



## Deciphering the EU's packaging landscape for delivery and takeaway food

Quantification of environmental aspects for the disposable packaging of delivery and takeaway food for the Netherlands, Belgium, Germany, France, Spain and EU28 through iterative collaborative research

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## About the report

This report is part of a broader [study](#) commissioned by Zero Waste Europe to Recycling Netwerk Benelux (RNB), as part of a European project – called the ReuSe Vanguard Project (RSVP) – which includes stakeholders from 5 European countries, namely Belgium, The Netherlands, Germany, Spain and France.

With the broader study, we aim to highlight the findings related to the concrete packaging sectors that present the biggest potential in terms of their environmental impacts as well as the feasibility of replacing single-use with reusable packaging in the coming years. This dedicated report gives more detailed results of the first part, which relates to the packaging used for delivery and take-away food.

*Part of a study produced by José Potting (ed.), Bram Honig (Recycling Netwerk Benelux) & Jason Wilcox (Reloop) (Utrecht, February 2022) for Zero Waste Europe.*

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## Project partners



## Funding





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## Summary

In the spring of 2021, Zero Waste Europe (ZWE) started the ReuSe Vanguard Project (RSVP). The goal of RSVP is for “Reusable solutions for packaging for beverages, takeaway drinks, and food as well as online delivery to get to scale in Europe and become the new normal in the sectors selected”. An essential part of RSVP is to “Map the packaging landscape in Europe and detect the Ecosystemic Leverage Points (ELPs)” through an iterative collaborative research. ZWE tasked Recycling Netwerk Benelux (RNB) to take the lead in this iterative collaborative research. The other collaborators, besides ZWE (Belgium) and RNB (the Netherlands), were RSVP’s core stakeholders ECOS (Europe), ENVIU (the Netherlands), Deutsche Umwelthilfe (Germany), Reloop (global), Retorna (Spain), Rezero (Spain), and Zero Waste France (France).

The iterative collaborative research was performed in two parts. The first part quantified 20 products in terms of the type and weight of their packaging, the amount of resources (raw materials) needed to produce this packaging, and the quantities and types of waste and environmental pressures associated with this. The second part qualitatively assessed the possibilities for shifting from disposable to reusable packaging (or none) for seven products identified from the 20 products covered in the first part.

This report provides the results of the first part for disposable boxes and containers used to pack delivery and takeaway food (i.e., meals for direct consumption). The achieved results for the packaging of delivery and takeaway food start from the number of food orders as calculated from uncertain data about the market size values for the included countries and EU28. These uncertain market value data are subsequently multiplied with uncertain data about the types and material composition of disposable food boxes and containers used. The results are therefore not very accurate but do give an indication of the amount of disposable boxes and containers involved for delivery and take away food.

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## 1. Introduction

In the spring of 2021, Zero Waste Europe (ZWE) started the ReuSe Vanguard Project (RSVP). The goal of RSVP is for “Reusable solutions for packaging for beverages, takeaway drinks and food, as well as online delivery to get to scale in Europe and become the new normal in the sectors selected”. RSVP consists of two phases. Phase 1 will identify necessary logistic, legislative, media and economic conditions resulting in plans to successfully shift three to five product and market segments, referred to as ‘Ecosystemic Leverage Points’ (ELPs), from disposable to reusable packaging (or none). The actual transitions are to take place in Phase 2.

An essential part of Phase 1 is to “Map the packaging landscape in Europe and detect the potential ELPs” through an iterative collaborative research. ZWE tasked Recycling Netwerk Benelux (RNB) to take the lead in this iterative collaborative research. The other collaborators, besides ZWE (Belgium) and RNB (the Netherlands), were RSVP’s core stakeholders. These core stakeholders were ECOS (Europe), ENVIU (the Netherlands), Deutsche Umwelthilfe (Germany), ReLoop (global), Retorna (Spain), Rezero (Spain), & Zero Waste France (France).

There is a wide range of products on the market, many of which are being sold in different types of packaging. One example is delivery and takeaway food in disposable boxes and containers. It would have been impossible to decipher in depth the whole packaging landscape for each product on the market. The iterative collaborative research therefore took a funnel approach to arrive at the five products qualifying as ELPs, for which plans to shift their packaging from disposable to reusable (or avoided) ones are to be developed. The focus in the iterative collaborative research was on disposable packaging.

The funnel approach started from all products, which were then narrowed down in eight steps to the final five products qualifying as ELPs. The first five steps made up the first part, and the next three steps constituted the second

part of the iterative collaborative research. The funnelling steps were at the beginning of each part, and concluded the second part. The approach for the first part took the following steps:

1. Selecting 20 products in order to quantify their disposable packagings
2. Quantifying the consumption of the selected products
3. Quantifying their disposable packaging and the materials from which these are made
4. Quantifying the environmental pressures for producing the packaging materials
5. Identifying the rates of waste recycling and littering of the empty packaging

The second part of the iterative collaborative research qualitatively assessed the prospects for shifting from disposable to reusable packaging (or none) for seven products identified as potential ELPs from the 20 products covered in the first part. One of these products was warm takeaway drinks. This report provides the results for the first part for disposable containers used to pack delivery and takeaway food (i.e., meals for direct consumption).

