to a consolidation centre after it leaves the warehouse in the case of online deliveries. From the consolidation centre, the product can further follow one of two routes- direct tranpsort to customer or transport to pick-Up and Drop-Off (PUDO) point. Vaayu's logistics models were used here to calculate the emissions for both use cases.

In the case of the offline distribution route, the product is assumed to be transported directly from the warehouse to a retail store covering a distance of 30 km (Shadia Moazzem et.al., 2021) by road. The average time spent by a product at the retail store was assumed to be 12 weeks. Average electricity consumption due to a product occupying space at a retail store was calculated, based on an average floor area of 257.8 m2 considering 3000 products occupying this space. Emissions from retail stores were allocated to the product based on the above assumptions.

Phase 5: Impact from customer transport

In the online distribution channel, the customer would have to travel to the PUDO to pick up the product. Emissions arising from this transport are calculated using Vaayu's model for customer self-pickup from a PUDO.

Considering the offline distribution channel, the modes of transport used by customers to travel to retail stores as well as the time taken by them were obtained from a survey conducted for Vinted. The probability split of different modes of transport along with the respective distances covered were used to calculate average emissions caused due to customer travel to retail.

Appendix Q: Delivery Model Details

This section provides details to Vaayu's methodology in modelling carbon emissions from e-commerce deliveries.

The journey of an e-commerce delivery can be split in three key transportation steps called First Leg, Mid Leg and End Leg. A Transportation Leg is defined as a trip between 2 waypoints. For example, a shipment going from A to C through B will have the following 2 legs: - A $\longrightarrow$ B and B $\longrightarrow$ C. Each leg can represent a different distance and different mode of transport, hence the necessity to account for variability and to look at each Transport Leg separately.

Logistics model description: from the origin to the customer
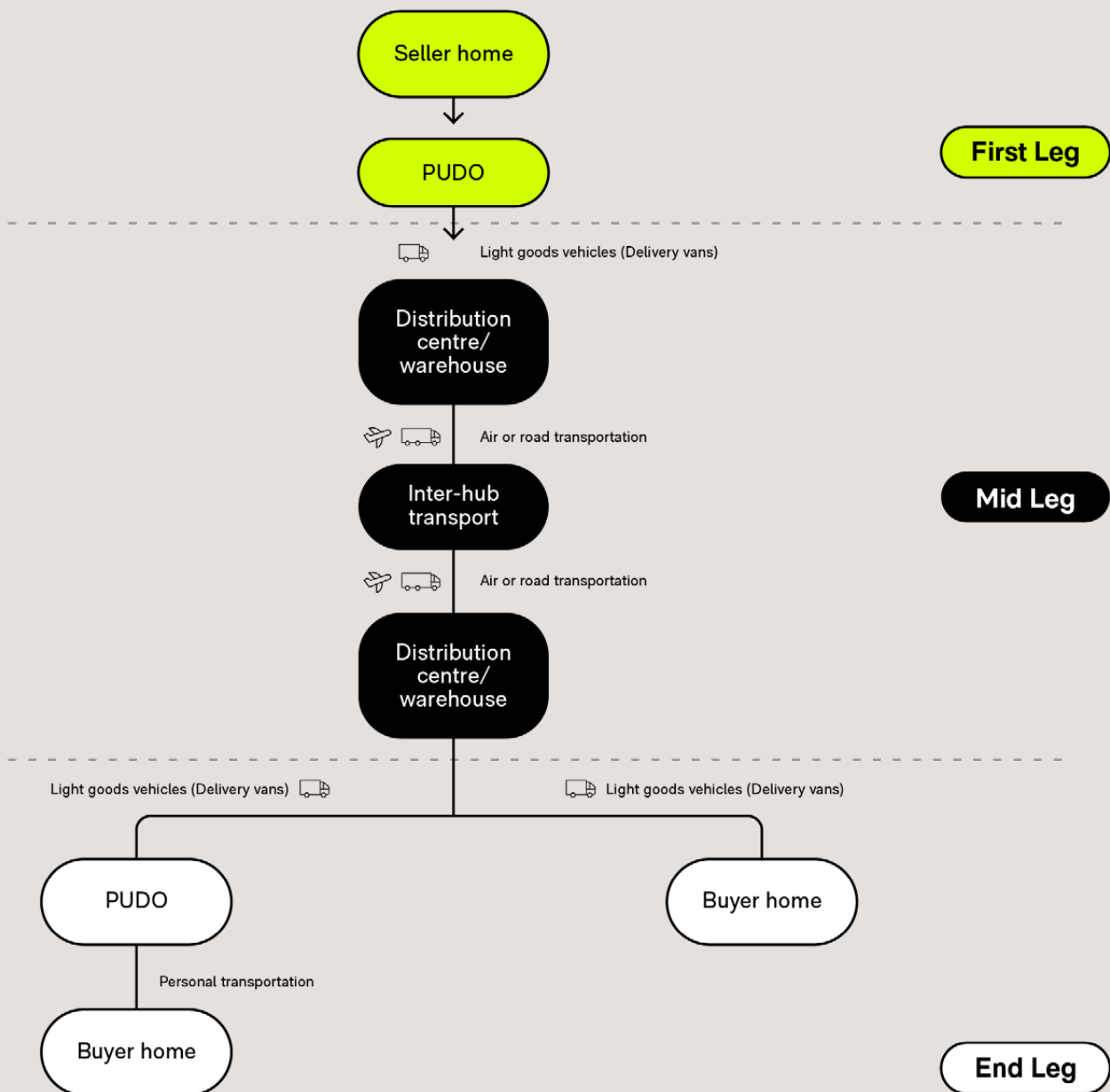
The different variables and scenarios accounted for in the model are listed below:

