STUDY OF ONLINE CONSUMER SALES:

THE ECONOMIC IMPACTS OF ONLINE CONSUMER SALES ON ADDITIONAL PACKAGING AND ITS COSTS IN IRELAND

Prepared for

Repak Limited

By

PMCA Economic Consulting

November 2018

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Executive Summary

This study estimates the packaging and cost implications of a particular form of e-commerce that is growing very rapidly, namely when consumers in Ireland make online purchases of goods from abroad (however, the consumers may not know or care about where the goods originate). Popular examples of such online purchases are clothing and footwear, sports products and gadgets. Unlike other forms of e-commerce, such as when a consumer buys groceries online from an Irish-based retailer, or purchases a pizza from a local take-away, the packaging imported to the country from distant/overseas online sales is not accounted for by the national packaging compliance system, which is coordinated largely by Repak. Nevertheless, the imported packaging has to be dealt with, and the escalating cost of coordinating the collection, recycling and recovery of the additional imported packaging is falling predominantly on Repak Members. It is estimated in this report that the average cost of dealing with the imported packaging currently is €526 per Regular Repak Member. But even more worryingly is the rapid rate of growth in this cost, driven by the ever increasing popularity of the e-commerce in question: at the rate of growth witnessed since 2015, the cost per Regular Member will exceed €1,000 by 2023 and €4,000 by 2031. Such cost increases are unwelcome at any time but the prospects are especially significant presently, when compliant businesses are facing into the challenges of Brexit and other sources of economic uncertainty.

This study builds on the previous PMCA study for Repak published last year, which, to the best our knowledge, was the first study to estimate the packaging implications of online consumer goods purchases from abroad and the corresponding packaging compliance costs. That study examined independent survey data and estimates of the value of the e-commerce in question from other sources to estimate the volume of goods entering the country through online purchases by consumers in Ireland and in turn the volume of packaging materials accompanying the goods involved.

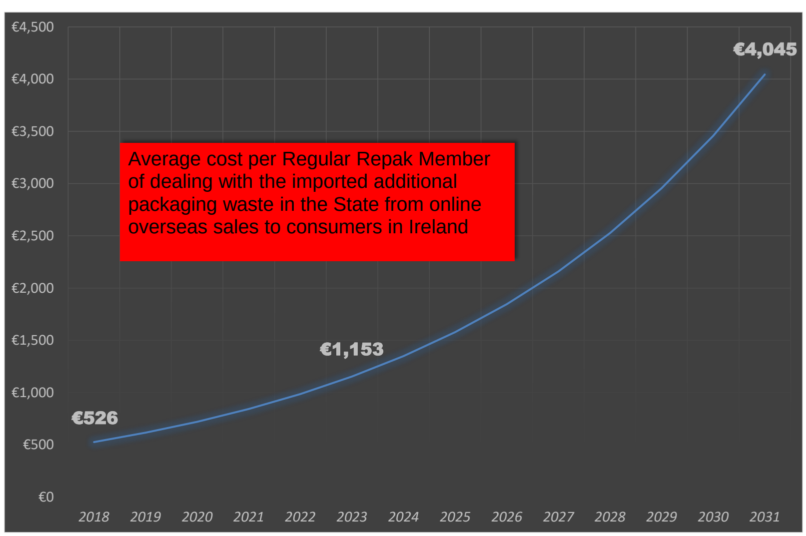
The key trends since 2015 are tabulated below and commented upon overleaf.

KEY RESULTS OF THE STUDY – DETAILS IN THE MAIN BODY OF THE REPORT

	Year and Growth			
Indicator	**2015**	**2016**	**2018**	**CAGR (2015-2018)**
1. Value of Consumer Goods Purchases from Abroad *via* Online (€m)	1,334	1,518	2,003	15%
2. % Share of Real GDP - Value Share	0.51%	0.55%	0.65%	8%
3. Quantity of Consumer Goods Purchases from Abroad *via* Online (Units)	23,181,378	27,221,573	33,046,379	13%
4. Tonnes of Packaging Imported to Ireland from Online Buying - Total	5,937	7,520	10,049	19%
5. Tonnes of Packaging Imported to Ireland from Online Buying - Cardboard	4,778	5,791	7,552	16%
6. % Packaging Imported to Ireland from Online Buying - Cardboard (5÷4)	80%	77%	75%	-2%
7. Tonnes of Packaging Imported to Ireland from Online Buying - Plastics	845	1,099	1,633	25%
8. % Packaging Imported to Ireland from Online Buying - Plastics (7÷4)	14%	15%	16%	5%
9. Tonnes of Total Packaging Waste Generated in Ireland (2018e)	983,384	991,298	977,477	-0.2%
10. % of All Packaging Waste due to Imported Tonnes - Volume Share	0.60%	0.75%	1.02%	19%
11. Ratio of Volume-to-Value Share (10÷2)	1.2	1.4	1.6	10%
12. Cost (€)	326,527	413,592	562,738	20%
13. Cost per Repak Member - Regular (€)	329	373	526	17%

Key Findings of the Study

1. The value of consumer goods purchases from abroad *via* online by people living in Ireland is estimated at €2,003m in 2018 and has grown at the average annual rate of 15% since 2015, more than double the corresponding growth of Ireland's real GDP (6%), one of the highest of any developed country.
2. The value of the e-commerce in question represents 0.65% of real GDP in 2018 and while this proportion is currently small it is growing strongly, namely by 8% CAGR since 2015.
3. The volume of imported consumer goods entering the State through online buying is estimated at over 33 million tonnes currently and has grown by 13% CAGR since 2015.
4. The quantity of imported packaging accompanying the 33m+ tonnes of consumer goods entering Ireland in 2018 is estimated at 10,049 tonnes, having grown by 19% CAGR since 2015, thus exceeding the growth in the volume of imported goods and that of the value of the e-commerce in question.
5. On average, each imported product arriving into the country comes with 304 grams of packaging materials (about the same weight as a tennis racket), up from 276g in 2016 and 256g in 2015.
6. While cardboard remains the main form of packaging material accompanying the imported consumer goods, accounting for three-quarters of all such packaging in 2018, its share has fallen since 2015. On the other hand, the share due to plastics is growing, which is a concern, given the problems associated with the recycling of plastics internationally. Noteworthy in the table above is that the volume of imported plastics packaging is estimated to grow at 25% CAGR during 2015-2018, which is very high.
7. The 10,049 tonnes of imported packaging associated with the online purchasing of consumer goods from abroad by people living in Ireland is estimated to account for 1.02% of all packaging waste generated in the State in 2018 (including the 10,049 tonnes). Although a small percentage *today*, what matters is its growth and it is noteworthy that the *volume share* of imported packaging from distant online sales (1.02%) exceeds the *value share* of the e-commerce (0.65% of real GDP), which in turn means that the *volume* of imported packaging from online shopping by people living in Ireland is disproportionately large compared with the *monetary value* of the e-commerce. At the rate of growth witnessed during 2015-2018, the volume of additional packaging entering the country through distant online sales could surpass 100,000 tonnes by 2032 and break the 500,000 tonne mark by 2041.
8. The costs faced by Regular Members of Repak in dealing with the additional packaging from distant online sales are estimated at €526 per Member currently, up from €526 in 2016 and €325 in 2015. At this rate of growth (17% CAGR), the cost would exceed €1,000 per Regular Repak Member by 2023 and be greater than €4,000 by 2031.