The body of the report starts with a description of the product to be packed, here delivery and takeaway food falling under food and catering services, then explores the number of food orders in the selected countries and EU28, before going into quantifying the disposable boxes and containers for packing the ordered food. The report closes with some main conclusions.

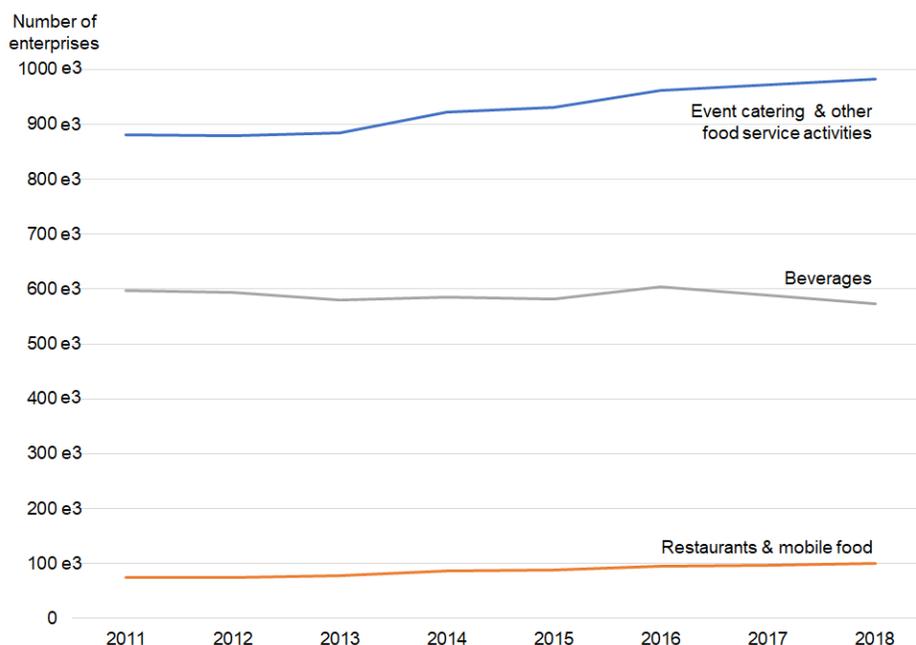
The quantification uses the newest available data, which is from before the disruptive Covid-19 pandemic emerged.

## 2. Results and discussion

### 2.1 Food and beverage services

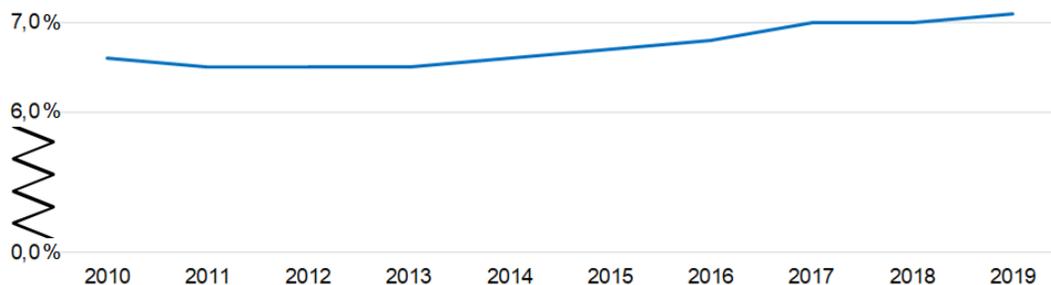
Food and beverage service activities is an Eurostat-container term for service activities providing food, snacks, drinks and refreshments for onsite or off the premises consumption (i.e. takeaway and delivery food). Eurostat’s enterprise-statistics splits food and beverage service activities into beverage service activities, restaurants and mobile food services activities and catering and other food service activities (together spanning up food and beverage service activities). Over the last decade, EU28 shows an increase in the number of enterprises for restaurant & mobile food and event catering & other food service activities and a slight decline in the number of enterprises for beverage service activities (see figure 1) ([Eurostat, 2021a](#)).