- **The origin of the package is the seller's house.**

This means that the customer travels to a PUDO to drop off the package. Two of the variables taken into account in the calculation are the distance (calculated based on Vaayu's PUDO density model) and mode of transport. The package is then picked by a delivery van and taken to the nearest consolidation centre. The package can pass a number of waypoints until reaching the final point of pick up. The carbon emissions at these steps of the journey are again calculated based on distance travelled and mode of transport used.

- **The origin of the package is the company warehouse.**

In this scenario the First Leg as visualised in the graph above does not happen, it is skipped. The rest of the journey remains the same.

- **The destination of the package is a PUDO.**

In this case, the package is transported to a consolidation centre near the recipient's house and afterwards to the PUDO. The customer then takes a trip to the PUDO to collect. Three key variables are considered in this instance: mode of transport, distance and the Trip Chaining factor. Trip Chaining is a travel pattern that combines the commuter's daily commitments (non-work-related stops) into one simple trip (home to work or work to home). Trip Chaining is used to calculate the proportion of the emissions that need to be allocated based on the proportion of the journey dedicated to the PUDO trip. This is calculated using the following formula:

$$TCF = t/T$$

TCF = Trip Chaining Factor

T = Total time of the trip

t = Extra time spent due to picking up the package

- **The destination of the package is the customer's home**

In this case, the package is taken from the consolidation centre near the customer's home and delivered directly to the customer's home.

Two other parameters that are considered in the overall calculation of emissions from the delivery are:

- A Bounce Rate which is calculated based on the historical shipments and is applied to the shipments to account for the extra emissions for the bounced leg

- In case the shipment is failed or returned, it is assumed that the shipment is returned to the origin and the emissions are doubled for that particular delivery.

Appendix R: Operational Footprint Methodology

Scope 1 Calculations

Within this scope, emissions from fuel used for company owned/leased cars was calculated. Fuel consumption of petrol and diesel in litres was provided by Vinted or calculated based on price data. This was then converted to kilograms based on their respective fuel densities. The amounts of fuel (in kilograms) were then multiplied by their respective emission factors sourced from DEFRA, UK to give the final carbon emissions resulting from fuel use.

Scope 2 Calculations

The emissions accounted for under this scope arise from heating and electricity in assets over which the company exerts operational control. In Vinted's case, this extends to their offices and server usage. Data for electricity usage was provided by Vinted for all locations except one, for which electricity consumption was calculated using floor area and electricity consumption data as per the ODYSSEE-MURE methodology. Location-based emission factors and market-based factors were utilised from the IEA to calculate the respective emissions as per the source of electricity (grid electricity or green electricity).

Since primary data on heat consumption was unavailable, country-specific heating intensity factors from EU data were multiplied by the respective floor areas to arrive at the total heat consumption. This was then further multiplied by a weighting factor of GHG intensities per fuel type, specific to country energy mixes used to provide heating, to arrive at the final carbon emissions value.

Electricity consumption of the data centres was provided by Vinted, which was then multiplied respectively by location-based emission factors and market-based emission factors from the IEA to arrive at the final emissions value.

