

Plastic Packaging Recycling Strategy 2018-2030

September 2018



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ACRONYMS

| | |
|-------|--|
| CEP | Circular Economy Package |
| DCCAE | Department of Communications, Climate Action and Environment |
| DRS | Deposit Return Schemes |
| EC | European Commission |
| EPA | Environmental Protection Agency |
| EU | European Union |
| GHG | Greenhouse gas |
| HDPE | High-density polyethylene |
| IWMA | Irish Waste Management Association |
| LDPE | Low-density polyethylene |
| NGO | Non-Governmental Organisations |
| NWCPO | National Waste Collection Permit Office |
| PET | Polyethylene terephthalate |
| PRI | Producer Responsibility Initiative |
| PPW | Plastic packaging waste |
| RPS | RPS Group plc |
| RWMOs | Regional Waste Management Offices |
| WEEE | Waste Electrical and Electronic Equipment |

GLOSSARY

Circular Economy is where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised. It is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy.¹

Eco-design means the integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle² including procurement, manufacture, use, and disposal.

Fee Eco-modulation means producers that design and make more recyclable products will be favoured by the fee structure.

Polymer type although the term polymer is sometimes taken to refer to plastics, it actually encompasses a large class of natural and synthetic materials with a wide variety of properties. Common plastics can be divided into polymer-types such as PET, HDPE and LDPE etc.

Post-consumer waste means waste that is produced by material consumers, where waste generation did not involve the production of another product.

Pre-consumer waste also known as post-industrial waste, or industrial scrap, this refers to waste generated during converting or manufacturing processes.

Primary packaging is packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase.

Recovery Operators (as defined in the Waste Management Act 2007) undertake the recovery and recycling of packaging waste arising in the Republic of Ireland.

Recyclate means materials resulting from the processing of plastic waste such as pellets, granules or flakes that will be used to form new products.

Reprocessor means an organisation which undertakes the specialised treatment or processing of material reclaimed from a waste stream in order to make it reusable in a new product. Reprocessing is usually an intermediary step in the recycling chain; it may also be the final step.

Secondary packaging is intended to protect not only the product, but also the primary packaging, which often is the packaging most visible to the consumer in retail displays. The most common

¹ 2015, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Closing the loop - An EU action plan for the Circular Economy (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>)

² DIRECTIVE 2009/125/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0125>)

examples of secondary packaging include cardboard cartons, cardboard boxes and cardboard/plastic crates.

Tertiary packaging includes outer packaging, including pallets, slip sheets, stretch wrap, strapping and labels, used for the shipment and distribution of goods. This packaging is also referred to as transport or transit packaging and is rarely seen by the final consumer.

Virgin plastic is plastic made from raw materials including natural products such as cellulose, coal, natural gas, salt and of course, crude oil.³ This does not include recycled content.

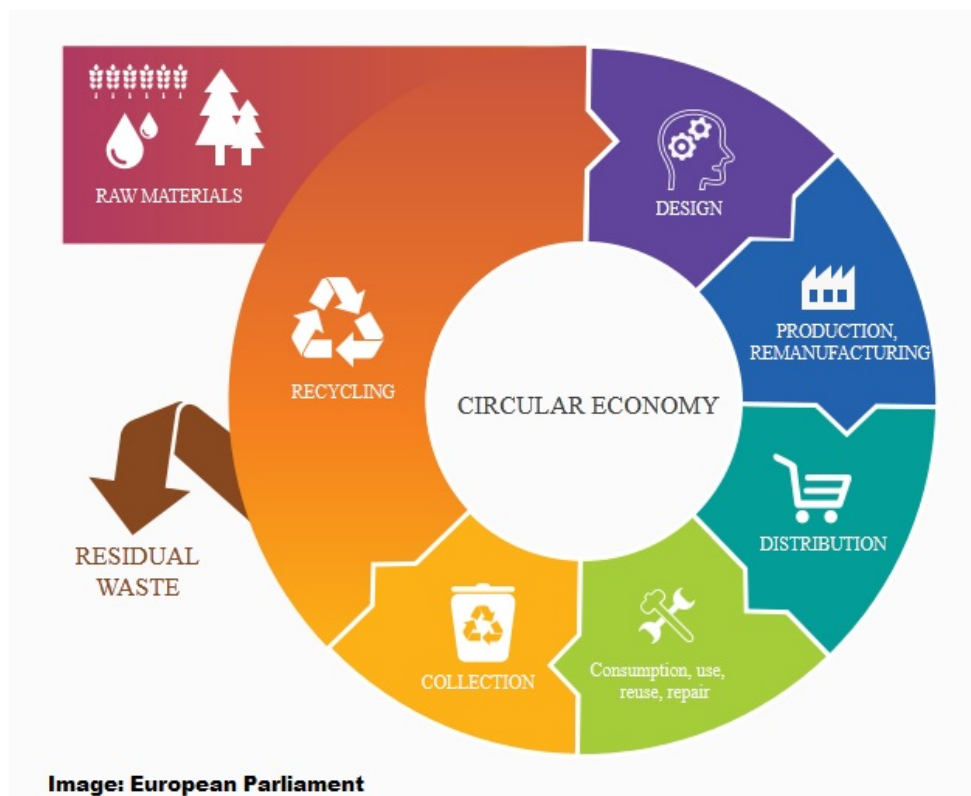
Waste and resource sector means waste collectors, recovery operators and reprocessors.

³ Plastics Europe Website: <https://www.plasticseurope.org/en/about-plastics/what-are-plastics>

EXECUTIVE SUMMARY

This document endeavours to inform policy makers, recommend actions for stakeholders and for Repak members in particular. It provides a holistic solution to the plastic waste recycling challenge presented by the Circular Economy Package (CEP).

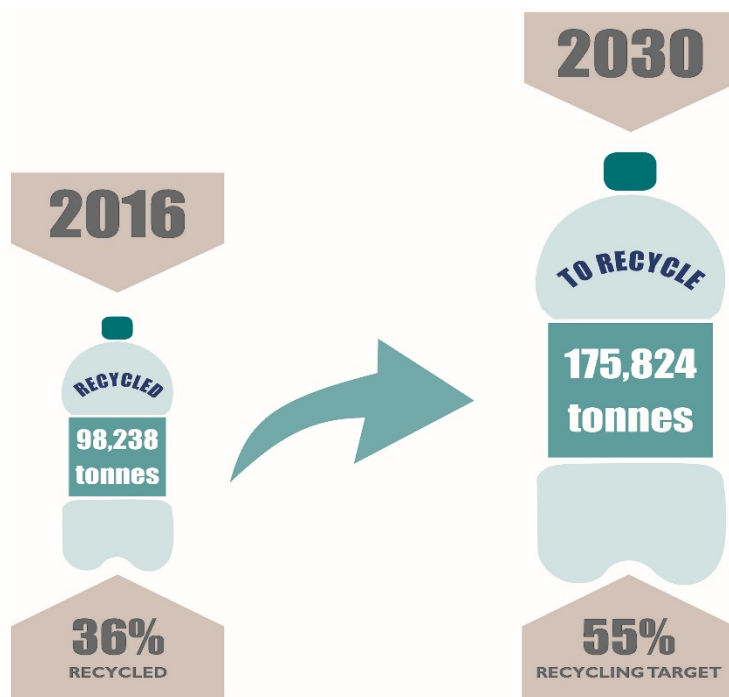
The CEP sees a move from the traditional take-make-use-dispose approach of the Linear Economy to a more holistic closed loop approach to material use, where materials are valued and kept in circulation for as long as possible.



On the 16th January 2018, the European Commission (EC) published a European Strategy for Plastics in a Circular Economy requiring all Member States to reuse and recycle 50% of all plastic packaging waste by 2025 and 55% by 2030.

In 2016, 98,238 tonnes of plastic were recycled, representing 36% of the total estimated 275,510 tonnes of waste plastic packaging generated in Ireland. This 36% of recycled plastic represents the equivalent of 4,912 40ft shipping containers of plastic material.

To achieve these new recycling targets, waste plastic packaging recycling in Ireland will have to increase to circa 175,824 tonnes by 2030.



The adoption of this new EC policy requires it to be transposed into Irish Law by 5th July 2020; therefore time is of the essence if we are to achieve the new EC recycling targets for plastic packaging waste.

Repak engaged RPS to undertake a review including stakeholder consultation to examine how best to achieve the new targets. A total of 65 different organisations and 81 individuals were invited to consult on the proposed strategy. The findings of the review which takes cognisance of the stakeholder views are outlined in this strategy. The strategy consists of 35 recommended actions, to deliver the objectives of the CEP strategy for plastics.

Achieving the European Commission vision will involve the collective action of key stakeholders. These include: Government and their Agencies, Producers, Waste and Resource Sector including trade bodies, Consumers and consumer representative NGOs. It is a clear finding that no single action by Government, business or individuals will suffice. Therefore it is important that roles and responsibilities for change are defined and shared appropriately.

It is recommended that the Government plays a critical leadership role in setting up and co-ordinating this strategy. This will ensure that all stakeholders in the value chain work together and utilise synergies towards the common objectives of the strategy.

Plastic is an important material in our economy. As the EC Plastics Strategy states *'too often the way plastics are currently produced, used and discarded fails to capture the economic benefits of a more 'circular' approach and harms the environment'*. Today, plastic packaging accounts for 40% of all plastic production.