Figure 1: Number of enterprises in beverages, restaurants & mobile food, and event catering & other food service activities in EU28 ([Eurostat, 2021a](#))



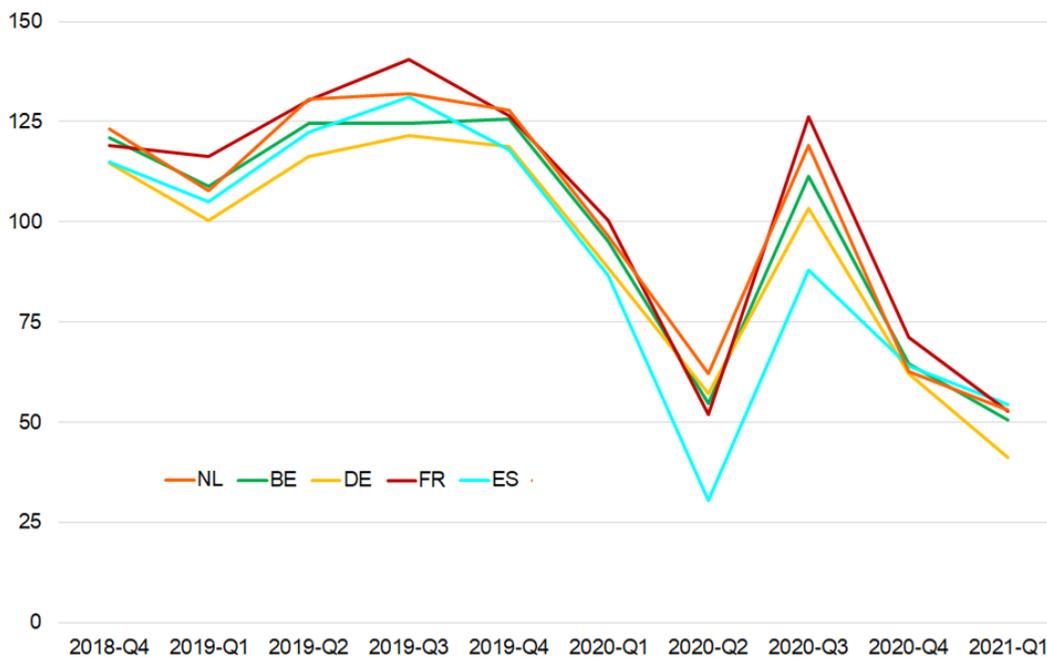
In line with the overall increase of enterprises for food and beverage service activities, household expenditures on catering services in the EU28 also increased between 2008 and 2019 (see figure 2). Household expenditures in 2019 were 7.1% of total household expenditures on average, with the lowest percentage of household expenditure being 3.0% in Poland and the highest being 13.3% in Spain. It should be noted that a household according to the Eurostat-statistics consists of two or more persons sharing a common accommodation or address (i.e., excluding one-person households) ([Eurostat, 2020](#); [Eurostat, 2021b](#)).

Figure 2: Expenditures on catering services of EU28-countries from 2010 to 2019 as percentage of total expenditures ([Eurostat, 2021b](#))



[Eurostat \(2021b\)](#) does not yet provide data about household expenditures on catering services for 2020 onwards, and neither does [Eurostat \(2021a\)](#) for the number of enterprises with food and beverage service activities. However, food and beverage service activities worldwide, including Europe, went largely down when the Covid-19 pandemic fiercely hit the world around March. In Europe, this initially caused a sharp decline in the total turnover of food and beverage service activities due to lockdowns in most European countries (see figure 3). There was a fairly good recovery during late spring and early summer, when infection rates were low as a result of which lockdowns were relieved. This situation unfortunately turned around again, when lockdowns needed to be reinstalled after the Covid 19-infections surged again in late summer ([Eurostat, 2021c](#)).

Figure 3: Total turnover for food and beverage service activities in the Netherlands (NL), Belgium (BE), Germany (DE), France (FR) and Spain (ES) from the last quarter in 2018 up to, and including the first quarter in 2021 (2015 = 100; no seasonal adjustment) ([Eurostat, 2021c](#))



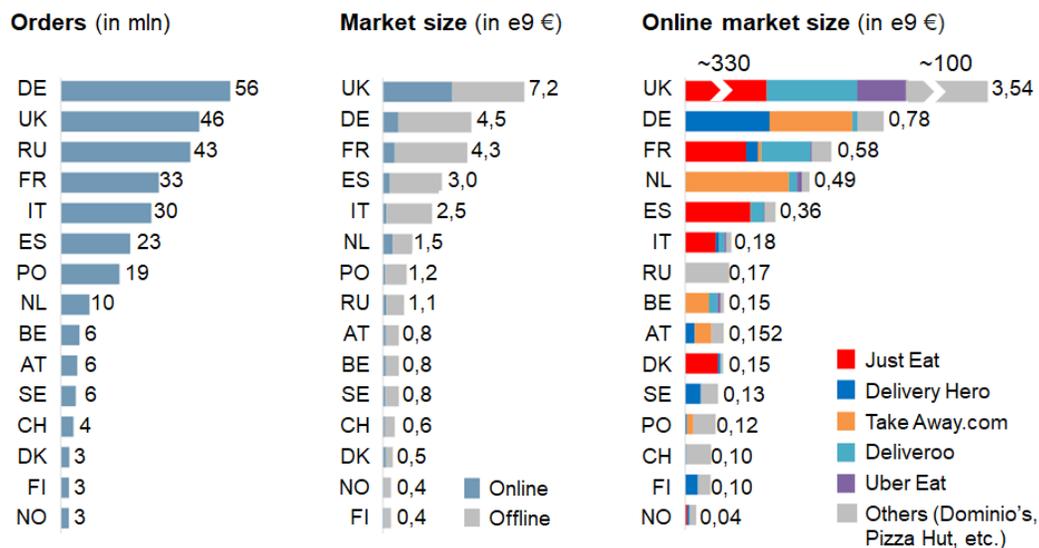
## 2.2 Delivery and takeaway food services

