

**STUDY OF ONLINE CONSUMER SALES**  
***THE IMPACT OF ONLINE CONSUMER SALES ON***  
***ADDITIONAL PACKAGING IN IRELAND***

Prepared for:

**Repak Limited**



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## Executive Summary

In these days of the information society and e-commerce, more and more of us are shopping online. The convenience and apparent economy of shopping *via* one's own personal computer, laptop, tablet or other electronic (mobile) device are among the main attractions for the growth of online retailing in recent years. It has been estimated that about half of all consumers shop online and a growing proportion of consumer goods purchased online by households is coming from suppliers overseas. Invariably when goods purchased online from overseas arrive at our doorstep – from the logistics/delivery person who takes our e-signature to confirm receipt – they come with packaging. However, the packaging accompanying such goods – specifically consumer goods from abroad purchased online by consumers/households – is unaccounted for in respect of packaging waste compliance. After opening the packaging, the consumer may place the packaging in the green bin, which is then extra packaging waste in addition to the domestic packaging accounted for by compliant producers. In effect, the recovery or recycling of the additional packaging entering the country through online consumer goods purchases from abroad is being paid for by compliant producers of packaging based in the country even though they did not generate the additional packaging in the first place.

In this report, it is estimated that over 27 million items of consumer goods were imported into Ireland as a result of online purchases from abroad by consumers/households in the country in 2016 (an additional almost 20 million e-items (e.g. e-books and/or digital music downloads) were also imported in this way but the e-goods come without packaging). Corresponding with the 27 million items of imported physical consumers goods through online purchases were an estimated 7,520 tonnes of imported packaging waste in 2016 (the corresponding figure in 2015 is estimated at 5,864 tonnes based on an estimated 22.5 million units of imported (physical) consumer goods in that year).

In respect of all packaging waste generated in Ireland in 2016 (including the additional imported packaging estimated here), the 7,520 tonnes accounted for 0.76% of the total, which was greater than the proportion of Ireland's national income accounted for by the value of this form of e-commerce (0.59% in 2016). This means that the quantity of additional packaging imported into the country is disproportionately large – *the volume of the additional packaging is greater than the monetary value of the e-commerce giving rise to the additional packaging, proportionately*. Furthermore, the additional imported packaging is growing strongly, as online consumer goods purchases from abroad increase inexorably (the proportion of all packaging waste accounted for by the additional imported packaging grew from an estimated 0.59% in 2015 to the aforementioned 0.76% a year later).

It is further estimated that the costs faced by compliant producers of packaging in Ireland (predominantly members of Repak) in dealing with the additional packaging from distant sales *via* online were approximately €200 per Repak member in 2016, up from €150 in 2015, in turn illustrating the extent to which the cost is growing and likely to continue growing in the coming years.

In view of the findings of this report, it is recommended that the Department of Communications, Climate Change and the Environment (DCCA), in conjunction with the Environmental Protection Agency (EPA), look further into this form of e-commerce and its environmental implications in terms of the cost of having to deal with the additional packaging waste generated in Ireland and the most effective policy response (and the question of who might pay for the additional packaging waste and how).

## Glossary of Terms

<b>CAGR</b>	Compound annual growth rate.
<b>Department</b>	Department of Communications, Climate Change and the Environment (or the DCCAE).
<b>EPA</b>	Environmental Protection Agency.
<b>EU</b>	European Union.
<b>EU28</b>	The twenty-eight Member States of the European Union (EU).
<b>Eurostat</b>	Official statistics agency of the EU.
<b>g</b>	Gram (there are 1,000 grams in a kilogram (kg) and in turn 1,000,000 grams in a (metric) tonne.
<b>GDP</b>	Gross domestic product (measure of an economy's national income).
<b>HDPE</b>	High density polyethylene.
<b>IMF</b>	International Monetary Fund.
<b><i>Inter alia</i></b>	Latin term meaning 'among other things'.
<b>IT</b>	Information technology (sometimes also referred to as 'ICT', meaning information and communications technology).
<b>kg</b>	Kilogram (thousand grams). There are 1,000 kg in a (metric) tonne.
<b>LDPE</b>	Low density polyethylene.
<b>Major producer</b>	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.
<b>Packaging</b>	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.
<b>PET</b>	Polyethylene terephthalate.
<b>PMCA</b>	PMCA Economic Consulting.
<b>PP</b>	Polypropylene.
<b>PS</b>	Polystyrene.
<b>PVC</b>	Polyvinyl chloride.
<b>Repak</b>	Repak Limited.
<b><i>Supra</i></b>	Latin citation term referring to 'above'.
<b><i>Via</i></b>	Latin/French term meaning 'by' or 'through'.