Scope 3 Calculations

As previously outlined, this scope includes indirect GHG emissions along the value chain from the following emissions categories:

- Purchased goods and services

- Capital goods

- Energy-related activities not included in Scope 1 or Scope 2

- Waste generated in operations

- Business Travel

- Employee commuting

- Packaging*

- Deliveries*

*Related to purchases on the platform and described in 3.3 Packaging Scope and 3.4 Deliveries Scope

For the emissions from purchased goods and services, capital goods and other energy-related activity, GHG emissions intensity per euro/dollar spent was used to calculate total emissions from spend data. Material waste emission factors from DEFRA UK were used to calculate waste emissions.

While emissions for business travel data were already calculated by Vinted, employee commuting emissions were calculated by extrapolating commuter habits (transport types and distances) from a sample survey over the total number of employees, multiplying them with emission factors from DEFRA UK based on transport fuel type. The detailed breakdown of the activities under Scope 3 and their results can be found in 5.2 Avoided Emissions Results.

Emissions from packaging and deliveries were also included as part of the Scope 3 emissions but have been reported separately. The outline of the methodology for packaging and deliveries can be found in sections 4.3 Packaging Methodology and 4.4 Delivery Methodology respectively.

Appendix S: Alignment with WRI Recommendations

This overview provides a summary of recommendations from the World Resource Institute's neutral framework for Estimating and Reporting the Comparative Emissions Impacts of Products (2019) and to what extent they were adopted in this report.

Type	Reccomendation	Adopted	Comment
1) General principles	If a company reports positive impacts, it should also report a complete inventory of Scope 1, 2, and 3 emissions. Companies should not make claims about positive impacts without being transparent about whether their Scope 1, 2, and 3 emissions are increasing or decreasing.	Yes	A complete inventory of Scope 1, 2 and 3 emissions was calculated separately and is included in Chapter 4.5 Operational Footprint Results. This analysis provides additional, complementary context to inform a more accurate baseline for selected Scope 3 emissions categories.
	Comparative impacts should not be used to adjust (e.g., "net") Scope 1, 2, and 3 emissions.	Yes	See comment above.
	Relevance: Ensure that the comparative assessment appropriately reflects the GHG effects of the assessed product (in relation to the base case) and serves the decision-making needs of users and stakeholders.	Yes	See 4. Methodology.
	Completeness: Include all life cycle GHG emissions (under an attributional approach) or all changes in emissions arising from the assessed product (consequential approach) in the assessment.	Yes, with scope to improve	See 4. Methodology. Market effects should be better estimated in future iterations, e.g. overall consumption patterns, system-level changes towards second-hand.
	Consistency: Use consistent accounting approaches, data collection methods, and calculation methods for the assessed and reference products (attributional approach) and the baseline and policy scenarios (Policy and Action Standard).	Yes, with scope to improve	Future analyses could focus on further reducing uncertainties related to an "average" product.
	Transparency: Provide clear and complete information to allow stakeholders to assess the credibility and reliability of the results, especially those related to key methodological issues, such as the choice of a reference product or baseline scenario.	Yes	See 4. Methodology and 5. Results.
	Accuracy: Reduce uncertainties as far as possible. If the attributional approach is used, limit the validity of the assessment to one year, to minimize the influence of drivers on the assessment's results.	Yes, with scope to improve	See 4. Methodology, including the development of a new primary dataset from Vinted users and use of conservative estimates. There is still high data uncertainty of GHG emissions across product categories due to the variance in raw materials and manufacturing processes, as well as in the Additional Purchase Rate, which can be improved in future analyses.