Before the Covid-19 pandemic, i.e. in 2019, European food and beverage enterprises consisted of 41% full service restaurants, 25% quick service restaurants, 32% cafés and bars, and 2% street food facilities. On a global scale, 70% of services were provided onsite, whereas 23% was taken away by consumers, and 7,5% was delivered to consumers. This was a shift from 2014, when nearly 75% was still consumed on site, a bit more than 21% was delivered, and less than 4% was taken away ([Deloitte, 2020](#)).

[Dealroom & Prioridata \(2017\)](#) provide data about the number of received orders and the market size of, presumably, food delivery services in 2016 (see

figure 4). [Dealroom & Prioridata \(2017\)](#) do not indeed explicitly mention whether the specific data relates to food delivery per se, nor the exact year to which the data relates. However, the whole publication is about food delivery and was released in March 2017. Around that time, online ordering of food was far less important than offline ordering of food, and just a few large platforms were taking care of these online orders (see figure 4).

Figure 4: Overview of number of orders, possibly false<sup>1</sup>, (online) market size for, probably<sup>1</sup>, food delivery in Germany (DE), the United Kingdom (UK) Russia (RU) France (FR), Italy (IT), Spain (ES), Poland (PO), the Netherlands (NL), Belgium (BE), Austria (AT), Sweden (SE), Switzerland (CH), Denmark (DK), Finland (FI) and Norway (NO) in, probably, 2016<sup>1</sup> (in gross market value), and market shares<sup>1</sup> of deliverers ([Dealroom & Prioridata, 2017](#))



One may question the reliability of the data in figure 4 as market size divided by the number of orders results in some 100 to 150 euro per delivery. That seems excessive. According to ABN-AMRO (2017), the average price of a food delivery in the Netherlands was 11.40 euro in the second quarter of 2017.

<sup>1</sup> See main text about order numbers and whether or not food delivery and the year to which the data relate. For the market share of online delivery, [Dealroom & Priority data \(2017\)](#) provides two slightly inconsistent stack diagrams. No explanation is given for the differences between both stack diagrams.

Furthermore, according to the Food Services Institute Netherlands ([FSIN, 2019](#)), the Dutch market size for food delivery was 1,200 mln euro in 2016, 1,500 mln euro in 2017, 1,700 mln euro in 2018 and 1,900 mln euro in 2019. The 1,500 mln of [Dealroom & Prioridata \(2017\)](#) seems thus a bit high, given that it probably relates to 2016 (the publication itself is from March 2017). [FSIN \(2019\)](#) is considered a reliable source.

According to [Statista \(2021a\)](#), the combined market size for delivery and takeaway food in 2017 was 6,100 mln euro for the United Kingdom, 2,800 mln euro for Italy, 2,200 mln euro for Spain, and 2,000 mln euro for France, 700 mln for Switzerland, 300 mln euro for Ireland and Denmark, and 200 mln euro for Norway. Except for Switzerland and Italy, all these numbers for delivery and takeaway food combined are (very) low compared to the ones in figure 4, which are for delivery only. It is unclear where [Statista \(2021a\)](#) took its data from.

In summary, the food delivery and takeaway market value data from [Dealroom & Prioridata \(2017\)](#) is in the right order, but may not be entirely accurate. Unlike [FSIN \(2019\)](#) and [Statista \(2021a\)](#), however, it contains data for countries of relevance here (i.e. the Netherlands, Belgium, Germany, France and Spain). In that context, the data from [Dealroom & Prioridata \(2017\)](#) is considered good enough.

[Deloitte \(2020\)](#) provides data for 2019 about the type of food consumed in several European countries (table 1). For the Netherlands, which is not one of the countries in [Deloitte \(2020\)](#), similar data for 2016 is provided by ABN-AMRO (2016). The data show some alignment between countries, although there are also clear differences. The differences between the Netherlands and the other countries may trace back in part to being derived from different data sources.