There is an urgent need to tackle this complex issue and this document is the first step to improve the circularity of plastic packaging in Ireland. This Plastic Packaging Recycling Strategy sets out measures that will:

- Assist Ireland in meeting its recycling targets.
- Promote the design and production of plastics and plastic products that optimises use and recycling.
- Support the circular economy.
- Achieve the above in a cost-effective manner.

Repak has a key role to play in the strategy. It is uniquely placed between producers and the recycling sector with a remit set by Government to influence and implement measures aligned with the four fundamental priorities of this strategy:

- Improving data flows and evidence.
- Promoting better eco design of plastic packaging.
- Increasing reuse and recycling of plastics.
- Educating consumer sustainable consumption.

There are significant challenges in relation to quantifying the amounts of plastic packaging waste generated in Ireland. There are data gaps between the EPA Plastic Packaging Waste data and Repak's member data which need to be addressed. Therefore, this strategy is designed to initiate the development of solutions and inform policy. Further details will be developed as data gaps are closed and changes in the regulatory framework published.

Reaching most of the objectives and actions that are described throughout the document will require innovation and research, improved infrastructure and therefore significant additional investments. It is essential that these costs are distributed equitably across the stakeholder chain.

In delivering the strategic vision, a two phase approach is proposed. Phase 1 provides the timeframe to close data gaps and put in place an effective framework and recommended actions for all stakeholders. During this period, a fully costed detailed plan to underpin the strategy will be produced. Phase 1 will provide a sound foundation on which the strategy for Phase 2 will be implemented.

Phase 1 covering the period 2018-2020: It is recommended that all stakeholders implement urgent and short term actions identified in Section 4, 5, 6 and 7. During Phase 1, the identified data gaps should be closed; stakeholders should progress actions within their current mandates. This will prepare the ground for medium to longer term action to be implemented in Phase 2.

Phase 2 covering the period 2021-2030: Repak will publish a revised detailed strategy fully costed to be in place by 2021. The revised strategy will recommend further measures based on evidence gathered during Phase 1 and Government actions to deliver the target for recycling of waste plastic packaging of 50% by 2025 and 55% by 2030. It will also focus on achieving other obligations associated with the EC Plastics Strategy and associated developments.

Achieving our EU targets for plastic recycling will require a major attitudinal change within society, something akin to what was achieved with the plastic bag levy or smoking ban. There is a role for every sector of society to play in addressing the plastics challenge and this document is designed to give everyone a pathway to achieving this.

This document will be submitted to the Minister and Department of Communications, Climate Action and Environment for consideration in determining national policy.

Table of urgent recommended strategy actions by stakeholder group and objective.

| Objective | Owner | Action | Priority |
|--|-------------------------------------|---|----------|
| Improving Data Flows | EPA/ Repak | Identify the reasons for the difference in plastic packaging waste and plastic packaging placed on market and agree a methodology to quantify plastic packaging waste by type. | Urgent |
| Designing Better Plastic Packaging | Producers | Commit to a Plastic Pledge to reduce plastic packaging waste and help Ireland to play its part in achieving the key goals set out within the EU Circular Economy Package. (See Appendix 3) | Urgent |
| Designing Better Plastic Packaging | EPA | Plastic packaging waste to be made one of the priorities for the National Waste Prevention Programme. | Urgent |
| Designing Better Plastic Packaging | EPA | Setting up of an eco-design working group under the National Waste Prevention Programme to provide leadership, advice and direction on key issues. | Urgent |
| Designing Better Plastic Packaging | DCCAE/ EPA | Develop and disseminate guidance on the end-of-life of biodegradable plastic packaging products. ⁴ | Urgent |
| Increasing Reuse and Recycling of Plastic Packaging | WMROs/ Repak | Identify where to capture additional plastic packaging waste for recycling (household, commercial, multi-occupancy, on-the-go, etc.). | Urgent |
| Increasing Reuse and Recycling of Plastic Packaging | DCCAE/ Waste and Resource Sector | Undertake a study to identify what collection system or combination of collection systems (including deposit refund) will work best to achieve reuse and recycling targets and reduce litter. ⁵ | Urgent |
| Increasing Reuse and Recycling of Plastic Packaging | Repak | Review and pilot subsidy rate for more challenging recyclable plastic type (e.g. films and composites). | Urgent |
| Encouraging Consumer's Sustainable Consumption and Behaviour | DCCAE | To setup a communication advisory panel to inform communication priorities, co-ordinate local, regional and national messages. Members to include EPA, Local authorities, Repak, Waste and resource sector, retailers, Consumer's group and NGOs. | Urgent |
| How to achieve the Vision | DCCAE | To set up a plastic packaging working group and develop terms of reference. | Urgent |

⁴ There is a considerable debate as to the extent to which plastics intended to be biodegradable do actually biodegrade in the natural environment and their impact on current plastic waste management systems.

⁵ A significant proportion of litter is caused by consumption outside the home.

1 INTRODUCTION

On the 16th January 2018, the European Commission (EC) Plastics Strategy was published after two years of consultation. This is a significant element of the Circular Economy Package (CEP) and is a strategy designed to *'protect the planet, defend our citizens and empower our industries'*.

It is the first Europe-wide strategy on plastics and is part of the transition towards a more circular economy. The goal is to protect the environment from plastic pollution whilst fostering growth and innovation.

The strategy sets out a strong business case for transforming the way products are designed, produced, used, and recycled in the EU and the strategy will create new investment opportunities and jobs.

Under the new plans, all plastic packaging on the EU market will be recyclable by 2030, the consumption of single-use plastics will be reduced and the intentional use of microplastics will be restricted.

The ambitious strategy is designed to:

- Make recycling profitable for business.
- Curb plastic waste.
- Stop littering at sea.
- Drive investment and innovation.
- Spur change across the world.

Repak in response to the EC Plastic Strategy commissioned RPS to prepare a strategy to respond to the challenges posed by the CEP Plastic Packaging Waste Strategy. The strategy's development has been informed by the EC policy document and a high level review of evidence published by Repak, EPA, DCCAE, Producers, NGOs and other organisations. It also considers the views of stakeholders expressed during the pre-consultation phase. On the 7th June 2018, 65 different organisations with 81 individuals attended the pre-consultation meeting and were invited to provide input to the review. The findings of the review including consultations are outlined with 35 action recommendations to deliver the objectives of the EC policy.

Recycling of packaging waste has been a success story in Ireland over the last 20 years. When Repak started in 1997, packaging waste recycling and recovery rates were less than 10%. Today we recycle 68% of packaging and recycling has become a way of life for the majority of the population. Building on that success has been more difficult in recent years and the recycling rate has largely stagnated with marginal increases. Plastic Packaging in particular at 36% recycling, while ahead of the current European target of 22.5% has remained static. Growth in plastic packaging, restrictions in the Chinese market, lack of a market demand for plastic recyclables in Europe, significant commodity price fluctuations for recycled plastics commodities along with infrastructure deficits across Europe have contributed to this stagnation. The EC Plastic strategy endeavours to address these issues.

In order to meet the 55% recycling target Ireland will need to recycle 175,824 tonnes of plastic in 2030.

In order to achieve the incremental increases in plastic packaging recycling, businesses and individuals must move away from the 'take-make-use-dispose' model of the Linear Economy towards a resource efficient, more circular economy that retains plastics in economic use for as long as possible and avoids escape into the environment is a priority.

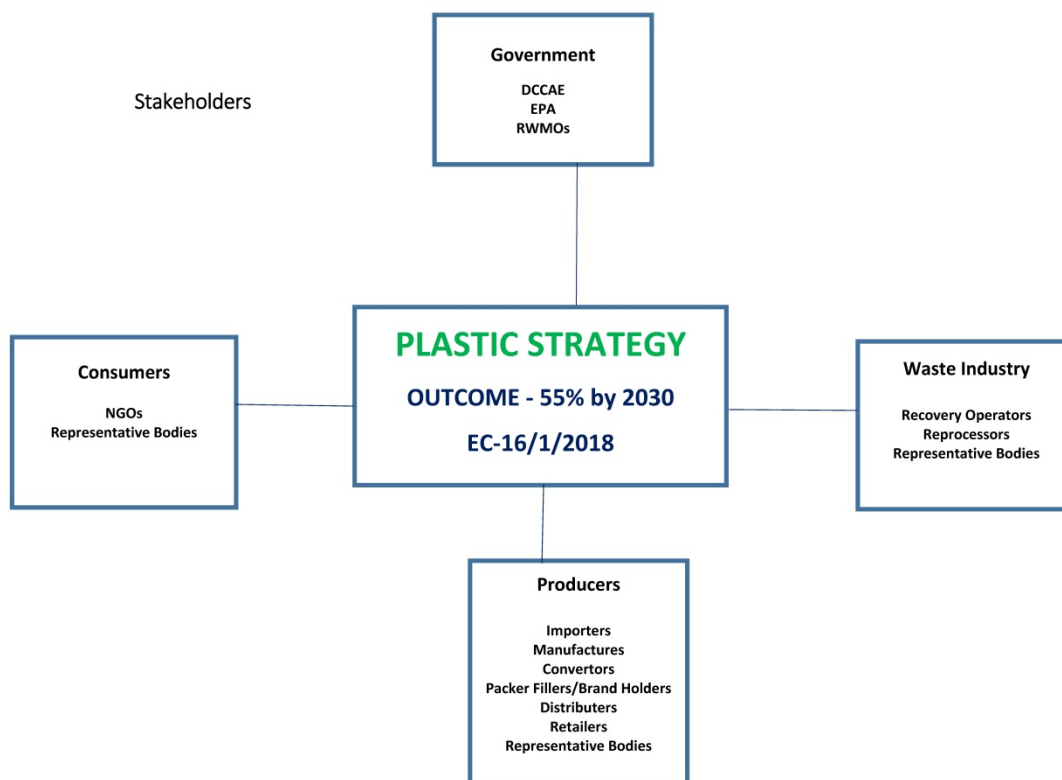
Plastic is an important material in our economy, and modern daily life is unthinkable without it. At the same time, the way that plastics, including plastic packaging, are produced, used and discarded, often fails to capture the economic benefits of a more 'circular' approach and subsequently may harm the environment.