## **Acknowledgements and Disclaimer**

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### **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

This report is prepared for Repak Limited (henceforth Repak) by Dr. Pat McCloughan, Managing Director of PMCA Economic Consulting (PMCA). It provides, for the first time in Ireland or any other country (to the best of PMCA's or Repak's knowledge), independent estimation of the additional packaging arising in the country from *consumers/households* in Ireland making *online* purchases of *goods* or *products* from *overseas* locations (i.e. from other EU countries and non-EU countries).

While price and convenience are major pluses for consumers engaging in this recent and rapidly growing form of online retailing, the incidence of which is relatively high in Ireland, neither the suppliers of the goods (based in other countries) nor the transit/logistics operators conveying the goods from source in the overseas locations to the consumers making the online purchases in Ireland pay for the recovery or the recycling of the associated packaging materials ending up in Ireland: consumers may put the packaging in their green bins but the compliance costs of dealing with the additional packaging are effectively being paid for by compliant producers (predominantly members of Repak, but also including producers self-complying through local authorities). The growth in online cross-border shopping and its comparably high incidence in Ireland mean that the extra compliance costs associated with the additional packaging are likely to be significant, and may necessitate a policy response to address the issue and to ensure that Irish businesses are not losing out competitively – the growth in online retailing means that the 'relevant market' for many consumer goods is becoming increasingly international in its geographical extent.

The objectives of this study are to estimate the volumes of packaging by material type associated with the goods coming into Ireland from online cross-border purchases by consumers and in turn to estimate the cost to Ireland from having to deal with the additional packaging waste arising from such purchases.

The particular type of e-commerce considered here concerns 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 the source of the goods) as opposed to online purchases of goods by households or consumers in Ireland from domestic sources (including for example grocery shopping from Irish-based retailers or fast food deliveries within Ireland) or as opposed to online purchases by businesses in Ireland from domestic or overseas sources – in the latter two forms of e-commerce, the packaging coming into the consumer's household is accounted for by compliant producers (business/retailers) but in the first form (studied here) the packaging from overseas is currently unaccounted for (but upon entering the country is aggregated into the packaging waste generated in Ireland and is therefore effectively having to be dealt with by compliant producers in the country).

## 1.2 Methodology

To date and to the best of our knowledge, there have been no independent estimates of the *volumes of packaging* arising from online cross-border shopping by consumers or households, in Ireland or other countries. Accurately estimating the volumes of additional packaging involved is a complex task, given the international nature of the supply chain and the variety of goods purchased.

Nevertheless, it is possible to derive reasoned, informed estimates of the volumes and in turn of the total cost that may be attributed to the additional packaging arising in Ireland, using existing studies already in the public domain and Repak/PMCA information/research.

Accordingly, the approach taken here is to begin with relevant existing research, which enables estimation of the value of online purchases from overseas locations of the main categories of consumer goods (computers, electronic equipment, health and beauty products, clothes/footwear etc.), from which we can then estimate the volumes of such goods by category, using unit price data to convert the values into volumes. From the volumes of goods estimates, the corresponding packaging by material type is then estimated. The analysis in this report is undertaken with respect to 'representative' goods purchased online by consumers, where data on their respective prices and packaging for international conveyance is incorporated into the estimation analysis.

### 1.3 Structure of the Report

The rest of the report is structured as follows:

- Section 2 considers the existing studies of relevance to the present assignment;
- Section 3 estimates the volumes of consumer goods (by main categories) through online consumer goods purchases from abroad and proceeds to estimate the tonnes of packaging arising in Ireland accordingly;
- Section 4 estimates the additional compliance costs associated with the imported packaging from online purchases of goods by consumers in Ireland; and
- Section 5 concludes the report, with recommendations.