Recommendation

In view of the findings of this report, it is recommended that the Department of Communications, Climate Change and the Environment (DCCAE), in conjunction with the Environmental Protection Agency (EPA), commences a proactive examination of the e-commerce considered in this study (*ideally on a disaggregated good-by-good basis*) and the most effective policy response (*and specifically the question of who should pay for the additional packaging waste generated and how*). If all the packaging were coming from online sales conducted through Irish-based businesses, there would be no issue, so long as those businesses were compliant with the packaging waste legislation. But the reality is very different and, as shown in other studies and surveys, Irish businesses are lagging in acquiring online selling capability, a situation not helped by the uneven distribution of reliable broadband around the country.

Glossary of Terms

CAGR	Compound annual growth rate (measure of the average annual growth rate).
Department	Department of Communications, Climate Change and the Environment (or the DCCAE).
EPA	Environmental Protection Agency.
EU	European Union.
EU28	The twenty-eight Member States of the European Union (EU).
Eurostat	Official statistics agency of the EU.
g	Gram (there are 1,000 grams in a kilogram (kg) and in turn 1,000,000 grams in a (metric) tonne).
GDP	Gross domestic product (measure of an economy's national income).
HDPE	High density polyethylene.
IMF	International Monetary Fund.
Inter alia	Latin term meaning 'among other things'.
IT	Information technology (sometimes also referred to as 'ICT', meaning information and communications technology).
kg	Kilogram (thousand grams). There are 1,000 kg in a (metric) tonne.
LDPE	Low density polyethylene.
Major producer	Businesses involved in the production, distribution and retailing of products containing packaging who annually place more than 10 tonnes of packaging (other than packaging for reuse or export) on the Irish market and have an annual turnover of more than €1 million.
Packaging	Any material used to contain and protect goods or to aid in their handling, delivery or presentation. Packaging is made from such materials as cardboard, paper, glass, plastic, steel, aluminium, wood, and composite materials such as those used in milk and juice cartons. The European legislative framework covers all types of packaging, including the outer box that holds a larger batch of smaller packaged products.
PET	Polyethylene terephthalate.
PMCA	PMCA Economic Consulting.
PP	Polypropylene.
PS	Polystyrene.
PVC	Polyvinyl chloride.
Repak	Repak Limited.
SME	Small and medium enterprise.
Supra	Latin citation term referring to 'above'.
Via	Latin/French term meaning 'by' or 'through'.

Acknowledgements and Disclaimer

Acknowledgements

Dr. Pat McCloughan would like to thank the following people at Repak for their help and assistance in the preparation of this report: Seamus Clancy (Chief Executive), Bill Collins (Financial Controller/Company Secretary), Colm Munnelly (Membership Manager), Tony O'Sullivan (Executive Manager Strategy and Policy), Laura Sherry (Marketing and Communications Manager), Mark Hayden (Sales Manager) and Mr. Brian Walsh (Prevention Services).

Disclaimer

This report is the sole responsibility of PMCA Economic Consulting. By virtue of preparing the report or otherwise in connection with this study, PMCA will not assume any responsibility or have any liability to any third parties.

1 Introduction

1.1 Purpose of the Report and Overview

This report is prepared for Repak by PMCA Economic Consulting. It builds on the 2017 report by PMCA for Repak which estimated the additional packaging arising in Ireland from *consumers/households* in the country making *online* purchases of *goods* or *products* from *overseas* locations (from other EU countries and non-EU countries).[1] This particular form of e-commerce is growing very strongly in Ireland, with all the indications that the rate of growth is escalating since last year's report by PMCA.

The 2017 report estimated that over 27 million items of consumer goods were imported to Ireland as a result of online purchases from abroad by consumers/households in the country in 2016. Accompanying the 27 million goods were an estimated 7,520 tonnes of imported packaging waste; the corresponding figure in 2015 was 5,937 tonnes based on an estimated 23 million units of imported consumer goods in that year. In appraising the economic significance of these estimates, the 7,520 tonnes of additional packaging waste entering the State in 2016 represented a 27% increase on the corresponding figure in 2015. The 7,520 tonnes accounted for 0.75% of all packaging waste generated in Ireland in 2016. While this is a small proportion, of significance is the rate of growth of the tonnes, driven by the very strong growth in the e-commerce in question. Ultimately, the imported tonnes of packaging waste arising from the e-commerce must be paid for by compliant businesses, which are predominantly Members of Repak.[2]

This report updates the previous PMCA study by estimating the volume of imported packaging entering the country in 2018 and the corresponding cost, and the projections in the coming years. Among the findings are that the imported tonnes of packaging waste will exceed 10,000 tonnes by the end of this year and that the cost per Regular Repak Member will be €526 in 2018 compared with €373 in 2016 and €329 in 2015. At this rate of growth, the cost per Regular Repak Member would exceed €4,000 by 2031.

It is important for the reader to the mindful of the particular type of e-commerce under consideration, namely *online purchases of goods by households or consumers in Ireland coming from abroad* (sometimes the source of the goods is known to consumers, sometimes not, or consumers may not care about where the goods originate). Thus, the e-commerce of interest here differs from (a) *online purchases of goods by households or consumers in Ireland from domestic sources* (for example grocery shopping from Irish-based retailers or fast food deliveries within Ireland or buying goods online from an Irish-based retailer) or (b) *online purchases by businesses in Ireland from domestic or overseas sources*. In the latter two forms of e-commerce, the packaging coming into the country is accounted for by compliant businesses in Ireland but in the first form (studied in the 2017 report and in this report) the packaging from overseas is unaccounted for, but nonetheless upon entering the country is aggregated into the usual packaging waste generated in Ireland and ends up being dealt with by compliant businesses, at additional and growing cost to these businesses (driven by the rapid growth in the e-commerce under consideration).