Table 1: Food types services in the Netherlands (NL) in 2016 (ABN-AMRO, 2016), and France (FR), Germany (DE), Spain (ES), Italy (IT) and the United Kingdom (UK) in 2019 ([Deloitte, 2020](#))

Food type	NL	DE	FR	ES	IT	UK
Italian	4%	5%	6%	4%	47%	5%
Other European	16%	25%	45%	60%	8%	10%
Pizza	8%	13%	8%	11%	32%	9%
Asian	13%	6%	6%	9%	2%	21%
Middle Eastern	5%	18%	7%	1%	<1%	13%
Latin American	2%	2%	1%	1%	1%	1%
North American	<sup>1)</sup> 16%	17%	17%	9%	3%	9%
Chicken		1%	2%	1%	<1%	5%
Bakery	<sup>2)</sup> 16%	4%	7%	2%	3%	16%
Other	<sup>3)</sup> 20%	8%	1%	3%	4%	10%

<sup>1)</sup> Breakfast in ABN-AMRO (2016)

<sup>2)</sup> French fries & fast food (16%) in ABN-AMRO (2016)

<sup>3)</sup> Lunch (18%) and unspecified (2%) in ABN-AMRO (2016)

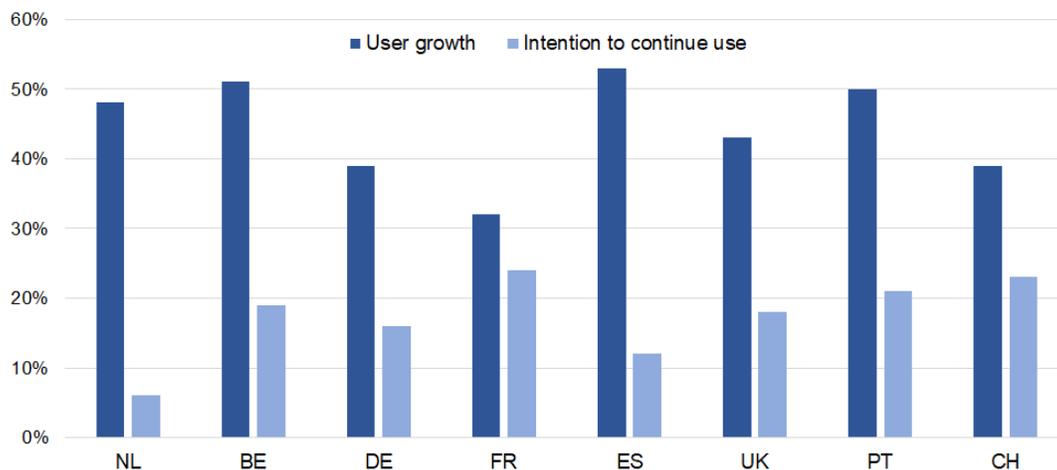
When the Covid-19 pandemic forced food and beverages enterprises to close, many restaurants and mobile food enterprises added food delivery to their services ([Restaurant business, 2020](#)). [ABN-AMRO \(2020\)](#) provides the increase in food delivery services from January up to and including November 2020 compared to the same months in 2019 for the Netherlands (see figure 5). Contrasting figure 3, which shows a steep fall in total turnover for food and beverage service activities as a whole, figure 5 shows a sharp increase for food delivery service activities.

Figure 5: Percentage growth in delivery services from January up to and including November 2020, compared to the same months in 2019 for the Netherlands ([ABN-AMRO, 2020](#))

January	February	March	April	May	June	July	August	September	October	November
28%	35%	34%	97%	93%	58%	57%	62%	47%	77%	76%

[Statista \(2021b\)](#) shows that for a couple of European countries, including the Netherlands, over the whole of 2020 considerably more consumers started to use food delivery services and many consumers intend to continue to make use of these services (see figure 6). Takeaway services also increased notably since the start of the Covid-19 pandemic, although not as much as delivery services ([ABN-AMRO, 2021](#)). Although the ordering of delivery and takeaway food declined once again when food service enterprises reopened (temporarily) during the low infection summer period, it is believed that the market for delivery and takeaway food will not return to the situation before the Covid-19 pandemic ([ABN-AMRO, 2021](#); [Deloitte, 2020](#); [McKinsey, 2020](#)).

Figure 6: Percentage growth in delivery services and consumers who intend to continue using food delivery services in the Netherlands (NL), Belgium (BE), Germany (DE), France (FR), SPain (SP), United Kingdom (UK), Portugal (PT) and Switzerland (CH) in 2020 ([Statista, 2021b](#))



## 2.3 Packaging or delivery and takeaway food

The market size values for the Netherlands, Belgium, Germany, France and Spain in figure 4 have been taken as a starting point for calculating the packaging for delivery and takeaway food. As discussed in section 2.3, the reliability of this data may be questioned, but the market size for the Netherlands is in the direction of (reliable) data from [FSIN \(2019\)](#), while the data of [Statista \(2021a\)](#) for France and Spain are remarkably low. Therefore the data in figure 4 are accepted as reasonable estimates for the 2016 market size for delivery and takeaway food for the selected countries.