### 1.4 About Repak

Repak is a government-approved environmental compliance scheme operator whose aims include the prevention and minimisation of packaging waste in Ireland as well as the funding of packaging recycling. Under European and Irish legislation, certain businesses – known as 'major producers' – are obliged to comply with the law, and the conditions for compliance apply to businesses in manufacturing, distribution and retailing with turnover greater than €1m and who place more than 10 tonnes of packaging/packaged goods in the country annually. Such obligated businesses have a choice of two compliance routes – they can self-comply and register with a local authority or they can become a member of Repak. The membership fees associated with joining Repak are used to fund packaging recycling and help Ireland to meet its packaging waste recovery and recycling targets. Repak is the predominant choice of compliance route for obligated businesses and the organisation has played a leading role in ensuring that Ireland has successfully achieved all of its recovery and recycling targets since the legislation came into effect in 1997.

According to the latest available comparative data from Eurostat (the official statistics agency of the EU), Ireland achieved packaging recycled per capita of 144 kg in 2014, which was more than one-third higher than that for the EU28 (107 kg), while packaging recovered per head was 195 kg in Ireland compared with 129 kg in the EU28, meaning the differential in favour of Ireland was more than 50% in that year. In the same year, the Eurostat data also show that Ireland's overall recovery and recycling rates for all packaging waste were 93% and 68% respectively, higher than the corresponding rates of 79% and 65% for the EU28. Furthermore, Ireland has also exceeded all of its recycling targets for specific materials, namely glass (87% versus the target rate of 60% by weight at the end of 2011), paper and board (79% v 60%), metals (81% v 50%), plastics (35% v 22.5%) and wood (85% v 15%). Data received from the Environmental Protection Agency in July 2017 show overall recovery and recycling rates of 91% and 68% for Ireland in 2015, and specific materials recycling rates of 88% glass, 34% plastic, 80% paper and board, 75% metals and 85% wood (2015 data for the other EU countries are not yet available from Eurostat).



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## 2 Review of Relevant Research

### 2.1 Introduction

The purchase of consumer goods through online means is today commonplace across households in Ireland. High-profile sales events like 'Black Friday' and more particularly 'Online Monday' illustrate the growing use of online technology for consumer purchases, not least in Ireland.

For the purposes of this report, and mindful that it is the first study to estimate the volume of packaging arising in Ireland, or any other country, from online purchasing of consumer goods from abroad (to the best of PMCA's or Repak's knowledge), our interest in reviewing the existing relevant studies in this section of the report is to infer the size of the market in respect of online purchases of consumer goods from abroad by households in Ireland.

Two sets of studies are relevant.

The first is the study by Indecon for the Department of Communications, Climate Action and Environment (the Department or DCCA) published in March 2016 and the second takes the form of market research from Ipsos-PAI which shows the extent of online cross-border purchases by consumers in Ireland and other countries conducted in 2016 and 2015. The studies provide information on the size and growth of online consumer purchases of goods from abroad (the Indecon study) and about the main categories of goods bought in this way (the Ipsos-PAI surveys).

In contrast to other studies that are also publicly available, the existing studies of interest here pertain in particular to consumer (or household/family) purchases of goods/products *via* online means from abroad, thereby isolating this particular form of e-commerce from other forms, including business/producer purchases whether from domestic or overseas sources. This consideration is important in the context of this study because online purchases of goods by consumers from sources abroad means that the packaging accompanying the goods coming into Ireland is escaping the country's packaging compliance system, whereas corresponding purchases by businesses/producers forms part of the overall packaging placed in the country (as do online purchases by consumers of goods from domestic sources). However, the imported packaging from cross-border online purchases by consumers in Ireland still must be dealt with and paid for, and the additional burden, which is expected to grow rapidly in the coming years, falls on compliant producers in Ireland, including Repak members.

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

The Indecon report for the Department (2016) estimated that the internet/digital economy accounted for 6% of (gross domestic product or national income, GDP) in Ireland in 2015.<sup>1</sup> Within this figure, it was 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 is 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).