1 The 2017 PMCA report for Repak is available here.

2 Businesses in Ireland can choose between two routes for complying with the packaging waste legislation, namely (i) joining Repak or (2) self-complying by registering with a local authority. The predominant route is through Repak. There are two types of Repak Member – Regular Members and Scheduled Members. The former include packaging material manufacturers, packaging converters, brand-holders, importers, distributors and retailers. Regular Members supply twice-yearly packaging statistics and pay fees according to the amount and type of packaging placed on the market. Scheduled Members retail directly to consumers but are not brand-holders or importers of products sold on-site.

1.2 Methodology

To the best of Repak's or PMCA's knowledge, the 2017 study was the first to estimate the *volume of packaging* arising from online cross-border shopping by consumers, in Ireland or other countries. While estimating the volume of additional packaging is a complex task, given the international nature of the supply chain and the sheer variety of goods purchased, PMCA was nonetheless able to derive informed estimates of the volumes of additional packaging imported to Ireland and in turn the additional cost that may be attributed to the extra packaging arising, using other evidence in the public domain.

Accordingly, the approach taken in the 2017 study was to begin with relevant existing research, which enabled estimation of the value of online purchases from overseas locations of the main categories of consumer goods involved (computers, electronic equipment, health and beauty products, clothes/footwear etc.), from which estimates of the volumes of such goods by category could be found, using unit price data to convert the values into volumes. From the estimated volumes of goods, the corresponding packaging by material type was then estimated, based on the types and volume of packaging required to convey the categories of goods from overseas to Ireland. The analysis in the 2017 report was carried out on the basis of 'representative' products purchased online by consumers, where independent data on their respective prices and packaging for international conveyance were incorporated into the analysis (noting that the representative goods were found in independent survey evidence to be the *principal* types of good purchased by consumers/households through online means, and thus that the volume of goods, and in turn the imported packaging, is likely to be underestimated).

Two brief observations are relevant to note here. First, our analysis excludes consumer online purchases of e-products, which do not necessitate packaging. Secondly, the 2017 PMCA report was based in part on international market research data from Ipsos/PayPal pertaining to the years 2015 and 2016, hence the estimation of the additional volumes of packaging imported to the country in those years. To the best of PMCA's knowledge, there was no corresponding market research in 2017 but there is new research for 2018 (from Ipsos/PayPal), hence the estimates in this 2018 report by PMCA pertain to that year (without the market research data for 2017, we refrained from estimating for that year, which in any event does not impact on the analysis or the conclusions drawn from the work carried out in this report because we can draw inferences about the rate of growth of the e-commerce in question from the estimates already for 2015 and 2016, and thus the likely levels of additional imported packaging from distant online sales, and the corresponding costs, in the coming years).

1.3 Structure of the Report

The rest of the report is structured as follows:

- Section 2 considers the existing studies of relevance.
- Section 3 estimates the volumes of consumer goods (by main categories) entering Ireland through online purchases from abroad before proceeding to estimate the tonnes of imported packaging arising in the State accordingly, generating informed estimates for 2018, and hence the average annual growth rate since 2015, and for the years ahead.
- Section 4 then estimates the additional compliance costs associated with the imported packaging and Section 5 concludes the report, with recommendations.

2 Review of Relevant Research

2.1 Introduction

The methodology employed in the 2017 PMCA report was firstly to estimate the *value* of online purchases of goods from abroad by consumers in Ireland and then the *volumes* of such goods imported to the country, and following that the *associated volumes of packaging materials* involved in the conveyance of the goods to Ireland. The monetary value was informed by reference to a study by Indecon for the Department of Communications, Climate Action and Environment in March 2016, which estimated that online consumer goods imported to Ireland were worth €1,334m in 2015, up by almost 50% on the value in 2012 (€906m). According to Indecon's estimates, the value of online purchases of goods by consumers in Ireland grew by 13.8% on a compound annual growth rate (CAGR) basis during 2012-2015, which was higher than the corresponding CAGR in respect of real GDP (gross domestic product) (namely 11.4%), which nonetheless was appreciably high by international comparison.[3]

Applying the CAGR of 13.8% (rounded) to derive the value estimate for 2016 (€1,518m), PMCA then made use of other (independent market research) data from Ipsos/PayPal regarding the main categories of goods purchased by consumers in different countries, which resulted in estimates of the quantities of such goods imported to Ireland in this way, using unit price data to convert the values into volumes for each category. Together with indicative estimates of the quantities of packaging needed to convey the goods from abroad to Ireland, the volume of imported packaging arising from the e-commerce was then estimated, at 7,520 tonnes in 2016 (up from 5,937 tonnes in 2015, an increase of 27%).

In what follows, we briefly outline the Indecon and Ipsos/PayPal studies (for completeness and for the benefit of the reader not familiar with these studies or the 2017 PMCA report). Then we consider the recently published Ipsos/PayPal study (2018), which updates the previous Ipsos/PayPal studies for 2015 and 2016 used to inform the PMCA report in 2017. The most recent Ipsos/PayPal study is noteworthy for indicating that the relevant e-commerce market in Ireland is growing by 16% CAGR, within which the sub-market facilitated by online sales using mobile devices is growing by 35% CAGR.

2.2 Size and Growth of Online Consumer Goods Purchases from Abroad in Ireland

The Indecon report for the DCCAE (2016) estimated that the broad digital economy accounted for 6% of GDP in Ireland in 2015.[4] Within this figure, Indecon estimated that €7,426.1m was due to household consumption, the largest broad component of the estimated contribution of the internet/digital economy to GDP (61%). By-far the largest part of the €7,426.1m household consumption estimate was online shopping by households, which Indecon estimated to be €6,437.1m in 2015, up by 43% on 2012 (Table 3.7, p. 40 of the Indecon report). However, the €6,437.1m estimate of online shopping by households pertains to all online shopping by households in Ireland – from both domestic and cross-border suppliers of both goods and services. For the purposes of this study, we are interested in *online cross-border* purchases by Irish-based consumers, of *physical goods* in particular, which require packaging.

3 The Indecon report ('Assessment of the Macro-Economic Impact of Internet/Digital on the Irish Economy') can be accessed here.