Thousands of beneficial products are produced with plastics that create economic activity, jobs, quality of life etc., from packaging of food and household products to integral part of cars, electronic equipment, farming and construction industries etc. Many of these products have reduced energy consumption and lower greenhouse gas emissions.

Conversely most plastics are non-biodegradable, can create ecological damage, may impact human health due to bioaccumulation in the food web and for many have long term negative GHG emissions impact.

Plastic is a complex material that comes in many different polymers and amalgamation of polymers types to produce products fit for purpose. Decoupling plastic packaging usage from population and economic growth will be key to delivering the EC vision but is also the biggest challenge given the breadth of stakeholders.

The following diagram illustrates the various stakeholders that have informed this strategy and each of their roles and responsibilities are detailed throughout this document in order for Ireland to deliver the EC vision.



Developing a Plastic Packaging Recycling Strategy to deliver the EC vision in Ireland is complex and will require multifaceted solutions from many of the stakeholders. The Plastic Packaging Recycling Strategy sets out measures that will:

- Assist Ireland in meeting its recycling targets.
- Promote the design and production of plastics and plastic products that optimises use and recycling.
- Support the circular economy.
- Achieve the above in a cost-effective manner.

A well-designed and delivered roadmap represents a win-win scenario for the environment, the economy and all stakeholders.

2 ABOUT REPAK

Repak is a not-for-profit company set up by Irish business and owned by its 2,700 members. The members are producers of packaging and the threshold is any company who places more than 10 tonnes of packaging onto the Irish market with a total turnover greater than €1 million in the calendar year. Repak's fees are based on a pay-as-you-produce basis i.e. the more packaging placed on the market by a producer, the higher their fee. The fees paid to Repak by the members are used to subsidise the collection and recovery of waste packaging through registered recovery operators, i.e. companies such as Panda, Thornton's, Greenstar etc. that collect waste packaging for sorting and separation for recycling across Ireland. This is how individual member companies comply with the Packaging Regulations and joining Repak is the most efficient and cost effective way for them to meet their compliance obligations, under the Packaging Regulations.

Repak Limited members have funded over €400m for the recovery and recycling of packaging waste in Ireland since 1997. Repak is approved under licence by the Minister for Communications, Climate Action and Environment, to operate as a compliance scheme for packaging recovery. Since Repak was set up in 1997 packaging recycling in Ireland has grown from a very low base to the point where Ireland is now one of the leading recycling countries in the EU.

Repak is strongly committed to achieving the European Commission vision for Plastic Waste and will provide leadership in the area of plastic packaging waste prevention, reuse and recycling.

Repak believes that achieving the vision will not only result in significant benefits to the environment but also their stakeholders.

3 BACKGROUND

In 2018, the European Commission adopted a strategy⁶ called 'A European Strategy for Plastics in a Circular Economy' addressing the challenges posed by plastics throughout the value chain and taking into account their entire life-cycle. The European Commission Vision is summarised as follows:

- Plastic waste generation is decoupled from growth. Citizens are aware of the need to avoid waste, and make choices accordingly. Consumers, as key players, are incentivised, made aware of key benefits and thus enabled to contribute actively to the transition. Better design, new business models and innovative products emerge that offer more sustainable consumption patterns.
- By 2030, all plastics packaging placed on the EU market is either reusable or can be recycled in a cost-effective manner.
- By 2030, more than half of plastics waste generated in Europe is recycled. Separate collection of plastics waste reaches very high levels.
- By 2030, sorting and recycling capacity in Europe has increased fourfold since 2015.
- Export of poorly sorted plastics waste outside Europe has been phased out.
- The plastics value chain is far more integrated, and the chemical industry works closely with plastics recyclers to help them find wider and higher value applications for their output.
- The market for recycled and innovative plastics is successfully established, with clear growth perspectives as more products incorporate some recycled content.
- More plastic recycling helps reduce Europe's dependence on imported fossil fuel and cuts CO₂ emissions, in line with commitments under the Paris Agreement.
- Innovative materials and alternative feedstocks for plastic production are developed and used where evidence clearly shows that they are more sustainable compared to the non-renewable alternatives.
- Many entrepreneurs see the need for more resolute action on plastics waste prevention as a business opportunity. Increasingly, new companies emerge that provide circular solutions, such as reverse logistics for packaging or alternatives to disposable plastics, and they benefit from the development of digitisation.
- The leakage of plastics into the environment decreases drastically. Effective waste collection systems, combined with a drop in waste generation and with increased consumer awareness, avoid litter and ensure that waste is handled appropriately.

To move towards that vision, the EC is introducing ambitious legislative changes. The main pieces of legislation relevant here are:

- Directive (EU) 2018/851⁷ makes amendments to Directive 2008/98/EC on waste (The Waste Framework Directive) which provides the legislative framework for the collection, transport, recovery and disposal of waste.
- Directive (EU) 2018/852⁸ amending Directive 94/62/EC on Packaging and Packaging Waste focuses on reusable and reuse of packaging. The amendment requires Member States to take

⁶ http://eur-lex.europa.eu/resource.html?uri=cellar:2df5d1d2-fac7-11e7-b8f5-01aa75ed71a1.0001.02/DOC_1&format=PDF

⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0851&from=EN>

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0852&from=EN>

appropriate measures to encourage an increase in the share of reusable packaging placed on the market and the reuse of packaging.

- Directive (EU) 2018/850⁹ amending Directive 1999/31/EC on the landfill of waste.

The overall impacts of these changes relevant to plastic packaging are:

- The increase of the plastic packaging waste recycling targets from 22.5% to reuse and recycling targets set at 50% in 2025 and 55% in 2030.
- Setting new standards for extended producer responsibility schemes.
- By 2030, there should be no landfill of material suitable for recycling or recovery, and the amount of municipal waste going to landfill should be less than 10% of the total arising by 2035. A new ban on incineration of separately collected recoverable waste comes in.
- Member States are encouraged to do more to ensure any waste exported for reuse and recycling is sent to facilities that broadly meet EC environmental standards.

These Directives will be transposed into Irish legislation by 2020. The practical impact of these changes will depend on how the Government choose to implement them.

In parallel, the EC has also published a proposal for a single-use plastics directive COM/2018/340¹⁰. The Commission is proposing new EU-wide rules to target the 10 single-use plastic products most often found on Europe's beaches and seas, as well as lost and abandoned fishing gear. It must be noted that this ambitious proposal is currently being reviewed. A number of concerns have been raised in terms of the practicalities of certain measures and policy coherence with other European legislation. This strategy document is mindful of the draft Directive.

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0850&from=EN>

¹⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018PC0340&from=EN>

4 PLASTIC PACKAGING WASTE FACTS

Plastic is an important and ubiquitous material in our economy and daily lives. It has multiple functions that help tackle a number of the challenges facing society. Of all plastic produced 40% is used in packaging to protect products¹¹, to help ensure food safety and reduce food waste. However due to its short lifetime¹², packaging is the principal source of plastic waste.

Plastic packaging is derived from fossil sources, but it can also be made from renewable sources (agriculture based). Fossil based plastics have a very different climate change impact compared to renewable ones.

In 2016, 98,238 tonnes of plastic packaging waste was recycled from an estimated 275,510 tonnes generated. Figure 1 shows the main plastic packaging types that made up the 98,238 tonnes recycled in 2016. This packaging waste was managed as follows: recycling 35.7%, recovery 44% and landfill 20.3%.

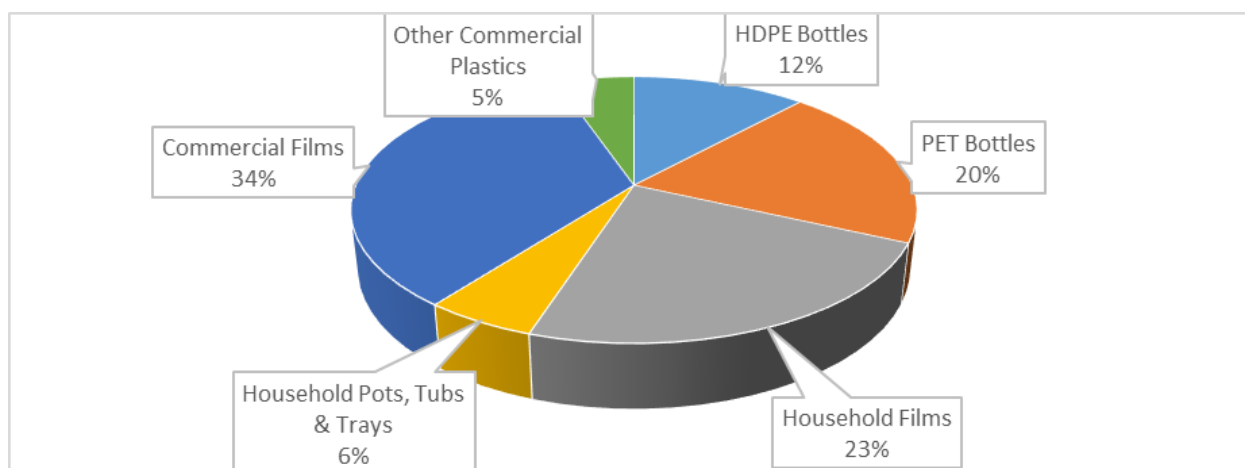


Figure 1: Plastic Packaging Waste Recycling in 2016 (Source: Repak Contractors)

The reuse and recycling of tertiary and secondary plastic packaging is generally simpler than for primary plastic packaging, as it is produced in large quantities and usually results in relatively clean and pure recyclates: much of this packaging is also composed of a single polymer. Recycling of post-consumer plastic packaging is more complicated due to the array of plastic resin types in the mix and levels of contamination in the current collection system.