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<sup>1</sup> The report (titled 'Assessment of the Macro-Economic Impact of Internet/Digital on the Irish Economy') can be accessed [here](#).

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 consumers, of *physical goods* in particular, which require packaging. Using other data and assumptions, Indecon derived the estimate that online consumer goods imported into Ireland were valued at €1,334m in 2015, up by almost 50% on the value in 2012 (Table 3.29, p. 52). According to Indecon, this means 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 latest year to which the Indecon estimates pertain.

PMCA considers that the €1,334m figure in the Indecon report is an informed estimate of online cross-border purchases of consumer goods by households in Ireland and may be employed for the purposes of the present study. However, the Indecon estimate is not broken down any further – in fairness, the objective of the Indecon study was to estimate the macro-economic impact of the internet/digital economy in Ireland.<sup>2</sup>

### 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 2015 and 2016 surveys.<sup>3</sup>

According to the latest such market research (2016), Portugal, Peru and Ireland are the countries where cross-border online shopping by consumers is most prevalent. In Ireland, 19% of all online shopping by consumers was conducted on domestic-only purchases in that year, while 67% of all online consumer goods shopping was on both domestic and cross-border or overseas shopping and 14% on cross-border-only purchases.

The market research by Ipsos PayPal proceeds to give a breakdown of the categories of goods purchased by consumers through online means from abroad (clothing and footwear, consumer electronics, toys and hobbies, entertainment/education and cosmetics/beauty products are the most popular). However, 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 2015 and 2016 Ipsos PayPal studies regarding the main categories of goods purchased from abroad through online means by consumers (the ‘% Purchases’ figures are reproduced from the Ipsos PayPal results and the use of the surveys in 2015 and 2016 is because Ireland was part of the country samples in those years).

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<sup>2</sup> 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 Department) (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.

<sup>3</sup> The Ipsos PayPal 2015 and 2016 surveys (in summary form), and other related studies, can be found [here](#).

The ‘% Share’ estimates in the table below have been estimated by PMCA to gauge the individual shares attributable to each main category and are used subsequently in the report. The relative shares are comparable with Eurostat data (which pertain to online purchases by internet users in the EU28).<sup>4</sup>

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

Category	Online Cross-Border Purchases			
	2016		2015	
	% Purchases	% Share	% Purchases	% Share
Clothing/apparel, footwear and accessories	46%	25%	49%	25%
Consumer electronics, computers/tablets/mobiles & peripherals	29%	16%	32%	16%
Travel and transportation goods	25%	13%	31%	16%
Digital entertainment/education (e.g. e-books, digital music)	24%	13%	31%	16%
Toys and hobbies	23%	12%	26%	13%
Entertainment/education (physical items)	20%	11%	29%	15%
Cosmetics/beauty products	20%	11%		
<b>Total</b>		<b>100%</b>		<b>100%</b>

*Source: Ipsos PayPal global market research 2015 and 2016 (supra footnote 3); PMCA analysis.*

*Note: The ‘% Purchases’ figures are reproduced from the Ipsos PayPal surveys and the ‘% Share’ figures are calculated from them by PMCA. The % Purchases figures relate to all consumers in all of the countries sampled by Ipsos PayPal.*

## 2.4 Other Relevant Information

Two other pieces of information are relevant to note here – one is the likely additional packaging associated with online consumer goods purchases from abroad and two are the prices of the goods compared with those available 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 (i.e. for competitive reasons) 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 2015 suggest that consumer prices in Ireland are higher than in the EU28 for clothing and footwear (by 10%) and for personal transport equipment (7%) but lower in respect of consumer electronics, computers etc. (by 5%).

<sup>4</sup> The Eurostat Ecommerce News report (15 January 2016) is available [here](#).

For the other categories of goods purchased by consumers through online means from abroad (as shown in Table 2.1 above), the price levels in Ireland *vis-à-vis* the EU28 vary depending upon specific goods and subsequently in this report we will assume the same price levels for the remaining categories in the table.<sup>5</sup>

The 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 0.55% of real GDP in that year. Online cross-border consumer purchases rose by 13.8% per year on average during 2012-2015, which was higher than the corresponding growth in real GDP, even given the unprecedented growth in real GDP that occurred in 2015 (26.4% growth) (the so-called ‘Leprechaun Economics’).