4 The 'Wolfgang Digital 2018 Irish Online Economy Report' also estimates a 6% GDP share (available here).

Using other data and assumptions, Indecon found that online consumer goods imported to Ireland were worth €1,334m in 2015, up by almost 50% on the value in 2012 (Table 3.29, p. 52 of the Indecon study). According to Indecon, this meant that online cross-border purchases of consumer goods (an import or 'leakage' from the Irish economy) accounted for 21% of all online shopping by households (domestic and cross-border, including goods and services) in Ireland in 2015.

The next part of the analysis, in this study, is to derive the value of online purchases of goods from abroad by consumers in Ireland in 2018, and then to break down the current value into the main categories of goods imported to the country in this way.[5] The Ipsos/PayPal market research (2018) helps with both.

2.3 Main Categories of Online Consumer Goods Purchases from Abroad in Ireland

For the past few years, online payments provider PayPal, in collaboration with market research organisation Ipsos, has been surveying consumers in countries around the world to gain a better understanding of developments in cross-border e-commerce. The research is relevant here because it pertains to physical consumer products/goods and differentiates between domestic and cross-border online transactions. Ireland features in the latest 2018 survey, as it did in the 2015 and 2016 surveys.[6]

In 2018, the incidence of online cross-border shopping is most prevalent in Ireland, proportionately. In particular, 16% of all online shopping by consumers is being conducted on domestic-only purchases (down from 19% in 2016), while 65% of all online consumer goods shopping was on both domestic and overseas shopping (67% in 2016) and *19% on cross-border-only purchases* (*up from 14% in 2016*). The 2018 market research by Ipsos/PayPal proceeds to give a breakdown of the categories of goods purchased by consumers through online means from abroad, with the proviso that the data on the main categories of goods purchased apply to all consumers surveyed in all countries.

Table 2.1 below summarises the information contained in the 2018 survey, as well as the 2015 and 2016 Ipsos/PayPal surveys used in the 2017 PMCA report. The columns headed '% Purchases' are reproduced from the Ipsos/PayPal surveys, while the '% Share' columns have been estimated by PMCA. The 2018 survey findings show three categories of consumer goods that did not appear as main consumer goods categories in the 2016 and 2015 surveys, namely 'jewellery/watches', 'collectables, memorabilia and art' and 'sports and outdoor equipment'. Shown at the bottom of the table is a statistical measure of concentration known as the Herfindahl-Hirschman Index (HHI). Defined as the sum of the squares of all shares for a given variable, the HHI varies from 0 (no concentration) to 10,000 (complete concentration, where a single consumer good category would account for all online purchases). The higher the value of the HHI, the more concentrated the share distribution. The HHI has fallen from 1,751 in 2015 to 1,569 in 2016, and to 1,470 in 2018, which suggests that online consumer goods purchases from overseas are becoming less concentrated or more varied, in turn reflecting the view that more and more consumers with different preferences are engaging in the particular form of e-commerce of interest in this report.

[5] The Indecon study does report a breakdown of average monthly expenditure by households using online means by category in 2015 (from a Red C survey of 1,007 individuals aged 18+ years conducted as part of the study for the DCCAE) (Table 3.4, p. 37 of the Indecon report). But this part of the Indecon study relates to both domestic and cross-border online purchases of goods and services by households in Ireland and not specifically to *cross-border online purchases of goods* by households in the country, in which our interest lies here.

[6] The Ipsos/PayPal 2018 survey is available here. The 2016 and 2015 surveys used in the 2017 PMCA report are accessible here.

Table 2.1: Main Categories of Goods Purchased from Abroad through Online Means by Consumers in Different Countries (Including Ireland) 2018, 2016 and 2015

	Online Cross-Border Purchases					
	2018		2016		2015	
Category	**% Purchases**	**% Share**	**% Purchases**	**% Share**	**% Purchases**	**% Share**
Clothing/apparel, footwear and accessories	68%	19%	46%	25%	49%	25%
Consumer electronics, computers/tablets/mobiles & peripherals	53%	15%	29%	16%	32%	16%
Toys and hobbies	53%	15%	23%	12%	26%	13%
Jewellery/watches	51%	14%				
Cosmetics/beauty products	46%	13%	20%	11%		
Collectables, memorabilia and art	42%	12%				
Sports and outdoors equipment	40%	11%				
Travel and transportation goods			25%	13%	31%	16%
Digital entertainment/education (e.g. e-books, digital music)			24%	13%	31%	16%
Entertainment/education (physical items)			20%	11%	29%	15%
Total		**100%**		**100%**		**100%**
HHI		***1,470***		***1,569***		***1,751***

Source: Ipsos/PayPal global market research 2018, 2016 and 2015 (supra footnote 6); PMCA analysis.
Note: The '% Purchases' figures are reproduced from the Ipsos/PayPal surveys for the years 2015, 2016 and 2018, and the '% Share' figures are calculated by PMCA. The % Purchases figures relate to all consumers in all of the countries sampled by Ipsos/PayPal. HHI denotes the Herfindahl-Hirschman Index of concentration.

2.4 Other Relevant Information

Two other pieces of information are relevant here – one is the likely additional packaging associated with online consumer goods purchases from abroad (compared with corresponding domestic purchases in physical stores) and two are the online goods' prices compared with those in physical stores domestically.

In regard to the likely additional packaging associated with online consumer purchases of goods (from abroad), when making such purchasing decisions consumers may be less sensitive about the packaging in which the goods come. Additional packaging may be required to protect products in transit and to enable tracking of delivery progress. But on the other hand, delivery/transit/logistics providers and goods providers may also have an incentive to keep packaging of online goods to a minimum, to enable maximisation of throughput, keep delivery costs low and for environmental reasons. For these reasons, the estimates of the additional packaging associated with the selected representative goods coming into Ireland from online cross-border purchases are kept low subsequently in this report, mindful that some (but not excessive) additional packaging is necessary for the safe conveyance of the goods across borders.

Turning to comparative price levels, Eurostat data for 2017 suggest that consumer prices in Ireland are among the highest in the EU (both consumer goods and services prices were 25% higher compared with the EU28 in that year).[7] As the e-commerce of interest expands further, so major online sellers can reduce their unit prices so as to reinforce their competitive position in the consumer goods market. Nonetheless, in what follows, we maintain the unit prices used in the 2017 PMCA report, meaning that the volume estimates in this study may be conservative (and thus the additional packaging estimates too).