Figure 2 shows the evolution of plastic packaging waste generation and management in Ireland from 2001 to 2016. It shows the plastic waste generation significantly decreased from 2008, with the economic downturn and started to increase with the economic recovery in 2012. Recycling has steadily increased from 2001, but has started to plateau in 2014. Energy recovery from plastic became

¹¹ European Commission COM(2018) 28 final

¹² Packaging has an inherent short life span of 1-5 days from point of sale and is often associated with high turn-over fast moving goods vs plastics in the automotive or construction industry which are designed for use in long-term applications for 10 to 50 years or more.

an important waste management option from 2011 and increased until 2014. Landfill has decreased consistently from 2001 to 2014, but increased in 2015 and 2016.

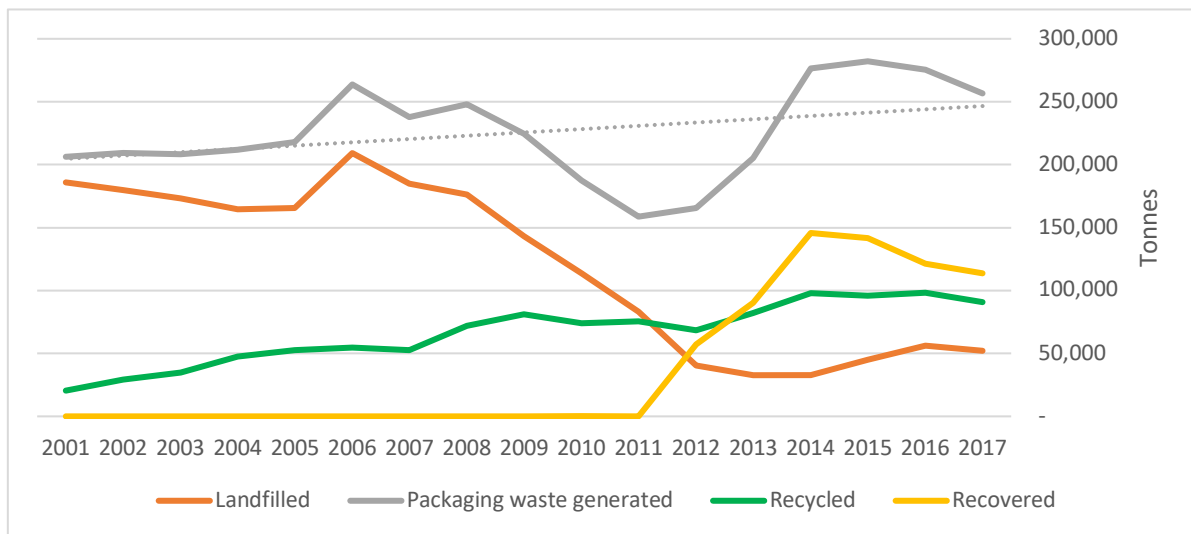


Figure 2: Plastic Packaging Waste Management 2001-2016 (Source: EPA)

There are a number of challenges relating to plastic packaging data and many of the core aspects of plastics material flows are still poorly understood. For example:

- There is no estimate of plastic packaging placed on the market or plastic packaging waste by resin type/application (e.g. PET, HDPE, films, etc.). This is a significant data gap as it is difficult to measure the performance of the current system for each type/application, to use this information for setting eco-modulation of fees, or to provide feedstock information to support business cases for the development of Irish recycling/reprocessing facilities.
- There is also no data on plastic packaging waste reuse. While reuse of consumer plastic packaging is rare, it is more common for pre-consumer plastics. It is important that this information is captured in order to contribute towards the revised reuse and recycling targets.
- Difference between EPA Plastic Packaging Waste data (275,510 tonnes) and Repak's member data for packaging placed on the market (123,668 tonnes or 45% of plastic packaging waste generated).¹³ It is important to understand where the remaining packaging comes from and assess the need for these producers to contribute to the achievement of the revised targets.
- There is a significant annual variability in plastic packaging waste generation per capita (e.g. 60kg per person in 2015/2016 versus 45kg per person in 2014) which makes it more difficult to assess the impact of packaging waste prevention programmes.

¹³ 1-2% of plastic placed on the market come from organisations that choose to self-comply and over 50% of plastic packaging comes from producers that are below thresholds, back door from non-obligated, online, and free-riders.

In order to support the EC Vision, the following actions are recommended:

| Owner | Action | Priority |
|-----------|---|------------|
| EPA/Repak | Identify the reasons for the difference in plastic packaging waste and plastic packaging placed on market and agree a methodology to quantify plastic packaging waste by type. | Urgent |
| EPA | To assist with the monitoring of the revised waste packaging targets, it is necessary to develop a methodology to quantify plastic packaging reuse. | Short Term |
| EPA/RWMOs | Develop a data sharing tool to get a clear understanding of capacity gaps. | Short Term |
| DCCAЕ | Review and amend Packaging Waste Regulations in order to close data gaps and create a more equitable producer pays system. | Short Term |

5 DESIGNING BETTER PLASTIC PACKAGING

Reducing the environmental impacts of packaging is a journey that started many years ago. Initially the main focus of companies has been on weight reduction (e.g. replacement of glass by plastic containers, or unit weight reduction of plastic bottles, as shown in Figure 3)¹⁴. There has also been some use of recycled content to replace virgin plastics but this is limited^{15 16}.

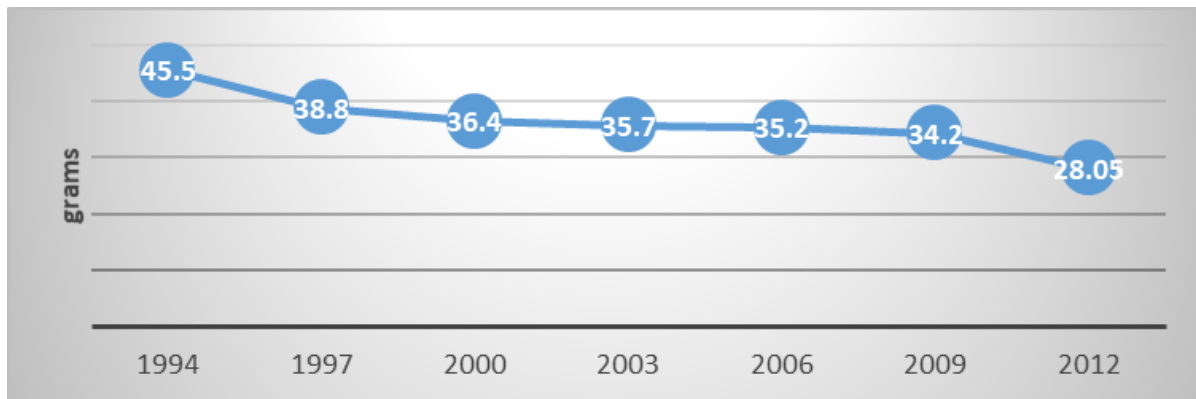


Figure 3: Change in the weight of 1.5l plastic water bottle¹⁷

Given the many benefits of plastic packaging, it has become clear that the likelihood of a drastic reduction in the volume of plastic packaging produced is low – although reduction should be pursued where possible (e.g. by moving away from single use by default). While the focus on lightweighting i.e. weight reduction of packaging products has made significant gains it would appear that it has reached its limit in terms of efficacy and there will be less opportunity for further reductions via this method. Lightweighting is fully aligned with EC policy and the waste hierarchy, however it is clear that in order to achieve a circular plastic economy further actions are required. The focus is now shifting to keeping materials used in plastic products in use for as long as possible.

This requires measures to improve recyclability, incorporate more recycled content and remove single use products. There are at present significant challenges, for example:

- Packaging design is a multi-dimensional concept taking into account technical (protecting products), economic, marketing and environmental aspects¹⁸. This is a complex area which requires careful consideration of trade-offs and supply chain co-operation. For example,

¹⁴ This is currently supported by the Repak fee system that is based on weight of packaging placed on the market.

¹⁵ Recycled plastics today only account for about 6% of the EU demand for new plastics materials. Source: European Commission COM (2018) 28 final.

¹⁶ Plastics packaging has seldom contained recycled content mainly for safety reasons, especially for food contact applications. However, technology has moved on and it is now possible to use some recycled plastics for food packaging. This is a fast-moving area.

¹⁷ Conseil National de l’Emballage, July 2018. Packaging after consumption of the product (https://conseil-emballage.org/wp-content/uploads/2018/07/EN_Packaging-after-consumption-of-the-product.pdf).