2) Accounting	Use a consequential approach when comparative impact estimates are used to inform decision-making and whenever market effects mediate comparative impacts. Where a consequential approach is not feasible, use an attributional approach for applications that can be supported with an interim attributional approach. Use only an attributional approach when helping buyers understand the Scope 3 implications of their purchasing decisions.	Yes	See 1. Introduction and 3. Scope.
	When using the attributional approach, - The product GHG inventories for the assessed and reference products should have identical functional units to ensure that the products can be compared on a like-for-like basis; and - The product GHG inventories should be calculated using equivalent methodological considerations, such as performance, system boundary, data types and quality, and allocation procedures.	N/A	-
3) Setting the assessed and referenced product Attributional approach	If the goal is to claim impacts have occurred in the marketplace, select a reference product that represents what is most likely to be sold in the market in the absence of the assessed product, rather than what already exists on the market (e.g., a market average).	N/A	-
Attributional and consequential approaches	If the assessed product is a component of more than one final product in one or more sectors, calculate and report impacts for a few representative final products and reference products to ensure representative results.	Yes	Multiple product categories and different packaging components were assessed. See 4. Methodology.
	When accounting for long-lived products, take the following steps: - Incorporate relevant and identifiable policy and non-policy drivers (e.g., changes in regulatory and market conditions) that are expected to significantly affect the sources/sinks included in the system boundary over the assessment period (e.g., projected changes in efficiency standards). (Note: The Policy and Action Standard explicitly includes these drivers in its analytical framework.) - Alternatively, if the attributional approach is used, limit the validity of the assessment to one year, to minimise the influence of drivers on the assessment's results.	No	Average use was collected in the user survey, but wider policy drivers were not analysed, given that new legislative measures promoting circularity are still to be fully implemented in the EU as part of the Circular Economy Action Plan.
	To account for the GHG impacts of renewable energy products: use "marginal" emissions factors to define the emissions profile of the comparable product.	N/A	-

4) System boundaries Attributional approach	Include the complete product life cycle in the assessment boundary.	N/A	-
	Companies may omit identical life cycle stages in the assessed and reference products, on the basis of modelled, secondary, or primary data.	N/A	-
	As an alternative to excluding life-cycle phases, use proxy data or simplified estimation methods.	N/A	-
	Companies can also omit specific processes in a single product's life cycle when all of the following conditions are met: primary or secondary data cannot be collected; extrapolated and proxy data cannot be determined to fill the data gap, and an estimation determines that emissions from the process areinsignificant.	N/A	-
	If identical life cycle phases or specific processes have been omitted, do not claim that emissions have changed on a percentage basis (e.g., that a product avoids emissions X percent, relative to the reference product).	N/A	-
Attributional and consequential approaches	Disclose any identified trade-offs with other (non-GHG) environmental impact categories.	No	This analysis is exclusively focused on carbon emissions (GHG) calculation. A complementary analysis on the trade-offs with other impact categories is recommended in future research.
	Include all significant positive and negative impacts in the assessment boundary, wherever they occur and whenever they can be assessed using reliable and verifiable data.	Yes	See 4. Methodology.
5) Data quality and uncertainty analysis	Determine the desired level of accuracy and completeness of the assessment on the basis of a range of factors, including the following: - Objectives of the assessment and intended uses and users of the results - Data availability - Capacity, resources, and time available to carry out the assessment	Yes	See 4.6 Avoided Emissions Methodology.
	Collect primary data for all processes under the reporting company's ownership or control.	Yes	See 4.6 Avoided Emissions Methodology and 5.3 Vinted User Survey Results.
	Assess the data quality of activity data, emissions factors, and emissions data following the GHG Protocol Product Standard. That is, assess data quality against five data quality indicators: technological representativeness, geographical representativeness, temporal representativeness, completeness, and reliability.	No	Not specifically, but data quality has been assessed and disclosed throughout the report.

	Conduct and report the results of quantitative and/or qualitative uncertainty assessments.	Yes	See 5. Results.
	Match the rigor of the uncertainty assessment to the objectives of the assessment, the required level of accuracy, data availability, and resources. See Chapter 10 of the Product Standard (attributional approach) or Chapter 12 of the Policy and Action Standard (consequential approach) for further guidance.	No	Not specifically, but uncertainties in every part of the model are reported.
	Particularly for products with a long use phase, conduct a sensitivity analysis of key parameters and assumptions in the assessment. Key parameters are those that are highly variable or most likely to significantly affect the results.	No	Data on laundry habits was not collected, since Vinted has limited leverage on the use phase of products traded on the platform. This can be further improved in the next iteration if relevant.
	Where uncertainty is high (e.g., multiple baseline options seem equally likely), use the most conservative assumptions.	Yes	See 4.6 Avoided Emissions Methodology.
6) Attribution	If the assessment has been performed with value chain partners, conduct attribution on the basis of a percentage that is agreed upon with those partners.	N/A	-
7) Scaling results to a product's market size Attributional approach	As a starting point, use actual (ex-post) or estimated (ex-ante) sales records or, if sales data are unavailable, production or shipment numbers. Where possible, adjust these data to reflect only the number of products estimated to replace existing or future stock.	N/A	-
	Report results at the functional unit level separately from results at the market level.	N/A	-
Consequential approach	Consequential approaches are inherently better at addressing market effects and are therefore preferred, especially if market effects are likely to be significant.	Yes	A consequential approach is used.
			-