7 The Eurostat comparative price level data are available here.

The aforementioned Indecon estimate of €1,334m for the value of online consumer goods purchases by households in Ireland from abroad in 2015 means that this form of e-commerce accounted for 0.51% of real GDP in that year. The figures are shown in Table 2.2 below, where the real GDP numbers are from the IMF World Economic Outlook Database (April 2018) (revised from the previous 2017 PMCA report). The change in the value of the relevant market from €1,727m in 2017 to €2,003m in 2018 is based on the 16% CAGR highlighted in the Ipsos/PayPal survey (2018) (*supra* footnote 6).[8]

Relative to real GDP, the value of online consumer goods purchases of interest in this study has grown from 0.51% in 2015 to 0.65% in 2018. This the latest estimated share of the activity in question of real GDP provides a benchmark with which to assess the share of all packaging waste by <u>volume</u> in Ireland accounted for by the additional packaging associated with imported consumer goods purchased *via* online subsequently in the report – *where we are interested in whether the <u>volume</u> of packaging waste share due to the e-commerce is greater than the 0.65% <u>value</u> share attributed to the online purchases in 2018.*

Table 2.2: Size and Growth of Online Consumer Goods Purchases in Ireland from Abroad and Real GDP (2012-2018)

Item	2012	2013	2014	2015	2016	2017	2018	Cumulative Growth (2012-2018)	CAGR (2015-2018)
Online Consumer Goods Purchases from Abroad (€m)	906	1,089	1,171	1,334	1,518	1,727	2,003	121%	15%
Real GDP (€m)	189,384	192,455	208,424	261,542	274,965	296,435	309,779	64%	6%
% Share of Real GDP	***0.48%***	***0.57%***	***0.56%***	***0.51%***	***0.55%***	***0.58%***	***0.65%***		

<u>Source</u>: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 4), IMF World Economic Outlook Database (April 2018), Ipsos/PayPal global market research (2018) (supra footnote 6); PMCA analysis.
<u>Note</u>: CAGR denotes compound annual growth rate.

2.5 Summary

The review of relevant research carried out in this section has identified the size, growth and relative scale of online consumer goods purchases from abroad by households in Ireland and has also established the main categories of goods purchased in this way, from the latest 2018 global market research evidence. The key estimates highlighted in this section are used to inform the analysis in the next section of the report, where we estimate and appraise the additional packaging entering Ireland from the online activity in question, which arises as an additional cost on compliant producers in Ireland (predominantly Repak Members, within which Regular Repak Members, *supra* footnote 2).

[8] Starting with the €1,334m figure in 2015, this is taken directly from the Indecon report of 2016, as are the estimates for the previous years (2012, 2013 and 2014). According to Indecon's estimates, the value of the e-commerce in question grew by 13.8% CAGR during 2012-2015. Applying this average annual growth rate yields the estimates of the value of the e-commerce in the years 2016 and 2017 (namely €1,518m and €1,727m respectively). The estimate of €2,003m in 2018 is derived by applying the 16% CAGR in the Ipsos/PayPal market research for the current year to the estimate in 2017, namely €1,727m. As a result, the value of the e-commerce in question grew by 15% on average per annum between 2015 and 2018 (the corresponding growth rate in respect of Ireland's real GDP was 6%).

3 Estimated Additional Packaging from Online Consumer Purchases from Abroad

3.1 Volumes of Goods from Online Cross-Border Purchases

The first step in estimating the volume of packaging arising from online cross-border purchases by consumers in Ireland is to estimate the quantity of goods imported to the country in this way. The Indecon report (2016)[9] and the latest Ipsos/PayPal market research for 2018[10] can be utilised to estimate the quantities of a 'representative' sample of goods imported in this manner in 2018. The results are shown in Table 3.1.

Earlier in Section 2, we estimated that the value of online cross-border consumer goods purchases in Ireland is €2,003m in 2018, up by over 121% on the corresponding value in 2012 (€906m) and representing 0.65% of the total size of the Irish economy currently based on real GDP. The estimate of the value of the relevant market in 2018 (€2,003m) is shown at the bottom of the second column of Table 3.1. This in turn determines the estimates of the online spending on the categories of goods reported in the Ipsos/PayPal survey for 2018 (using the percentage distribution of goods categories given in the latest Ipsos/PayPal market research and reproduced earlier in this report in Table 2.1, p. 5). Clothing/apparel, footwear and accessories is the largest category of consumer goods purchased online in 2018 (€386m), like it was in 2016 (€373m) and in 2015 (€330m) (from the 2017 PMCA study).

To estimate the corresponding quantities of goods imported to Ireland in this way, and in the absence of disaggregated data on the specific types of goods purchased online by consumers, it is necessary to consider representative products per category from which we can estimate the respective quantities of online imports using the representative products' unit prices. It emerges that over 33 million units of the representative products were imported to Ireland in 2018. This estimate represents a 21% increase on the estimated 27.2m units in 2016 and a 43% increase on the estimated 23.2m units in 2015.

Table 3.1: Estimated Volumes of Goods from Online Purchases from Abroad by Consumers in Ireland (2018)

	€m	Representative Products		
Category	**2018**	**Product**	**Unit Price (€)**	**Quantity (2018)**
Clothing/apparel, footwear and accessories	386	Pair of Shoes	100	3,858,038
Consumer electronics, computers/tablets/mobiles & peripherals	301	Laptop/Tablet	700	429,571
Toys and hobbies	301	Standard Monopoly Game/Chess Set	20	15,034,999
Jewellery/watches	289	Wrist Watch	100	2,893,528
Collectables, memorabilia and art	238	Vintage Pictures/Photos (Delicates)	100	2,382,906
Sports and outdoors equipment	227	Golf Clubs	250	907,774
Cosmetics/beauty products	261	Skincare, Haircare, Fragrances (200ml glass bottle)	50	1,739,899
		Skincare, Haircare, Fragrances (200ml plastic bottle)	30	5,799,664
Total	**2,003**	**Total Quantity**		**33,046,379**

<u>Source</u>: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 4), Ipsos/PayPal global market research 2018 (supra footnote 6), Eurostat; PMCA analysis.
<u>Note</u>: The corresponding tables for 2015 and 2016 are Table A1 and Table A2 respectively (p. 14).

9 *Supra* footnote 4.
10 *Supra* footnote 6.

3.2 Tonnes of Additional Packaging Materials from Online Cross-Border Purchases

Having estimated the quantities of representative goods imported to the country through online purchases by consumers in Ireland, we can in turn estimate the volumes of packaging materials accompanying the products entering the country in this way.