¹⁸ Eco-design plays a significant role in manufacturing companies’ quest for improved sustainability performance. It is believed that over 80% of all product related environmental impacts are determined during the production phase. Several environmental objectives can be pursued simultaneously but many eco-design initiatives are geared towards tackling single issue discrete improvements.

packaging made from thin layers of mixed materials or plastic films will generally require more energy, water and materials to collect and clean it than can be recovered. Much of this packaging will be contaminated by food residues which means that even if it is collected for recycling, there will be a high rejection rate at the sorting plant. However, this sort of packaging has environmental advantages further up the supply chain by allowing more products to be packaged onto one delivery vehicle, which means fewer vehicle movements and less traffic congestion and fuel consumption.

- There is no agreed definition of recyclability¹⁹ which leads to confusion and further engagement with the waste and resource sector is needed to understand the impact of design choices.
- Design decisions to solve environmental problems are not always based on proper **lifecycle analysis** and taking into account the **waste hierarchy** (repair, reuse and remanufacturing are to be preferred over recycling, incineration with energy recovery or landfilling as the least preferred option).
- Most packaging is designed and produced at international scale, and is not tailored to local recycling markets. A large proportion of packaging production comes from abroad, where in the absence of a global protocol it is more difficult for retailers to influence supply chain. The use of 'own brand' goods by retailers does however create more opportunity to influence the specifications of packaging.

In Ireland the key actions to influence packaging design should focus on:

- Gain commitments from producers to implement changes in their supply chain.
- Building and disseminating knowledge of successful eco-design practices.
- Reward companies that reduce the environmental impacts of their products.
- Support the adoption of global guidelines/standards compatible with Ireland's needs.

¹⁹ What is recyclable in one country may not be in another. As goods are traded globally this poses a challenge in terms of harmonisation. Plastic Europe has proposed that for a product to be considered recyclable, it must meet four conditions:

1. The product must be made with a plastic that is collected for recycling, has market value and/or is supported by a legislatively mandated programme;
2. The product must be sorted and aggregated into defined streams for recycling processes;
3. The product can be processed and reclaimed/recycled with commercial recycling processes; and
4. The recycled plastic becomes a raw material that is used in the production of new products.

In order to support the EC Vision, the following actions are recommended:

| Owner | Action | Priority |
|-------------------------------------|--|------------|
| Producers | Commit to a Plastic Pledge to reduce plastic packaging waste and help Ireland to play its part in achieving the key goals set out within the EU Circular Economy Package. (See Appendix 3) | Urgent |
| EPA | Plastic packaging waste to be made one of the priorities for the National Waste Prevention Programme . | Urgent |
| EPA | Setting up of an eco-design working group under the National Waste Prevention Programme to provide leadership, advice and direction on key issues. | Urgent |
| DCCA/EPA | Develop and disseminate guidance on the end-of-life of biodegradable plastic packaging products. ²⁰ | Urgent |
| Repak | Eco-modulation: Repak will incentivise producers' eco-design efforts by developing a fee modulation system. The fee modulation will reward producers that place on the market packaging with better environmental performance. | Short Term |
| Repak | Expand the ' Prevent & Save Programme ' (see Appendix 5) to: <ul style="list-style-type: none"> Facilitate interaction between packaging product designers and recyclers to explore design solutions affecting end-of-life. Organise packaging design workshops in collaboration with relevant third level institutions. Disseminate further case studies. | Short Term |
| DCCA/EPA | Develop and disseminate an Irish guidance for the eco-design of plastic packaging. The aim of the guidance will be to show quick wins and identify best approach/framework for more complex solutions. ²¹ | Short Term |
| Enterprise Ireland | Facilitate access to financial support to assist companies in the design of Environmentally Superior Products. | Short Term |
| DCCA/EPA Producers organisations | Lobby the European Commission/international trade organisations to implement harmonised measures (e.g. global standards, definitions) and influence global supply chains through trade agreements and legislation. | Ongoing |

²⁰ There is a considerable debate as to the extent to which plastics intended to be biodegradable do actually biodegrade in the natural environment and their impact on current plastic waste management systems.

²¹ See guidance developed by WRAP

<http://www.wrap.org.uk/sites/files/wrap/Issues%20to%20tackle%20in%20plastics%20packaging%20%28002%29.pdf>

6 INCREASING REUSE AND RECYCLING OF PLASTIC PACKAGING

The 2018 Packaging and Packaging Waste Directive²² requires a significant increase in reuse and recycling of plastic packaging waste from the current target of 22.5% to 50% in 2025 and 55% in 2030.

To achieve these targets, the quantities of plastic packaging waste captured/available for reuse and recycling will need to increase significantly. If quantities of plastic packaging waste generated also increase, additional reuse and recycling will be required to achieve the targets.

With regards to reuse and recycling, one of the key focuses of the European Strategy for Plastics in the Circular Economy is to improve the economics and quality of plastic recycling. At national level, one of the main instruments to improve the economics of recycling includes the Repak subsidies paid to recovery operators. Factors affecting quality include collection system, information and awareness, enforcement, sorting equipment etc.

Current key challenges include:

- Collection of plastics still does not generate sufficiently clean and homogenous streams (especially from post-consumer waste) that could enable recyclers to have the purity and scale providing improved material outputs.
- Contamination of materials collected in co-mingled recyclable collections is high compared to international levels affecting quality of recyclates and increasing processing costs at MRFs/reprocessing facilities.²³
- Lack of appropriate collection systems and recycling opportunities for waste generated by on-the-go consumption and from multi-occupancy dwellings.
- There is also limited data to estimate costs of new collection systems in an Irish context.
- Different plastics require different treatment options.²⁴ A greater variety of technologies are needed to recycle plastic compared to other waste types. The potential varies by sector and polymer type.²⁵
- Achieving economies of scale for Irish MRFs and reprocessing facilities.
- Although it is a critical step to attract investment to develop further recycling in Ireland, putting in place end of waste criteria for plastic has been slow.
- Limited impact of green public procurement on stimulating the demand side.

In order to achieve targets, plastic packaging will need to be extracted from waste sent to landfill and energy recovery. While producers will do their parts on improving recyclability of packaging and incorporating recycled content in products, the waste and resource sector, and local authorities will need to provide additional collection infrastructure, improve MRFs for better sorting and

²² Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0852&from=EN>).

²³ Repak estimates that co-mingled recyclable collections contain an average 25% of non-recyclable materials. In 2016 this was approx. 87,000 tonnes.

²⁴ For example, plastic bottles made of PET cannot be recycled together with transport packaging made of LDPE.

²⁵ For example, it is easier to recycle PET than LDPE, where significant advances have been made in optical sorting. Approaches to increasing the recycling of films and flexible packaging could include separate collection, or investment in extra sorting and processing facilities at recovery facilities for handling mixed plastic wastes.

expand/develop additional reprocessing facilities. This will be where the main cost of implementing the EC plastic vision will be borne.

A market for plastic recyclates (from mechanical and chemical recycling) and other secondary raw materials will only continue to grow if such secondary raw materials can fulfil specific quality standards.

Beyond the idea to give more certainty to recyclers regarding return on investment, recycling should also be supported by creating legal certainty and a level playing field compared to virgin material production. Indeed, there are indications that uncertainties concerning the legal status and regulatory acceptance of plastic waste stifle investments in plastic recycling. This relates both to the waste management conditions for certain plastic waste which may or may not be considered as hazardous, and to the conditions for recovered plastics to cease to be waste and become a product.

The general end-of-waste criteria, i.e. criteria according to which waste ceases to be waste, and the ways how this can take place, are defined in Article 6 of the Waste Framework Directive. Such criteria have been set by the EC for iron, steel and aluminium scrap, glass cullet and copper scrap. For plastic waste, end-of-waste criteria have not been set because of the complexity and diversity of polymers and variety of potential applications. None of the existing standards and technical specifications fit the purpose of end-of-waste criteria and only business to business specifications define in practice the technical characteristics of waste plastics and recyclates. Therefore there is merit in providing a roadmap to businesses on how end-of-waste criteria for waste plastics can be achieved so that the economic case for the development of infrastructure can be encouraged and assessed with a degree of certainty.

Innovation shall also be supported in order to reach the EU circular economy goals, to provide smart and sustainable alternatives to consumers and business and fulfil other commitments such as those linked to CO₂ emissions and climate change. It will also contribute to improving the quality of plastic waste for recycling (e.g. developing a technology for markers and tracers in polymers) or to scale up and develop recycling technologies (e.g. chemical recycling) where proven beneficial for the environment and climate.

In a North-South context, Brexit as a current unknown quantity poses issues for consideration such as currency, trade tariffs, standards, end-of-waste criteria, movement of waste, potential for co-operation on an island of Ireland basis including shared infrastructure to achieve economies of scale etc.

In order to support the EC Vision, the following actions are recommended:

| Owner | Action | Priority |
|---------------------------------------|--|-------------|
| RWMOs/Repak/Waste and Resource Sector | Identify where to capture additional plastic packaging waste for recycling (household, commercial, multi-occupancy, on-the-go, etc.). | Urgent |
| DCCAE/Waste and Resource Sector | Undertake a study to identify what collection system or combination of collection systems (including deposit refund) will work best to achieve reuse and recycling targets and reduce litter. ²⁶ Any consideration of a bottle deposit and return scheme needs to occur in the context of a fundamental evaluation of its cost-benefit implications. Stakeholder and recycling infrastructure impacts need to be considered. | Urgent |
| Repak | Review and pilot subsidy rate for more challenging recyclable plastic type (e.g. films and composites). | Urgent |
| DCCAE/LAs | Depending on findings from the collection study, consider revision to Waste Collection Permits/By laws to improve collection of segregated plastics. | Short Term |
| DCCAE/Repak | Strengthen the pull effect of green procurement on the demand side through industry (see pledge in Appendix 3) and public sector commitments . | Short Term |
| EPA | Define a process how end-of-waste criteria for plastic can be achieved. | Short Term |
| Repak | Carry out a detailed costing of the measures to be implemented. | Short Term |
| Repak | Examine feasibility of a reprocessor subsidy . | Medium Term |
| LAs/Waste and Resource Sector | Increase collection infrastructure provision and apply the lessons learnt from pilots and studies. | Medium Term |
| DCCAE | Assess the impact of an energy recovery levy on recycling targets. | Medium Term |
| DCCAE/Repak/Waste and Resource Sector | Develop options to mitigate market vulnerability (low materials prices, geo-politics, etc.). | Medium Term |

²⁶ A significant proportion of litter is caused by consumption outside the home.