8) Reporting	Make clear that the comparative impact is not equivalent to changes in the amount of GHGs emitted into the atmosphere.	Yes	See the penultimate page of this report for a Disclaimer.
	When using the attributional approach, clearly describe the assessed and reference products, and why they were selected, and report the life-cycle emissions for each.	N/A	-
	When using a consequential approach, clearly describe the baseline and policy scenarios, and why they were selected, and report the emissions of each.	Yes, with scope to improve	See 4. Methodology. Market effects should be better estimated in future iterations, e.g. overall consumption patterns, system-level changes towards second-hand.
	Mention that the total comparative impact reflects the collective effort of the entire value chain.	Yes	Impacts across the whole value chain are discussed in 1. Introduction, 4. Methodology and 5. Results.
	Report the total comparative impact and, for solutions that are intermediate products, qualitatively describe how the assessed product contributes to comparative impact of the final product.	Yes	See 5. Results including separation into life-cycle stages.
	Describe the assumptions, data sources, and methodologies used to estimate the comparative impacts.	Yes	Throughout, see 3. Scope and 4. Methodology.
	If attribution is attempted, report the attribution method and ratio.	Yes	Economic allocation is used to deal with multifunctional processes. While cut-off allocation is used to not allocate production & distribution impacts for the second life of the item.
	Provide a quantitative estimate or qualitative description of the uncertainty of the results, as well as the range of results from sensitivity analyses for key parameters and assumptions.	Yes	See 4. Methodology (e.g. GHG emissions range of product categories, replacement rate, delivery scenarios).
	Disclose any identified trade-offs with other (non-GHG) environmental impact categories.	No	-

When estimating the aggregate comparative impact for product portfolios	Describe how products were selected for inclusion in the portfolio-wide estimate and describe the methods used to obtain this estimate (e.g., any extrapolation techniques).	Yes	See 4. Methodology. Based on sales history in multiple markets, so that the distribution of Vinted transactions were appropriately represented.
	Describe the number of products assessed and the percentage these products represent in terms of the company's total product portfolio.	Yes	See 4. Methodology. Total transactions, number of product categories and category share was assessed in the calculation. Category share was not disclosed due to commercial sensitivity.
	Describe the products that have been excluded from the portfolio assessment.	Yes	"New With Tags" products excluded. See 4.6 Avoided Emissions Methodology and 6. Appendices, Appendix J.
	Consider getting external stakeholder feedback on the credibility of the accounting methodology.	Yes	Feedback on Methodology and Results was provided by an independent academic expert and integrated. The report has not been peer-reviewed.
9) Setting targets	Before setting targets for comparative impacts, companies should set science-based reduction targets for their Scope 1, 2, and 3 emissions (e.g., to reduce Scope 3 emissions from sold products).	N/A	Targets not yet set.
	Companies should not set ratio targets (including net-positive targets) unless (1) the impacts have been estimated for a company's entire product portfolio using a consequential approach that covers negative and positive impacts and (2) the GHG inventories are comprehensive and conform to GHG Protocol requirements.	N/A	Targets not yet set.
If comprehensive impact estimates and inventories are unavailable	Consider setting targets for product performance and R&D. For example, "Company A will increase the number of products that have a positive impact by 30 percent by 2020" or "Company B will increase the share of zero- and low-carbon products to X percent of overall products."	N/A	Targets not yet set.
	Make secondary claims (but not set targets) regarding the positive impacts associated with these products. For example, "Company C avoided X tons of emissions through increased sales of products in its Green Portfolio."	N/A	Targets not yet set.

Disclaimer

This report is a complementary calculation to estimate the comparative climate impact of buying second-hand on Vinted instead of a new product. The net climate impact does not replace Vinted's corporate carbon inventory accounting, which is listed separately in this report (see 5.6 Operational Footprint Results).

The comparative climate change impact calculated is therefore not equivalent to the amount of greenhouse gases emitted into the atmosphere, and it does not mean that any item purchased on Vinted generates zero carbon emissions. All items and companies have a footprint, even in a world run on 100% renewable energy.

Avoided emissions is, however, a valuable calculation for comparing one choice's impact to another.

Vinted
Climate
Impact
Report

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