The data in Figure 4 relate to food delivery only. According to ABN-AMRO (2016), in 2016, the Dutch market consisted of 36% delivery of food and 64% takeaway of food. Assuming the same market distribution for other countries and also the same market increase as in the Netherlands, as well as applying the average Dutch price for food delivery to takeaway food, the number of food orders has been calculated for the Netherlands, Belgium, Germany, France and Spain in 2019. The number of delivery and takeaway food orders for EU28 has been calculated by extrapolating from the number of Dutch inhabitants (17,3 mln) to EU28 inhabitants (513.1 mln) ([Eurostat, 2021d](#)), and by correcting for the EU28 (7.1%) versus Dutch (6.7%) share in total expenditures (see table 2). Obviously the numbers in table 2 are not very accurate, but they are still considered acceptable due to a lack of better data. Corrections with inflation over the years or purchase power parity between countries have not been applied as this at most would have suggested, but not really contributed to a decrease of the uncertainty of the calculated values.

Table 2: The roughly estimated number of orders of delivery and takeaway food for the Netherlands (NL), Belgium (BE), Germany (DE), France (FE) and Spain (ES) in 2019 as calculated from a number of assumptions (see main text)

	NL	BE	DE	FR	ES	EU28
No. of orders	570 mln	304 mln	1,710 mln	1,634 mln	1,140 mln	17,946 mln
- Pizzas	46 mln	24 mln	222 mln	131 mln	125 mln	1,435 mln
- Others	524 mln	280 mln	1,488 mln	1,504 mln	1,015 mln	16,502 mln

A common packaging for pizzas is a disposable cardboard pizza box (see figure 7). The order composition from table 1 has been used to calculate the number of pizza orders. The percentage of pizza orders for Belgium is missing in Table 1 and has been put on a par with the Netherlands and France. The rest of the orders are for all other food types that can be in different types of packaging (see figure 7 for some typical examples).

Figure 7: Examples of typical disposable food containers ([Verburgt, 2020](#)) and a typical disposable pizza box, including their weight and material composition



The specific disposable 100% cardboard pizza box in figure 7 weighs 130 g and is suitable for pizzas with a cross section of 33 cm. This disposable pizza box has been used to calculate the packaging weight involved in packing delivery and takeaway pizzas in the selected countries and EU28 (see table 3). The weight of disposable pizza boxes from table 3 has been multiplied using conversion factors to calculate environmental pressures from the production of the materials (from resource extraction up to and including material production, i.e. excluding manufacturing packaging from those materials). The environmental pressures covered are the use of renewable and non-renewable energy carriers, global warming, eutrophication, land use, and water consumption. The conversion factors used are widely used in life cycle assessment (LCA) studies and can be extracted from all mainstream LCA software.

Table 3 also indicates that disposable pizza boxes in principle are not recycled. That is because their packaging typically contains smears of pizza leftovers, which makes them unsuitable for recycling. Disposable pizza boxes therefore should not be discarded as cardboard and cardboard waste, but instead be put with the commingled waste.

According to the national Dutch monitoring of litter, disposable food boxes and containers make up 2% of total littering in the Netherlands, while bags for takeaway food make up 3%. The 2% for disposable food boxes and containers applies to all types of food packaging, thus including disposable pizza boxes and disposable containers for other types of food, which are not separately mentioned ([Lieverse & Ter Beek, 2020](#)). The percentages for disposable food boxes, containers, and bags are assumed to apply to the other countries and EU28 as well (see table 3 and 5). Bags for takeaway food are not quantified in this report.

Table 3: Overview of the number and weight of disposable cardboard boxes for delivery and takeaway pizzas, recycling and incineration percentages, and contributions to grey (non-renewable) and green (renewable) energy, global warming (GW), eutrophication (EU), land use (LU) and water use (WU) for the Netherlands (NL), Belgium (BE), France (FR), Spain (ES) and European Union (EU) in 2019 (see text above for used sources)