7 ENCOURAGING CONSUMER'S SUSTAINABLE CONSUMPTION AND BEHAVIOUR

Consumers, end-users or waste producers must make informed choices when purchasing goods, sorting their waste and ensuring it is treated and disposed of according to the proper mechanisms.

With awareness of plastic pollution in the environment heightened, consumers are putting increased pressures on Government and retailers to take actions.

Amárach consumer survey²⁷

- Over two thirds of respondents are concerned about the effects of plastics.
- Almost half claim reassurance that waste is effectively recycled would convince them to separate more of their waste, and more than 2 in 5 would like more information on how and where to separate it.

In addition to the provision of environmentally friendly alternatives (see Section 5) and waste collection infrastructure (see Section 6), clear information/labelling with practical consumer education is required to influence consumer behaviour.

Some of the challenges associated with encouraging consumer's sustainable consumption and behaviour include:

- Consumer's understanding of what they can and cannot recycle. This is likely to become more complex due to potential changes to the existing collection system which may be confusing for the consumer and communication about these changes will need to be carried out effectively.
- Understanding of consumer behaviour and attitudes: Consumers have different needs with respect to information and their potential to be influenced by instruments and tools varies. Many consumers have a positive but passive view of sustainable consumption. Policy tools and instruments need to be targeted to different types of households, individuals or groups. Many variables also need to be taken into account, including income, age, biases, attitudes and gender.
- Currently, communication on sustainable consumption is delivered through a range of organisations²⁸ sometimes the messages are aligned (e.g. communication on the national recycling list²⁹), but most of the time communication is fragmented, uncontrolled and/or conflicting. This leads to confusion and misinformation. In the absence of consistent messaging, communications in the media are useful to raise issues but do not provide the necessary analysis to respond to these challenges and suggest less than optimal solutions to complex problems.


²⁷ Completed by Amárach July 2018 on a total sample of 1,000 aligned with national population profile.


²⁸ DCCAE, EPA, Local authorities, Repak, waste operators, NGOs, consumer groups and retailers etc.


²⁹ <https://recyclinglistireland.ie/irelands-household-recycling-list/>


Your new household recycling list


Rigid Plastics



Plastic Drink Bottles


Plastic Cleaning Bottles



Butter, Yoghurt & Salad Tubs



Fruit & Veg Trays



Plastic Milk Cartons



Soap or Shampoo Bottles

Tins & Cans


Soup Cans



Pet Food Cans



Drink Cans



Food Cans


Clean,
Dry and
Loose


Paper & Cardboard



Letters and Brochures


Cardboard Boxes (Flat)


Egg Boxes


Toilet and Kitchen Roll


Newspapers


Tetra Pak Juice or Milk Cartons

#RecyclingListIRL
www.recyclinglistireland.ie

The **Recycling list** provided:

- Consistent range of materials.
- Consistent national messages.
- Clear, non-branded images of materials.
- List of non-target materials.
- Information on end destination.

In order to encourage sustainable consumption and behaviour, further co-ordination of communications is required. DCCAE as part of its wider mandate has a central role in the co-ordination of information and awareness.

Improving the quality and flow of clear and transparent information about the sustainability of products and end-of-life stage can help to remove many misconceptions.

Promoting a fundamental attitudinal change amongst the public and its relationship with plastic consumption and waste analogous to the public perception of the plastic bag levy or smoking ban will be required to address the challenges posed by plastic packaging. Littering and contaminating recycling should be viewed as socially unacceptable.

The staggering fact that co-mingled recyclable collections contain an average 25% of non-recyclable materials which in 2016 was approx. 87,000 tonnes shows that proper separation of recyclables in the home and in the office will lead to a significant reduction in contamination and result in higher recycling rates and quality materials which will be more marketable for use in recycled products in Ireland or abroad.

The waste and resource industry and NGOs have a significant role to play in disseminating the national messages to consumers.³⁰

In addition to the measures already in place to encourage, the following actions are recommended:

| Owner | Action | Priority |
|--|---|-------------|
| DCCAE | To setup a communication advisory panel to inform communication priorities, co-ordinate local, regional and national messages. Members to include EPA, Local authorities, Repak, Waste and resource sector, Retailers, Consumer's group and NGOs. | Urgent |
| DCCAE/WMROs | Develop an annual national communication activity plan on the recycling of waste including plastic waste. Funding needs to be set aside annually to fund co-ordinated and targeted campaigns. Repak to contribute to this fund. | Short Term |
| DCCAE/WMROs/ Waste and Resource Sector | Develop mechanisms to update recycling list and communicate changes effectively to the public. This is required to include materials that are not currently on the list but become recyclable because of change in technology/economics/market. This must also include the ongoing education and awareness of both domestic (household), and commercial and industrial customers by the private and public waste sector. | Short Term |
| NWCPO/WMROs/ Repak | Provide support to waste and resource sector to develop a communication plan to help create clear and consistent messages that can be targeted to audiences. | Medium-term |
| NGOs/Consumer Groups | NGOs and consumer's group to use their networks to disseminate messages to encourage sustainable consumption. | Medium Term |
| Repak | Repak has a mandate from DCCAE to encourage behavioural change and keep the recycling of packaging to the fore, to further improve our recycling rates. Repak will need to realign its communications campaigns to deliver the new plastic targets . See current national annual campaigns in Appendix 4. Annual consumer surveys are needed to assess if measures are working. | Ongoing |

³⁰ A good example of communication from an NGO is the Recycling Ambassador Programme. <https://voiceireland.org/rap/#what-goes-in>

8 HOW TO ACHIEVE THE VISION

Achieving the European Commission vision requires a ‘whole system’ approach to have any impact and will involve the collective action of Government, brand holders, retailers and manufacturers, consumers, and the waste and resource sector.

In considering the best approach, we must have regard to a number of external factors:

- Plastic and plastics packaging are part of global supply chains and many decisions are made outside Ireland. Similarly most of plastic packaging recycling takes place abroad.
- Ireland operates in an international regulatory framework set by the European Commission and the World Trade Organisation.
- The market structure for packaging waste management is different from most of our European counterparts and solutions implemented abroad may not be transferable to Ireland.

Government will have a critical role setting up the co-ordination element through its regulatory powers. It is essential that **DCCAE set-up a cross sector plastic packaging working group** (similar to the Food Waste Forum) to lead collaboration and provide co-ordination to align the goals of the stakeholders. This proposed vehicle must allow for joint, urgent, collaborative initiatives across industries, Governments and NGOs. This will help address fragmentation issues. The use of existing structures³¹ and synergies with other plastic waste streams³² should also be maximised.

Repak is uniquely placed to facilitate the collaboration element. Repak can:

- Facilitate dialogue between producers and the waste and resource sector.
- Improve the economics of recycling by using members fee to support plastic packaging recycling.
- Provide leadership to maintain value of plastic packaging in the economy.

Repak will also participate further in national and regional platforms such as the National Waste Prevention Committee and the Regional Waste Management Plans Co-ordination Group.

To achieve the strategic objectives of the vision a set of priorities shown in Figure 4 have been developed and Repak will use its influence to promote collaboration in the plastic supply chain and between public authorities and industry to achieve these objectives.

³¹ National Waste Prevention Programme, RWMOs, NWCPO etc.

³² From construction and demolition, End-of-life vehicles, WEEE sources.



Figure 4: Repak Strategic Priorities

Reaching most of the objectives and actions that are described throughout the document will require innovation and research and therefore major additional investments. It is essential that stakeholders contribute to cost of achieving the measures fairly. In several areas knowledge gaps must be closed.

In delivering the strategic vision a two phase approach is proposed. Phase 1 provides the timeframe to close data gaps and put in place an effective framework and implementable actions for all stakeholders. During this period, a fully costed, revised, detailed strategy will be produced. As there are significant data gaps and a dynamic policy environment, this strategy is designed to initiate the development of solutions and inform policy and needs to be adaptable. Further details will be developed as data gaps are closed and developments in the regulatory framework published.