The analysis presented in Table 3.2 shows, for each of the representative products, the estimated volumes (tonnes) of the specific packaging materials associated with the estimated volumes (as derived in Table 3.1). It is estimated that a total of 10,049 tonnes of packaging materials accompanied the 33m imported (physical) goods in 2018, which translates into an average of 304 grams of packaging materials per imported product, up from 276g and 256g in 2016 and 2015 in the PMCA report of 2017 (equivalent to the weight of a tennis racquet). It appears, therefore, that consumers engaged in online shopping from Ireland are increasing the range of their purchases as well as the quantity, with the result that more imported packaging accompanying the online products is entering the country.

Apparent in Table 3.2 is that most of the imported packaging is cardboard, which accords with experience in practice (7,552 tonnes of cardboard were imported in 2018, representing 75% of all imported packaging, compared with 5,971 tonnes in 2016 (77%) and 4,778 tonnes in 2015 (80%)). Also noteworthy is that the volume of imported packaging due to plastics is increasing: from the analysis in Table 3.2, 1,633 tonnes of plastic packaging were imported in 2018, up from the 1,099 tonnes and the 845 tonnes estimated in 2016 and 2015 respectively (25% CAGR 2015-2018). In 2018, the share of all additional imported packaging materials due to plastics was 16.2%, compared with 14.6% in 2015 and 14.2% in 2016.

The estimation of the volumes of packaging materials associated with the representative consumer products has included inputs from Repak's experience and expertise in packaging technology, in regard to the typical volumes (kg) of packaging materials associated with the representative products imported (allowing for the likelihood that the representative goods entail some more packaging compared to the situation where they are bought in retail outlets but at the same time mindful that the suppliers of the online goods, and the freight operators, have an incentive to ensure that the packaging is not excessive, for commercial and environmental reasons).

Table 3.2: Estimated Tonnes of Packaging Materials from Online Purchases from Abroad by Consumers in Ireland (2018)

	Packaging Materials (Tonnes)														
				Paper/Cardboard				Plastic							
Representative Product	**Steel**	**Aluminium**	**Wood**	**Tetra**	**Paper**	**Cardboard**	**Glass**	**PET**	**HDPE**	**PVC**	**LDPE**	**PP**	**PS**	**Other Plastic**	**Total**
Pair of Shoes	0	0	0	0	239	718	0	0	0	0	193	0	0	0	1,150
Laptop/Tablet	0	0	0	0	3	86	0	0	0	0	21	0	0	0	110
Standard Monopoly Game/Chess Set	0	0	0	0	90	3,533	0	0	0	0	752	0	0	0	4,375
Wrist Watch	0	0	0	0	14	463	0	0	0	0	43	87	0	0	608
Vintage Pictures/Photos (Delicates)	0	0	0	0	0	488	0	0	0	0	48	0	0	0	536
Golf Clubs	0	0	0	0	45	454	0	0	0	0	64	45	0	0	608
Skincare, Haircare, Fragrances (200ml glass bottle)	0	0	0	0	9	418	435	0	0	0	52	9	0	0	922
Skincare, Haircare, Fragrances (200ml plastic bottle)	0	0	0	0	29	1,392	0	116	0	0	174	29	0	0	1,740
Total Quantity	**0**	**0**	**0**	**0**	**430**	**7,552**	**435**	**116**	**0**	**0**	**1,347**	**170**	**0**	**0**	**10,049**
%	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***4.3%***	***75.1%***	***4.3%***	***1.2%***	***0.0%***	***0.0%***	***13.4%***	***1.7%***	***0.0%***	***0.0%***	***100.0%***

Source: Estimates derived in Table 3.1, Repak estimates of packaging materials (kg) associated with online cross-border purchases of goods by consumers in Ireland; PMCA analysis.
Note: See Glossary for definitions of the plastic material types. The corresponding tables for 2015 and 2016 are Table A3 and Table A4 respectively (p. 15).

3.3 Tonnes of Packaging Materials from Consumer Online Cross-Border Purchases – *Contextualisation*

The estimate of 10,049 tonnes of additional packaging entering Ireland this year as a result of consumers/households making online purchases of goods from abroad (the equivalent of 304g per imported product on average) can be cast in the context of the total volume of packaging waste generated in Ireland. The latest available data from Eurostat show that there were 991,298 tonnes of packaging waste generated in Ireland in 2016. While this quantity appears to be large, which it is, it nonetheless represents a decrease on the 1,055,951 tonnes in 2007, or an average annual rate of decline of 0.7% during 2007-2016. Assuming this trend continues, there would be an estimated 977,477 tonnes of packaging waste generated in the country in 2018. This in turn implies that the 10,049 tonnes of packaging waste estimated in this study resulting from consumers engaging in online purchases of various consumer products from overseas constitutes 1.02% of all packaging waste placed on the market in Ireland (which includes both the 10,049 tonnes as well as the 977,477 tonnes). The 1.02% proportion may be interpreted as the *volume share* of all packaging waste in Ireland due to the particular form of e-commerce studied here. Of particular significance is that it exceeds the *value share* of the e-commerce in question (namely that the monetary value of the e-commerce in question (€2,003 in 2018) accounted for 0.65% of Ireland's real GDP in that year (as shown earlier in Table 2.2, p. 6)).

This in turn leads to the conclusion that *the additional volume of imported packaging from such e-commerce is disproportionately large in Ireland*. In other words, *the additional volume of packaging tonnes exceeds the monetary value of the online purchases on a proportional basis*, which is what matters from a packaging compliance perspective because the additional tonnes of imported packaging have to be collected and recovered or recycled at an extra cost to Ireland, falling mainly on Repak Members.

What is more, it appears from the analysis conducted by PMCA in 2017 and this year that the discrepancy between the *volume share* and the *value share* attributed to consumers in Ireland purchasing consumer goods *via* online channels from abroad is growing, which in turn implies that the additional imported packaging is escalating. In particular, the 1.02% volume share estimated for 2018 is 1.6 times the magnitude of the aforementioned 0.65% value share; in 2016, the ratio of the volume to the value share was 1.4 (volume share of 0.75% and value share of 0.55%) and in 2015 the ratio was 1.2 (volume share 0.60% and value share 0.51%).