Countries	NL	BE	DE	FR	ES	EU28
Pizza boxes (mln pieces)	46	24	222	131	125	1,435
Cardboard (ton)	5,929	3,162	28,904	16,997	16,305	186,539
Grey energy (TJ)	87,6	46,2	422,5	248.46	238.4	2,726.7
- Fossil energy	76,9	41,0	374.7	220.3	211.4	2,418.3
- Nuclear energy	9,8	5,2	47.6	28.0	26.8	307.0
- Biomass	0.0	0.0	0.2	0.1	0.1	1.4
Green energy (TJ)	51.8	27.6	252.5	148.5	142.4	1,629.3
- Biomass	48.6	25.9	237.1	139.4	133.7	1,530.0
- Wind, solar, geoth.	1.0	0.5	4.8	2.8	2.7	31.20
- Hydro	2.2	1.2	10.6	6.2	6.0	68.1
GW (ton CO <sub>2</sub> -eq.)	5,711	3,046	27,842	16,372	15,705	179,680
EU (ton PO <sub>4</sub> -eq.)	14	8	70	41	40	452
LU (10 <sup>3</sup> m <sup>2</sup> a crop-eq.)	2,349	1,253	11,452	6,734	6,460	73,909
WU (10 <sup>3</sup> m <sup>3</sup> )	76	41	371	218	209	2,393
Recycling (%)	> 0	> 0	> 0	> 0	> 0	> 0
Incineration (%)	< 100	< 100	< 100	< 100	< 100	< 100
Share in litter (%)	2	2	2	2	2	2

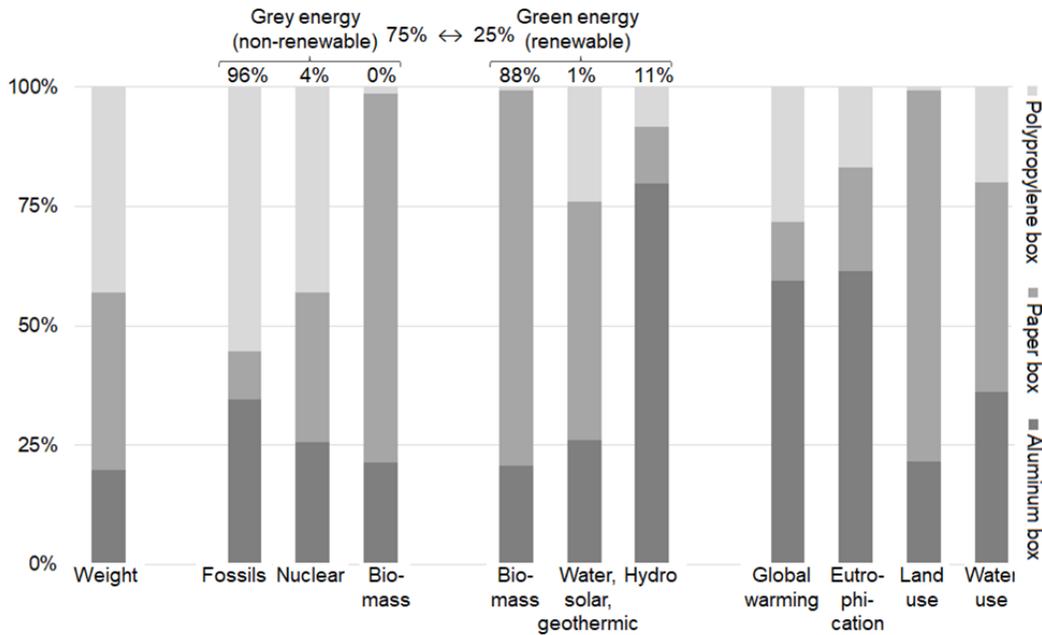
A wide variety of packaging can be used and is also used for other types of food that make up the majority of the food orders. Exact data is not available.

[Verburgt \(2020\)](#) distinguishes between three typical food containers used for other types of food than pizza (see figure 7). For each of these three containers, the total weight has been calculated if all food would be provided in just one of them (see table 4). Similarly, the relative contribution of each food container to energy use and environmental impact for the cradle-to-gate production of the materials per food container have been calculated by multiplication with similar conversion factors as were used for the disposable pizza boxes. Figure 8 shows how the polypropylene, coreboard and aluminium containers perform in relation to each other.

Table 4: Overview of the estimated total weight of containers if all delivery and takeaway food not being pizzas would be exclusively packed in either polypropylene, coreboard or aluminium food containers in the Netherlands (NL), Belgium (BE), France (FR), Spain (ES) and European Union (EU) in 2019

Countries	NL	BE	DE	FR	ES	EU28
If all food containers would exist of typical polypropylene ones (see figure 7)						
Total (ton)	16,522	8,812	46,871	47,362	31,966	519,798
If all food containers would exist of typical coreboard ones (see figure 7)						
- Core board (ton)	13,695	7,304	38,851	39,258	26,496	430,855
- Polyethylene (ton)	624	333	1,771	1,789	1,208	19,637
Total (ton)	14,319	7,637	40,622	41,047	27,704	450,492
If all food containers would exist of typical aluminium ones (see figure 7)						
- Aluminium (ton)	3,986	2,126	11,309	11,427	7,712	125,412
- Core board (ton)	3,462	1,846	9,821	9,923	6,698	108,910
- Polyethylene (ton)	157	84	446	451	304	4,950
Total (ton)	7,605	4,056	21,576	21,802	14,714	239,272

Figure 8: The relative contributions of one polypropylene food container, one coreboard food container and one aluminium food container to the shown energy uses and environmental impacts



Given the uncertainties around the number of orders and used types of food containers, and since it is unknown which food containers are used in what quantity in the selected countries and EU28, it was deemed irrelevant to calculate total energy use and environmental impact for the selected countries and EU28.