Phase 1 covering the period 2018-2020: all stakeholders to implement urgent and short term actions identified in Section 4, 5 and 6. During Phase 1, stakeholders will progress actions within their current mandates and will prepare the ground for medium to longer term action to be implemented in Phase 2.

| Owner | Action | Priority |
|------------------|---|------------|
| DCCAIE | To set up a plastic packaging working group and develop terms of reference. | Urgent |
| DCCAIE | Transpose the revised Directives into Irish law and develop a national circular economy strategy framework into which the strategy will be incorporated. The PRI approval basis is to be revised in line with the strategy for the next approval period. | Short Term |
| DCCAIE/EPA/RWMOs | Research to be undertaken to close data gaps and help build evidence to understand areas as to which measures can make the biggest difference. | Short Term |

Phase 2 covering the period 2021-2030: Repak will publish a revised, fully costed, detailed strategy to be in place by 2021. The revised strategy will recommend further measures based on evidence gathered during Phase 1 and Government actions to deliver the target for reuse and recycling of waste plastics packaging of 50% by 2025 and 55% by 2030 and achieve other obligations associated with the EC Strategy for Plastics in a Circular Economy and associated developments.

| Owner | Action | When |
|--|--|---------------------|
| Repak | Prepare a fully costed, detailed strategy. | Medium Term |
| Government/Waste and Resource Sector/Producers | Invest to meet the objectives and targets set by the European Commission and address the challenges posed by plastic packaging. | Medium to Long Term |

APPENDIX 1: SUMMARY KEY ISSUES FROM PRE-CONSULTATION WITH STAKEHOLDERS

1. Background

In May 2018, RPS was commissioned by Repak Ltd. to assist in the preparation of a Plastic Packaging Recycling Strategy in response to the challenges set by European Commission 2030 plastic packaging targets. The strategy's development has been informed by a high level review of evidence published by Repak, EPA, DCCAE, NGOs and other organisations. It also considers the views of stakeholders from Government, producers, consumers and the waste and resource sector, following a pre-consultation meeting held on the 7th of June 2018 attended by **65 organisations**, a follow-up questionnaire, as well as further meetings with selected stakeholders. In response to the questionnaire issued, a total of **36 responses** were received from a range of five stakeholder groups including Manufacturers of Plastic Packaging, Waste Collectors, Waste Collectors/Reprocessor, Reprocessors, Representative Bodies and the Education sector. As a follow up RPS contacted all of the organisations to explore the suggestions in more detail and meetings/calls took place with **27 organisations**. The contributions varied from concrete proposals to general remarks on how best to develop the strategy into the foreseeable future. This summary briefly describes some of the key messages of the contributions and reviews the common threads and differences between the stakeholders.

2. Summary of Responses

2.1 Manufacturers of Plastic Packaging

The manufacturers of plastic packaging believe that encouraging a behavioural change and raising awareness to reduce contaminated plastic recyclates is the first action that needs to be taken. **Effective communication** through media outlets will be vital in this process and should also actively inform consumers of their own roles in reducing plastics through their purchasing decisions. Manufacturers envision that this **behaviour change/awareness should be both incentivised and penalised** as appropriate to ensure a long-term change. If successful, reduction in plastic contamination through recycling could result in major increases in the levels of plastic packaging currently recycled. Manufacturers would like to see **greater investment in infrastructure which encourages recycling**. Improvement through investment in infrastructure should be targeted at improving sorting facilities to ensure more plastic is processed, as well as the installation of on-the-go plastic recycling bins. Manufacturers also want a **financial incentive for companies that use recycled material** or make investments that permit the increased use of recycled material. A tax incentive scheme that rewards users of recycled material and penalises users of virgin polymer material would be a good way of driving the correct behaviours and investment decisions. Current market prices for the recycled and virgin material are very close due to natural market forces and supply and demand. As such, there is little commercial benefit to using recycled material instead of virgin polymer material. The absence of a commercial benefit in using recycled plastics encourages companies away from purchasing recycled material and away from making the extra investment to allow for increased use of recycled material. A **fee clawback** for companies (retailers, producers) that meet recyclability targets on plastics is an incentive-based approach that should also be considered. Manufacturers should **engage with the whole supply chain to improve recycling rates**. Currently, some companies are **implementing their own voluntary incentives** which are encouraged but thinking between manufacturers should be joined up. There are mixed views from manufacturers about the implementation of a deposit-return scheme for PET bottles. Some of the companies suggested that this would improve the quality feedstock of recyclables in Ireland and while others believe it would

not be the most effective allocation of resources. In addition, some manufacturers believe that **legislation needs to make energy recovery a less attractive route while others wish to promote eco-design incentives for colleges in Ireland** with the review of new plastics types.

2.2 Waste Collectors

The response from waste collectors to the questionnaire varied with some companies wanting to actively participate and put forward solutions while others considered that the overall responsibility falls directly with the consumer, producer and not the waste operator. Of the companies that wanted to actively participate, they would like to see a **fiscal incentive implemented for recycling plastic packaging** in Ireland. They believe that a financial incentive would support the business case and support change to their current practices in order to achieve the recycling goal. Waste collectors also believe that where practical, plastic packaging originating in Ireland, should be **processed and recycled in Ireland**. The current 'out of sight, out of mind' export recycling is simply not sustainable and the only long-term, sustainable option for them would be the investment in Irish recycling facilities. In addition, waste operators would also like to **create a market for recyclates produced in Ireland** in order to allow for the displacement of virgin plastic with domestically produced recycled plastic. Another financial idea put forward by the waste collectors is to financially **discourage the reliance on recycling in countries with questionable environmental performance** and to financially discourage the landfilling of recyclate. Another issue raised by waste collectors was that of poor labelling on plastic packaging. They want to see **clear labelling on packaging in order to assist segregation and manual sorting at materials recovery facilities**. In addition, waste collectors would also like to set-up a waste forum so that the companies involved in the waste processing industry could engage with product designers, consumers, packaging producers and retailers to educate themselves of the practical difficulties associated with recycling composite materials. Another issue raised in the questionnaire was the **way recycling is carried out at apartment blocks and managed estates**. Currently, there are poor recycling facilities in the majority of these areas and waste operators believe that if improvement is made here there is great potential for increasing recycling rates. In addition, one company had an issue with rogue operators and brokers operating which they feel could severely damage Ireland's recycling industry reputation. They would like to see **greater enforcement of all waste brokers**.

2.3 Reprocessors and Waste collectors

Reprocessors and waste collectors who responded to the questionnaire commented that **the range of plastic polymers** in the mix collected from the household, is much too complex and **needs to be simplified to fewer types**. Reprocessors and waste collectors also highlighted the **need for greater infrastructure** while also highlighting the issues regarding huge **delays in securing planning permission and permit/licensing**. Delays of up to 4+ years are being experienced which they believe is unjustified and impractical by any standards. In addition, they wish to call on the Government to recognise the financial requirements for the installation of infrastructure and therefore apply incentives. Reprocessors and waste collectors also believe **a joint strategy meeting needs to take place between all involved stakeholders** in the supply chain including the waste industry, plastic processors, retailers, Repak, Government and it's agencies (such as, EPA, DCCAE and local authorities). In addition, reprocessors and waste collectors want to improve the quality of plastic material collected and recycled by **improving the accurate and timely collection of data**. Furthermore, reprocessors and waste collectors believe that **plastic film is the biggest challenge to face the recycling of plastics**.

Reprocessors directly involved in the industry and who responded to the questionnaire are very open to stakeholders visiting their reprocessing facilities. They feel there is currently a **lack of knowledge in the plastic recycling process** and what Reprocessors actively do; therefore stakeholders involved in

the governance do not recognise their importance to the circular plastic economy. Reprocessors would also like an incentive scheme to be implemented to support investment in ensuring that recycled plastics meet high-quality standards. In addition, a **financial support system** would be seen to help kick-start and sustain a domestic plastic recycling industry which includes both regrind and granulate production. Reprocessors also commented that **plastic packaging producers should change their product designs so that they are easier to recycle** giving the technological limits of the industry. Furthermore, materials which may be technically recycled, but for which no economically viable solution exists should be discouraged from use. Reprocessors would also be in favour of **manufacturers of plastic items to be obligated to include a minimum content of recycled plastic materials in their products**. In terms of legislation, reprocessors suggest that **mail order related packaging, those that are imported from another country, should have a levy/tax** placed on them for the cost of recycling this material. In addition, reprocessors also suggested **streamlining the planning permission** to handle scrap plastic regrind as it is causing an enormous barrier to the development of the domestic market. Finally, reprocessors would like to see the **consideration of a DRS** to help increase plastic bottle recycling rates and as well as increasing the quality of plastic bottles being presented for recycling.

2.5 Sector Representative Bodies

Sector representative bodies who are directly involved in the industry have outlined that **poor communication is leading to poor recycling rates and greater contamination**. Therefore representative bodies suggest that a **clear communication strategy** to all stakeholders is developed and integrate as part of the broader messages of Ireland's circular economy ambitions. They believe that this effective communication will be a critical part in the way plastic is consumed and recycled in the future. Representative bodies also suggest that there is a **lack of joined-up thinking between producers and waste collectors** in terms of recycling symbols and recycling list guidance. This lack of joined up thinking is also contributing to reduced recycling rates and increased contamination. To address this issue some representative bodies suggest the **introduction of clear common labels** across certain types of plastics. In terms of legislation, some representative bodies would like to see the introduction of laws which would fundamentally force producers into increasing the amount of recycled plastic in the products, while others champion a voluntary scheme. In addition, some representative bodies wish to see a **tax on single use items** and a **modulation in members fees** to reflect the sustainability of the packaging material, rewarding more recyclable/compostable material and providing a disincentive for hard to manage materials such as low-grade plastics and composites. In terms of the **introduction of a DRS**, there are mixed views. Some representative bodies support the establishment of a DRS for plastic and drink containers to collect on-the-go plastic bottles and as a mean to achieve 90% collection rates. While other representative bodies do not wish to introduce one in Ireland due to fear of fraud issues as well as the lack of aligned jurisdiction with Northern Ireland. Furthermore, some representative bodies also highlighted the issue with deposit return schemes in Germany and Nordic countries where a high 'return rate' did not necessarily mean a high 'recycling rate' as a high proportion of plastic waste is sent for incineration.