3.4 Summary of the Changes in Imported Packaging over Time

The following trends for 2015, 2016 and 2018 are apparent from Table 3.3 presented overleaf:

- The value of consumer goods purchases from abroad *via* online channels by people living or based in Ireland is estimated at €2,003m in 2018 and has grown at the average annual rate of 15% since 2015. The 15% CAGR is more than double that of Ireland's real GDP during the same period (6%).
- The value of the e-commerce represents 0.65% of real GDP in 2018 and the relative size of such distant sales has grown strongly by 8% CAGR since 2015.
- The quantity of imported consumer goods into Ireland through online means is estimated at over 33 million tonnes in 2018 and has grown at 13% CAGR since 2015.
- The volume of imported packaging accompanying the consumer goods entering the country is estimated to be 10,049 tonnes in 2018, and has increased by 19% CAGR since 2015.
- Cardboard remains the principal type of packaging material accompanying the imported consumer goods but its share has fallen from 80% in 2015 to 77% in 2016 and to 75% in 2018.

- On the other hand, the share of all imported packaging materials due to plastics is on the rise, which is a concern for the country, owing to the problems with plastics recycling that have come to our attention in the past year, and which now constitute a global issue. Particularly noteworthy in the table below is that the volume of imported plastic packaging waste from the e-commerce in question has grown very rapidly by 25% CAGR during 2015-2018, compared with 16% in respect of cardboard.
- The 10,049 tonnes of imported packaging associated with the online purchasing of consumer goods from abroad by people living in Ireland is estimated to account for 1.02% of all packaging waste generated in the State in 2018 (including the 10,049 tonnes), which exceeds the value share of this form of e-commerce. The gap between the two shares is expected to grow in the coming years as more and more imported packaging enters the country from distant online purchases by Irish-based consumers.
- At the rate of growth witnessed during 2015-2018, the volume of additional packaging entering the country through distant online sales (estimated at 10,049 tonnes this year) could surpass 100,000 tonnes by 2032.

Table 3.3: Key Summary Statistics Concerning the Packaging Implications of Online Purchases of Goods from Abroad by Consumers/Households in Ireland (2015-2018)

	Year and Growth			
Indicator	**2015**	**2016**	**2018**	**CAGR (2015-2018)**
1. Value of Consumer Goods Purchases from Abroad *via* Online (€m)	1,334	1,518	2,003	15%
2. % Share of Real GDP - Value Share	0.51%	0.55%	0.65%	8%
3. Quantity of Consumer Goods Purchases from Abroad *via* Online (Units)	23,181,378	27,221,573	33,046,379	13%
4. Tonnes of Packaging Imported to Ireland from Online Buying - Total	5,937	7,520	10,049	19%
5. Tonnes of Packaging Imported to Ireland from Online Buying - Cardboard	4,778	5,791	7,552	16%
6. % Packaging Imported to Ireland from Online Buying - Cardboard (5÷4)	80%	77%	75%	-2%
7. Tonnes of Packaging Imported to Ireland from Online Buying - Plastics	845	1,099	1,633	25%
8. % Packaging Imported to Ireland from Online Buying - Plastics (7÷4)	14%	15%	16%	5%
9. Tonnes of Total Packaging Waste Generated in Ireland (2018e)	983,384	991,298	977,477	-0.2%
10. % of All Packaging Waste due to Imported Tonnes - Volume Share	0.60%	0.75%	1.02%	19%
11. Ratio of Volume-to-Value Share (10÷2)	1.2	1.4	1.6	10%

Source: Indecon (supra footnote 4), Ipsos/PayPal global market research (2015, 2016 and 2018) (supra footnote 6), IMF World Economic Outlook data (April 2018), Eurostat; PMCA Economic Consulting analysis.

4 Estimated Cost from Online Consumer Goods Purchases from Abroad

Household packaging is much more expensive to collect by recovery operators than business or commercial packaging. According to the Repak Annual Report 2017, the average cost of household collection and recycling/recovery was €56 per tonne in that year, compared with €10 per tonne in respect of commercial tonnes.[11]

The implication is that distant sales to consumers from online sources overseas places an additional burden on Repak Members for complying with tonnes for which they are not responsible. Ordinarily, Repak Members and other compliant businesses (through local authorities) are responsible for the tonnes they generate in terms of collection and recovery/recycling of their packaging waste streams, where they have an incentive to optimise the packaging generated in the economy given the need for packaging and at the same time the need to ensure that packaging is not excessive or more than necessary to maintain a clean environment. But the packaging from distant sellers to consumers/households in Ireland is something that compliant producers in Ireland have no control over and this stream of packaging waste coming into the country is growing very rapidly (by 19% per year during 2015-2018, as shown in Table 3.3, p. 10) and is likely to continue growing strongly in the years ahead as more and more households engage in online purchases of consumer goods sourced from overseas.

The 10,049 tonnes of additional packaging materials estimated to enter Ireland this year from distant online selling is estimated to cost €526 per Repak Member (Regular). The €526 average cost per Regular Repak Member represents 17% CAGR on the corresponding estimate for 2015 (€329). At this rate of increase, the cost per Regular Repak Member would break €1,000 by 2023 and exceed €4,000 by 2031 – a substantial uplift in cost by any measure or standard (see Figure 4.1 overleaf).

[11] Repak's Annual Report for 2017 is available here.

Figure 4.1: Projected Average Cost per Regular Repak Member of Dealing with the Additional Imported Packaging from Online Purchases of Goods from Abroad by Consumers in Ireland (2018-2031)

Source: Imported packaging through distant online sales in Table 3.3; PMCA analysis.

5 Conclusions and Recommendation

5.1 Conclusions of the Study

The main finding of the research conducted in this report is that the additional packaging entering Ireland from consumers making online purchases from abroad is growing very rapidly: it is estimated that the volume of packaging accompanying the goods coming into the country will exceed 10,000 tonnes at the end of this year, representing an average annual rate of growth of 19% compared with 2015, which is very strong by any comparison. At this rate of growth, the volume of such packaging entering the country will exceed 100,000 tonnes by 2032 and break the 500,000 tonne mark by 2041 (to put these projections in context, less than 1,000,000 tonnes of packaging waste were generated from domestic sources last year).

What is significant about the imported additional packaging is that the cost of its collection and recycling/recovery has to be paid for. The average cost per Regular Repak Member currently is estimated at €526, up from €373 in 2016 and €329 in 2015. At this rate of increase (17% CAGR), the average cost would exceed €1,000 in five years (by 2023) and surpass €4,000 by 2031, which represent substantial cost uplifts for the businesses concerned.

5.2 Recommendation

In view of the findings of this report, it is recommended that the Department of Communications, Climate Change and the Environment (DCCAE), in conjunction with the Environmental Protection Agency (EPA), commences a proactive examination of the e-commerce considered in this study (*ideally on a disaggregated good-by-good basis*) and the most effective policy response (*and specifically the question of who should pay for the additional packaging waste generated and how*). If all the packaging were coming from online sales conducted through Irish-based businesses, there would be no issue, so long as those businesses were compliant with the packaging waste legislation. But the reality is very different and, as shown in other studies and surveys, Irish businesses are behind the curve in acquiring online selling capability, a situation not helped by the uneven distribution of reliable broadband around the country.