The latest available IMF data at the time of conducting the analysis in June 2017 show that real GDP in Ireland was €256,312m in 2016. If online consumer goods purchases from abroad grew at trend during the period, then the activity would have been worth €1,518m in 2016, or 0.59% of real GDP. This the latest estimated share of the activity in question of GDP (from independent sources) provides a benchmark with which to assess the share of all packaging by volume in Ireland accounted for by the additional packaging associated with imported consumer goods from online subsequently in the report – *whether the share of interest is disproportionately large or not.*

**Table 2.2: Size and Growth of Online Consumer Goods Purchases in Ireland from Abroad and Real GDP (2012-2015)**

Item	2012	2013	2014	2015	Cumulative Growth	CAGR
Online Consumer Goods Purchases from Abroad (€m)	906	1,089	1,171	1,334	47.2%	13.8%
Real GDP (€m)	176,022	177,900	192,923	243,951	38.6%	11.5%
<b>% Share of GDP</b>	<b>0.51%</b>	<b>0.61%</b>	<b>0.61%</b>	<b>0.55%</b>		

*Source: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 1); International Monetary Fund (IMF) World Economic Outlook data (April 2017); PMCA analysis.*

*Note: CAGR denotes compound annual growth rate.*

## 2.5 Summary

The review of the relevant research carried out in this section of the report 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. 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 in Ireland from the activity in question, which arises as an additional cost on compliant producers – predominantly Repak members.

<sup>5</sup> The Eurostat comparative price level data are available [here](#). At the time of completing this report in June/July 2017, Eurostat released two studies of note here: one on relative price levels in the EU, where Ireland had the second highest prices for consumer goods (and services) in the EU in 2016, after Denmark (with indices of 125 and 139 respectively, compared with 100 for the EU28); the second report on e-commerce shows *inter alia* that 66% of internet users shopped online during the last year and that 20% of EU businesses sold *via* the internet. Across Member States, businesses conducting e-sales were most common in Ireland (30%), Denmark (29%), Germany and Sweden (both 28%). The first Eurostat report is available [here](#) and the second [here](#).

### 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 into the country in this way. The Indecon report (2016)<sup>6</sup> and the Ipsos PayPal global market research studies for 2015 and 2016<sup>7</sup> can be utilised to estimate the quantities of a 'representative' sample of goods imported in this manner for 2016. The results are shown in Table 3.1 (the corresponding estimates for 2015 are shown subsequently).

Indecon estimated that the value of online purchases of consumer goods from abroad by people in Ireland was €1,334m in 2015, up from an estimated €906m in 2012, representing average annual growth of 13.8% during 2012-2015.<sup>8</sup> Applying this growth rate to the figure of €1,334m yields the estimate of €1,518 in respect of the value of online cross-border consumer goods purchases in Ireland in 2016. This estimate is shown at the bottom of the second column in the table below and in turn determines the estimates of the online spending on the categories of goods reported in the Ipsos PayPal survey report for that year (using the percentage distribution reproduced here in Table 2.1, p. 5). Clothing/apparel, footwear and accessories was the largest category of consumer goods purchased online in 2016 (€373m).

Next, to estimate the quantities of goods imported 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 goods' unit prices (Eurostat data). It emerges that over 46m units of the representative goods were imported into Ireland in 2016 or 27.2m when e-products are excluded because they do not contain packaging.

**Table 3.1: Estimated Volumes of Goods from Online Purchases from Abroad by Consumers in Ireland (2016)**

Category	€m	Representative Products		
	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 1); Ipsos PayPal global market research 2016 (supra footnote 3); IMF World Economic Outlook data (April 2017); Eurostat; PMCA analysis.*

<sup>6</sup> *Supra* footnote 1.

<sup>7</sup> *Supra* footnote 3.

<sup>8</sup> See Table 2.2, p. 6 of the present report by PMCA.

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

Having estimated the quantities of representative goods imported into the country through online purchases by consumers in Ireland, we may in turn estimate the volume of packaging accompanying the products brought into the country in this way.