There is some data from Germany, which can give perspective to the calculated weights in table 4. [NABU \(2017\)](#) and [GMV \(2018\)](#) provide the weights of disposable food boxes and containers in German waste. The German data and the data in table 4 'compare' as follows:

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German data		Table 3 & 4 data (assuming all food containers are made up of one material only)
92.869 ton	< coreboard >	28,904 ton pizza boxes 40,622 ton containers for other food
20,786 ton	< Plastic / polypropylene >	46,871 ton containers for other food
6,125 ton	< Aluminium >	21,576 ton containers for other food

The data shows that the combined weight of the disposable cardboard pizza boxes and containers for other food in table 3 and 4, table 4 assuming that all other food containers are made of coreboard, is lower than [NABU \(2017\)](#) and [GMV \(2018\) report](#). These latter two reports quantify the actual weight of coreboard food boxes and containers in German waste. It looks like the numbers in table 3 and 4 are on the low side. This may be because order numbers are estimated too low or the weight of the typical disposable food boxes and containers in figure 7 are too low/not representative of disposable food boxes and containers in Germany. The opposite applies to the disposable coreboard and aluminium food containers.

Disposable coreboard food containers are, similarly to disposable pizza boxes, in principle not recycled. The smears of food leftovers make them unsuitable for recycling. Polypropylene and aluminium food containers can in principle be recovered from commingled waste for recycling. Table 5 gives the recycling percentages for the materials in the relevant food containers involved.

Table 5: Recycling percentages for plastics (polypropylene and low-density polyethylene) in relevant containers used for delivery and takeaway food not being pizzas in the Netherlands (NL), Belgium (BE), France (FR), Spain (ES) and European Union (EU) in 2019

Countries	NL	BE	DE	FR	ES	EU28
Plastic						
- Recycling (%)	52.0	42.4	47.1	26.9	50.7	41.8
- Incineration (%)	42.3	56.3	52.8	43.0	15.4	33.6
Metals (aluminium)		98.2	91.7	87.1	84.0	80.1
- Recycling (%)		0.0	1.0	1.0	0.0	0.7
- Incineration (%)						
Share in litter (%)	2	2	2	2	2	2

It should be noted that the recycling percentages from [Eurostat \(2022e\)](#) in Table 3 and 5 differ across countries in the way they are established, and in some cases are calculated from the weight of collected plastic packaging (that is, without excluding losses from sorting and cleaning). The European Commission has recently published Directive 2018/852 ([EC, 2018](#)) and Implementing Decision 2019/655 ([EC, 2019b](#)) to harmonise the way of establishing the percentage of recycled packaging materials, i.e. the recycling results for countries.

Directive 2018/852 ([EC, 2018](#)) and Implementing Decision 2019/655 ([EC, 2019b](#)) entered into force on 5 July 2020, and may first be implemented in 2021 by the selected countries. However, [Brouwer et al. \(2019\)](#) and [Van Velzen et al. \(2010\)](#) explored the influence of the new way of establishing the percentage by recalculating the Dutch recycling results for 2017. The Dutch recycling rates for plastics and glass have fallen considerably following this new way of establishing the percentage. The recycling percentages in Table 5 for the other countries covered are probably also an overestimate compared to whether they would have been established according to Directive 2018/852 ([EC, 2018](#)) and Implementing Decision 2019/655 ([EC, 2019b](#)).



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According to the national Dutch monitoring of litter, disposable food boxes and containers make up 2%, while bags for takeaway food make up 3% of total littering in the Netherlands. The 2% for disposable food boxes and containers applies to all types of disposable food packaging, thus including disposable pizza boxes and containers for other types of food, which are not separately mentioned ([Lieverse & Ter Beek, 2020](#)). The percentages for disposable food boxes, containers and bags are assumed to apply as well to the other countries and EU28 (see table 3 and 4). Bags for takeaway food are not quantified in this report.

### 3. Conclusions

This report deciphers the packaging landscape for delivery and takeaway food for the Netherlands, Belgium, Germany, France, Spain and the EU28. The achieved results for the packaging of delivery and takeaway food start from the number of food orders as calculated from uncertain data about the market size values for the included countries and EU28. These uncertain market value data are subsequently multiplied with uncertain data about the types and material composition of disposable food boxes and containers used. The results are therefore not very accurate but do give an indication of the amount of disposable boxes and containers involved for delivery and take away food.

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