Annex of Supplementary Information

Table A1: Estimated Volumes of Goods from Online Purchases from Abroad by Consumers in Ireland (2015)

	€m	Representative Products		
Category	**2015**	**Product**	**Unit Price (€)**	**Quantity (2015)**
Clothing/apparel, footwear and accessories	330	Pair of Shoes	100	3,301,313
Consumer electronics, computers/tablets/mobiles & peripherals	216	Laptop/Tablet	700	307,994
Travel and transportation goods	209	Car Sat Nav	200	1,044,293
Digital entertainment/education (e.g. e-books, digital music)	209	e-book/digital album download	10	20,885,859
Toys and hobbies	175	Standard Monopoly Game/Chess Set	20	8,758,586
Entertainment/education (physical items)	195	Educational Textbooks (New and Used)	20	9,769,192
Total	**1,334**	**Total Quantity (Incl. e-book digital album download)**		**44,067,237**
		Total Quantity (Excl. e-book digital album download)		**23,181,378**

Source: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 4), Ipsos/PayPal global market research 2015 (supra footnote 6), Eurostat; PMCA analysis.
Note: The corresponding table in the main body of the report pertaining to 2018 is Table 3.1, p. 7.

Table A2: Estimated Volumes of Goods from Online Purchases from Abroad by Consumers in Ireland (2016)

	€m	Representative Products		
Category	**2016**	**Product**	**Unit Price (€)**	**Quantity (2016)**
Clothing/apparel, footwear and accessories	373	Pair of Shoes	100	3,733,200
Consumer electronics, computers/tablets/mobiles & peripherals	235	Laptop/Tablet	700	336,220
Travel and transportation goods	203	Car Sat Nav	200	1,014,457
Digital entertainment/education (e.g. e-books, digital music)	195	e-book/digital album download	10	19,477,566
Toys and hobbies	187	Standard Monopoly Game/Chess Set	20	9,333,000
Entertainment/education (physical items)	162	Educational Textbooks (New and Used)	20	8,115,652
Cosmetics/beauty products	162	Skincare, Haircare, Fragrances (200ml glass bottle)	50	1,082,087
		Skincare, Haircare, Fragrances (200ml plastic bottle)	30	3,606,957
Total	**1,518**	**Total Quantity (Incl. e-book digital album download)**		**46,699,138**
		Total Quantity (Excl. e-book digital album download)		**27,221,573**

Source: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 4), Ipsos/PayPal global market research 2015 (supra footnote 6), Eurostat; PMCA analysis.
Note: The corresponding table in the main body of the report pertaining to 2018 is Table 3.1, p. 7.

Table A3: Estimated Tonnes of Packaging Materials from Online Purchases from Abroad by Consumers in Ireland (2015)

	Packaging Materials (Tonnes)														
				Paper/Cardboard				Plastic							
Representative Product	**Steel**	**Aluminium**	**Wood**	**Tetra**	**Paper**	**Cardboard**	**Glass**	**PET**	**HDPE**	**PVC**	**LDPE**	**PP**	**PS**	**Other Plastic**	**Total**
Pair of Shoes	0	0	0	0	205	614	0	0	0	0	165	0	0	0	984
Laptop/Tablet	0	0	0	0	2	62	0	0	0	0	15	0	0	0	79
Car Sat Nav	0	0	0	0	6	90	0	0	0	0	31	0	0	0	127
e-book/digital album download	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Monopoly Game/Chess Set	0	0	0	0	53	2,058	0	0	0	0	438	0	0	0	2,549
Educational Textbooks (New and Used)	0	0	0	0	49	1,954	0	0	0	0	195	0	0	0	2,198
Total	**0**	**0**	**0**	**0**	**314**	**4,778**	**0**	**0**	**0**	**0**	**845**	**0**	**0**	**0**	**5,937**
%	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***5.3%***	***80.5%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***14.2%***	***0.0%***	***0.0%***	***0.0%***	***100.0%***

Source: Estimates derived in Table A1, Repak estimates of packaging materials (kg) associated with online cross-border purchases of goods by consumers in Ireland; PMCA analysis.
Note: See Glossary for definitions of the plastic material types. The corresponding table in the main body of the report pertaining to 2018 is Table 3.2, p. 8.

Table A4: Estimated Tonnes of Packaging Materials from Online Purchases from Abroad by Consumers in Ireland (2016)

	Packaging Materials (Tonnes)														
				Paper/Cardboard				Plastic							
Representative Product	**Steel**	**Aluminium**	**Wood**	**Tetra**	**Paper**	**Cardboard**	**Glass**	**PET**	**HDPE**	**PVC**	**LDPE**	**PP**	**PS**	**Other Plastic**	**Total**
Pair of Shoes	0	0	0	0	231	694	0	0	0	0	187	0	0	0	1,112
Laptop/Tablet	0	0	0	0	2	67	0	0	0	0	17	0	0	0	86
Car Sat Nav	0	0	0	0	6	87	0	0	0	0	30	0	0	0	124
e-book/digital album download	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard Monopoly Game/Chess Set	0	0	0	0	56	2,193	0	0	0	0	467	0	0	0	2,716
Educational Textbooks (New and Used)	0	0	0	0	41	1,623	0	0	0	0	162	0	0	0	1,826
Skincare, Haircare, Fragrances (200ml glass bottle)	0	0	0	0	5	260	271	0	0	0	32	5	0	0	574
Skincare, Haircare, Fragrances (200ml plastic bottle)	0	0	0	0	18	866	0	72	0	0	108	18	0	0	1,082
Total	**0**	**0**	**0**	**0**	**360**	**5,791**	**271**	**72**	**0**	**0**	**1,004**	**23**	**0**	**0**	**7,520**
%	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***4.8%***	***77.0%***	***3.6%***	***1.0%***	***0.0%***	***0.0%***	***13.3%***	***0.3%***	***0.0%***	***0.0%***	***100.0%***

Source: Estimates derived in Table A1, Repak estimates of packaging materials (kg) associated with online cross-border purchases of goods by consumers in Ireland; PMCA analysis.
Note: See Glossary for definitions of the plastic material types. The corresponding table in the main body of the report pertaining to 2018 is Table 3.2, p. 8.