The analysis presented in Table 3.2 shows, for each of the representative products, the 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 7,520 tonnes of packaging materials accompanied the 27.2m imported (physical) goods in 2016, which translates into an average of 276 grams per imported product (contextualisation of the estimate of the imported packaging is outlined below where we cast the estimated 7,520 tonnes in the context of all packaging waste generated in Ireland and compare the resulting proportion with the proportion in respect of the estimated value of online cross-border consumer goods purchases in 2016 (i.e. €1,518) with real GDP).

As apparent from Table 3.2, most of the imported packaging into Ireland is cardboard, which would accord with experience in practice.

The estimation of the volumes of packaging materials associated with the imported consumer goods has included inputs from Repak's experience and expertise in packaging technology and in particular information sought by PMCA regarding the typical volumes (kg) of packaging associated with the representative goods imported (allowing for the likelihood that the selected 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, also 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 (2016)**

Representative Product	Packaging Materials (Tonnes)														Total
	Paper/Cardboard							Plastic							
	Steel	Aluminium	Wood	Tetra	Paper	Cardboard	Glass	PET	HDPE	PVC	LDPE	PP	PS	Other Plastic	
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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>360</b>	<b>5,791</b>	<b>271</b>	<b>72</b>	<b>0</b>	<b>0</b>	<b>1,004</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>7,520</b>
<b>%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.8%</b>	<b>77.0%</b>	<b>3.6%</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>13.3%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>

*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.*

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

The estimate of 7,520 tonnes in respect of the additional packaging in Ireland resulting from consumers/households making online purchases of goods from abroad in 2016 (or 276g per imported product on average) can be cast in the context of the total volume of packaging waste generated in Ireland. In carrying out this part of the analysis, we may ask the question: *what proportion of all packaging waste generated in the country is accounted for by the additional imported packaging estimated in this report and how does the proportion compare with 0.59%, this being the proportion of real GDP accounted for by the estimated value of online imported purchases in 2016 (i.e. the €1,518m estimate, derived from Indecon's estimate of €1,334m in 2015 and its corresponding estimates back to 2012) relative to real GDP in 2016 (namely €256,312m, from the IMF's latest World Economic Outlook, April 2017)?*

The analysis presented in Table 3.3 below arrives at the estimate of 0.76%, which refers to the proportion of all packaging waste in Ireland (including the additional packaging entering the country from online distance selling) accounted for by the estimated imported packaging associated with online consumer goods purchases from abroad by consumers/households in Ireland.

**Table 3.3: Estimated Additional Tonnes of Packaging Materials from Online Purchases of Goods from Abroad by Consumers in Ireland in the Context of Total Packaging Waste Generated in Ireland (2015)**

Packaging Material	Packaging Waste Generated in Ireland (2015) (Tonnes)
Paper & Cardboard	405,677
Plastic	282,148
Wood	82,036
Metallic	65,861
Aluminium	...
Steel	...
Glass	143,598
Other	4,064
<b>Total</b>	<b>983,384</b>
<b>Estimated Online Cross-Border Consumer Goods Purchases (2016)</b>	<b>7,520</b>
<b>% Total</b>	<b>0.76%</b>

*Source: Eurostat data on packaging waste generated in Ireland (2014); PMCA analysis.*

The 0.76% estimate is derived using the aforementioned 7,520 tonnes of additional packaging in Ireland due to the online cross-border consumer goods imports and the latest available EPA figures on total packaging waste generated in Ireland and its breakdown by specific packaging materials (available for the year 2015). In particular, the 0.76% estimate is derived as the 7,520 tonnes relative to the total of the 983,384 tonnes plus the 7,520 tonnes from distant online consumer sales.

Comparing the 0.76% estimate with the previous proportion of 0.59% in respect of the proportion of real GDP accounted for by the value of online cross-border purchases of consumer goods by households in Ireland indicates that the additional volume of imported packaging from such e-commerce activity is disproportionately large in Ireland. In other words, *the additional volume of packaging tonnes exceeds the monetary value of the purchases*, 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 a cost to Ireland, predominantly falling on Repak members. (Note also that the estimated 7,520 tonnes from the online cross-border consumer goods purchases is well in excess of the 'other' category of packaging waste materials in the official statistics (4,064 tonnes in Table 3.3), even though the additional packaging from this form of e-commerce is (currently) unaccounted for in the same statistics.)

### 3.4 Changes in the Volumes of Imported Packaging over Time

Given the paucity of existing/previous studies and the absence of data on the nature and quantity of goods imported into Ireland through online consumer goods purchases from abroad, it is not possible to reliably derive trend estimates from 2016 back in time. Nonetheless, the methodology that we have applied to derive estimates for 2016 can also be used for the previous year, to which the Indecon value estimate of €1,334m pertains, and the Ipsos PayPal market research data on Ireland are also available for 2015, enabling estimates of the volume of additional packaging tonnes imported to be calculated in the same way as for 2016. The results of the analysis for 2015 are as follows:

- An estimated total of over 42m units of goods were imported into the country from online cross-border purchases by consumers in Ireland (this estimate includes e-book and digital downloads);
- When e-books and digital downloads are excluded, an estimated total of 22.5m goods were imported;
- The total volume of packaging accompanying the imported goods is estimated at 5,864 tonnes (compared with the 7,520 tonnes estimated in 2016 as shown above);
- The distribution of packaging materials was more concentrated in cardboard in 2015 compared with 2016 (shares of 79.6% versus 77%) and this change was due to the change in product categories in the Ipsos PayPal survey results between the years;
- The estimated 5,864 tonnes of additional packaging imported into Ireland in 2015 represented 0.59% of the estimated total packaging waste generated in Ireland (in 2015);
- The 0.59% estimate is greater than the proportion of 0.55%, this being the share of the value of online consumer goods purchases from abroad (€1,334m) of real GDP in Ireland in 2015 estimated in the Indecon report;
- The latter result suggests that, as with 2016, the additional imported packaging from online cross-border consumer goods purchases is disproportionately large in Ireland (i.e. the volume of imported packaging is greater than the monetary value of the e-commerce in question); and
- As this form of e-commerce is likely to continue to grow in the coming years, it is probable that the range of packaging materials accompanying the imported consumer goods will widen (as consumer purchases are likely to diversify) but that paper/cardboard is likely to continue to dominate in the mix of packaging materials over the medium-term.<sup>9</sup>

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<sup>9</sup> The detailed results for 2015 are presented in the Annex of Supplementary Information at the end of the report, specifically in Table A1, Table A2 and Table A3, which correspond with Table 3.1, Table 3.2 and Table 3.3 here in the main body of the report.



## **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. In 2016, household packaging collected and recycled/recovered through kerbside collections and bring banks ranged in estimated cost (in terms of Repak funding) from €40 per tonne to €65 per tonne, with an average cost of €55 per tonne for all household packaging. On the other hand, according to Repak estimates, 'backdoor' or commercial tonnes were funded at approximately €11/tonne, indicating that collecting packaging materials from households for recovery/recycling is about five times more expensive than collecting from Repak businesses.

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 producers (through the local authority route) 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 in the country is likely to grow significantly in the years ahead as online consumer purchases of goods are set to increase rapidly, in the views of the trends witnessed to date (as shown in this report).

The estimated 7,520 tonnes of additional packaging materials that entered Ireland in 2016 from distant online selling is estimated to have cost over €413,000 or 28% more than the estimated cost in the previous year.

In alternative terms, it is estimated that the additional packaging from online consumer goods purchases from abroad resulted in compliance costs of almost €200 per Repak member in 2016, having risen from about €150 in the previous year.

The additional costs are not insignificant and of particular significance is the rate of increase in these costs, which is likely to grow in the coming years as such e-commerce is expected to rise (and the composition of specific materials may diversify over time too).

## 5 Conclusions and Recommendations

### 5.1 Conclusions of the Study

The main finding of the research conducted in this report is that while the volume of the additional packaging from online distant sales is small when set against the volume of all packaging waste generated in Ireland, the proportion (estimated at 0.76% in 2016) is nevertheless greater than the proportion of Ireland's national income accounted for by this form of e-commerce (0.59% in the same year), meaning that the quantity of additional packaging imported into the country is disproportionately large: *the additional volume of packaging tonnes exceeds the monetary value of the purchases*, 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 a cost to Ireland, predominantly falling on Repak members (owing to the fact that joining Repak is the predominant compliance route chosen by obligated producers (businesses) in Ireland). What is more, the additional volume of imported packaging is growing strongly, as online consumer goods purchases from abroad increase inexorably (the proportion of all packaging waste accounted for by the additional packaging grew from an estimated 0.59% in 2015 to the aforementioned 0.76% a year later).

It is estimated that the costs faced by compliant producers of packaging in Ireland (predominantly Repak members) in dealing with the additional packaging imported into the country exceeded €413,000 in 2016, or almost €200 per Repak member, which is not an insignificant additional outlay faced in these already challenging economic times (in the context of Brexit and heightened international uncertainty etc.). The corresponding costs a year earlier are estimated at approximately €150 in 2015, which illustrates the extent to which the cost is estimated to have grown between the two years, and which is likely to grow in the coming years.

### 5.2 Recommendations

In view of the findings of this report, which to the best of our knowledge is the first study of its kind in Ireland or internationally, it is recommended that the Department (or the DCCAE), in conjunction with the EPA, looks further into this form of e-commerce and its environmental implications in terms of the cost of having to deal with the additional packaging waste generated in Ireland and the most effective policy response (and the question of who might pay for the additional packaging waste and how).

## Annex of Supplementary Information

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

Category	€m		Representative Products	
	2015	Product	Unit Price (€)	Quantity (2016)
Clothing/apparel, footwear and accessories	330	Pair of Shoes	100	3,733,200
Consumer electronics, computers/tablets/mobiles & peripherals	216	Laptop/Tablet	700	336,220
Travel and transportation goods	209	Car Sat Nav	200	1,014,457
Digital entertainment/education (e.g. e-books, digital music)	209	e-book/digital album download	10	19,477,566
Toys and hobbies	175	Standard Monopoly Game/Chess Set	20	9,333,000
Entertainment/education (physical items)	195	Educational Textbooks (New and Used)	20	8,115,652
<b>Total</b>	<b>1,334</b>	<b>Total Quantity (Incl. e-book digital album download)</b>		<b>42,010,095</b>
		<b>Total Quantity (Excl. e-book digital album download)</b>		<b>22,532,529</b>

*Source: Indecon report (2016) (Table 3.29, p. 52) (supra footnote 1); Ipsos PayPal global market research 2015 (supra footnote 3); IMF World Economic Outlook data (April 2017); Eurostat; PMCA analysis.*

*Note: The corresponding table in the main body of the report pertaining to 2016 is Table 3.1, p. 7.*

**Table A2: Estimated Tonnes of Packaging Materials from Online Purchases from Abroad by Consumers in Ireland (2015)**

Representative Product	Packaging Materials (Tonnes)													Total	
	Paper/Cardboard						Plastic								
	Steel	Aluminium	Wood	Tetra	Paper	Cardboard	Glass	PET	HDPE	PVC	LDPE	PP	PS		Other Plastic
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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>336</b>	<b>4,665</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>863</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,864</b>
<b>%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>5.7%</b>	<b>79.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>14.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>

*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 2016 is Table 3.2, p. 8.*

**Table A3: Estimated Additional Tonnes of Packaging Materials from Online Purchases of Goods from Abroad by Consumers in Ireland in the Context of Total Packaging Waste Generated in Ireland (2015)**

<b>Packaging Material</b>	<b>Packaging Waste Generated in Ireland (2015) (Tonnes)</b>
Paper & Cardboard	405,677
Plastic	282,148
Wood	82,036
Metallic	65,861
Aluminium	...
Steel	...
Glass	143,598
Other	4,064
<b>Total</b>	<b>983,384</b>
<b>Estimated Online Cross-Border Consumer Goods Purchases (2015)</b>	<b>5,864</b>
<b>% Total</b>	<b>0.59%</b>

*Source: Estimates derived in Table A2; Eurostat data (2013); PMCA analysis.*

*Note: The corresponding table in the main body of the report pertaining to 2016 is Table 3.3, p. 9.*