2.6 Education

Those who responded to the questionnaire from the education sector outlined that they wish to see **more up to date national surveys** being published on a more regular basis. They consider this would

outline the issue as to where we stand as a nation when it comes to reaching our targets as well as aiding in raising the education and or awareness of the situation. Furthermore, with a **positive promotion, marketing and media presence** the issue could be better outlined for each stakeholder. The education section would also like to see the **introduction of a Tax Credit (like R&D tax credit) for domestic companies to use recycled material from Irish processing companies**. In addition, the education sector also suggested investigating the possibility of having a reverse vending scheme or a DRS. Furthermore, the education section would like to see a certificate logo showing the percentage of Irish recycled plastics in each product.

APPENDIX 2: TABLES OF RECOMMENDED ACTIONS

Tables of recommended strategy actions by priority order and stakeholder group - Urgent and Short Term.

Key: Green = Design, Orange = Recycling, Black = Data, Blue = Communication, Red = Implementation

| Owner | Urgent | Short Term |
|----------------------|--|---|
| Repak | <ul style="list-style-type: none"> ■ Review subsidy rate for more challenging recyclable plastic type. | <ul style="list-style-type: none"> ■ Develop a fee modulation system. ■ Expand the 'Prevent & Save Programme' ■ Carry out a detailed costing of the measures to be implemented. |
| Public Sector | <ul style="list-style-type: none"> ■ Set up a plastic packaging working group and develop terms of reference. ■ Make plastic packaging waste one of the priorities for the National Waste Prevention Programme. ■ Set up an eco-design group under National Waste Prevention Programme. ■ Set up a communication advisory panel. | <ul style="list-style-type: none"> ■ Review and amend Packaging Waste Regulations in order to close data gaps and create a more equitable producer pays system. ■ To develop a methodology to quantify plastic packaging reuse. ■ Define a process for end-of-waste criteria for plastic to be achieved. ■ Revise PRI approvals in line with strategy for next approval period. |
| Producers | <ul style="list-style-type: none"> ■ Commit to a Plastic Pledge to reduce plastic packaging waste and help Ireland to play its part in achieving the key goals set out within the EU Circular Economy Package. (See Appendix 3) ■ Develop and disseminate guidance on the end-of-life of biodegradable plastic packaging products. | <ul style="list-style-type: none"> ■ Facilitate access to financial support to assist companies in the design of Environmentally Superior Products. ■ Develop and disseminate guidance for eco-design of plastic packaging. ■ Strengthen green procurement. ■ Revise Waste Collection Permits/By-laws to improve collection of segregated plastics. ■ Develop an annual, national communication, activity plan. |
| Joint | <ul style="list-style-type: none"> ■ Identify the reasons for the difference in plastic packaging waste and plastic packaging placed on market and agree a methodology to quantify plastic packaging waste by type. ■ Develop a data sharing tool to get a clear understanding of capacity gaps. ■ Identify where to capture additional plastic packaging for recycling (e.g. household, commercial, multi-occupancy, on-the-go). | <ul style="list-style-type: none"> ■ Develop mechanisms to update recycling list and communicate changes effectively to the public. This must also include ongoing education and awareness of both domestic, and commercial and industrial customers by the private and public waste sector. ■ Research to be undertaken to close data gaps and help build evidence to understand areas as to which measures can make the biggest difference. |

| Owner | Urgent | Short Term |
|-------|---|------------|
| | <ul style="list-style-type: none"> ■ Undertake a study to identify what combination of collection systems (including DRS) will best achieve reuse / recycling targets and reduce litter. | |

Tables of recommended strategy actions by priority order and stakeholder group - Medium Term and On-Going.

Key: Green = Design, Orange = Recycling, Black = Data, Blue = Communication, Red = Implementation

| Owner | Medium Term | On-Going |
|----------------------|---|--|
| Repak | <ul style="list-style-type: none"> ■ Examine feasibility of a reprocessor subsidy. ■ Prepare a fully costed, detailed strategy. | <ul style="list-style-type: none"> ■ Encourage behavioural change and keep recycling of packaging to the fore to further improve our recycling rates. |
| Public Sector | <ul style="list-style-type: none"> ■ Assess the impact of an energy recovery levy on recycling targets. | |
| NGOs | <ul style="list-style-type: none"> ■ Disseminate messages to encourage sustainable consumption. | |
| Joint | <ul style="list-style-type: none"> ■ Increase collection infrastructure provision and apply the lessons learnt from pilots and studies. ■ Develop options to mitigate market. ■ Provide support to waste and resource sector to develop a communication plan to help create clear and consistent messages that can be targeted to audiences. ■ Invest to meet the objectives and targets set by the EC and address the challenges posed by plastic packaging. | <ul style="list-style-type: none"> ■ Lobby the European Commission/international trade organisations to implement harmonised measures (e.g. global standards, definitions) and influence global supply chains through trade agreements and legislation. |

Table of recommended strategy actions by objective.

Improving Data Flows

| Owner | Action | Priority |
|-----------|--|------------|
| EPA/Repak | Identify the reasons for the difference in plastic packaging waste and plastic packaging placed on market and agree a methodology to quantify plastic packaging waste by type . | Urgent |
| EPA | To assist with the monitoring of the revised waste packaging targets, it is necessary to develop a methodology to quantify plastic packaging reuse . | Short Term |
| EPA/RWMOs | Develop a data sharing tool to get a clear understanding of capacity gaps. | Short Term |
| DCCAIE | Review and amend Packaging Waste Regulations in order to close data gaps and create a more equitable producer pays system . | Short Term |

Designing Better Plastic Packaging

| Owner | Action | Priority |
|------------|--|------------|
| Producers | Commit to a Plastic Pledge to reduce plastic packaging waste and help Ireland to play its part in achieving the key goals set out within the EU Circular Economy Package. (See Appendix 3) | Urgent |
| EPA | Plastic packaging waste to be made one of the priorities for the National Waste Prevention Programme . | Urgent |
| EPA | Setting up of an eco-design working group under the National Waste Prevention Programme to provide leadership, advice and direction on key issues. | Urgent |
| DCCAIE/EPA | Develop and disseminate guidance on the end-of-life of biodegradable plastic packaging products. ³³ | Urgent |
| Repak | Eco-modulation: Repak will incentivise members eco-design efforts by developing a fee modulation system. The fee modulation will reward members that place on the market packaging with better environmental performance. | Short Term |
| Repak | Expand the ' Prevent & Save Programme ' (see Appendix 5) to: <ul style="list-style-type: none"> Facilitate interaction between packaging product designers and recyclers to explore design solutions affecting end-of-life. Organise packaging design workshops in collaboration with relevant third level institutions. Disseminate further case studies. | Short Term |
| DCCAIE/EPA | Develop and disseminate an Irish guidance for the eco-design of plastic packaging. The aim of the guidance will be to show quick wins and identify best approach/framework for more complex solutions. ³⁴ | Short Term |

³³ There is a considerable debate as to the extent to which plastics intended to be biodegradable do actually biodegrade in the natural environment and their impact on current plastic waste management systems.

³⁴ See guidance developed by WRAP

<http://www.wrap.org.uk/sites/files/wrap/Issues%20to%20tackle%20in%20plastics%20packaging%20%28002%29.pdf>

| Owner | Action | Priority |
|-----------------------------------|--|------------|
| Enterprise Ireland | Facilitate access to financial support to assist companies in the design of Environmentally Superior Products. | Short Term |
| DCCAE/ Producers organisations | Lobby the European Commission/international trade organisations to implement harmonised measures (e.g. global standards, definitions) and influence global supply chains through trade agreements and legislation. | Ongoing |

Increasing Reuse and Recycling of Plastic Packaging

| Owner | Action | Priority |
|---|--|-------------|
| WMROs/Repak | Identify where to capture additional plastic packaging waste for recycling (household, commercial, multi-occupancy, on-the-go, etc.). | Urgent |
| DCCAE/Waste and Resource Sector | Undertake a study to identify what collection system or combination of collection systems (including deposit refund) will work best to achieve reuse and recycling targets and reduce litter . ³⁵ Any consideration of a DRS needs to occur in the context of a fundamental evaluation of its cost-benefit implications. Stakeholder and recycling infrastructure impacts need to be considered. | Urgent |
| Repak | Review and pilot subsidy rate for more challenging recyclable plastic type (e.g. films and composites). | Urgent |
| DCCAE/LAs | Depending on findings from the collection study, consider revision to Waste Collection Permits/By laws to improve collection of segregated plastics. | Short Term |
| DCCAE/Repak | Strengthen the pull effect of green procurement on the demand side through industry (see pledge in Appendix 3) and public sector commitments . | Short Term |
| EPA | Define a process how end-of-waste criteria for plastic can be achieved. | Short Term |
| Repak | Carry out a detailed costing of the measures to be implemented. | Short Term |
| Repak | Examine feasibility of a reprocessor subsidy . | Medium Term |
| LAs/Waste and Resource Sector | Increase collection infrastructure provision and apply the lessons learnt from pilots and studies. | Medium Term |
| DCCAE | Assess the impact of an energy recovery levy on recycling targets. | Medium Term |
| DCCAE/Repak/ Waste and Resource Sector | Develop options to mitigate market vulnerability (low materials prices, geopolitics, etc.). | Medium Term |

³⁵ A significant proportion of litter is caused by consumption outside the home.

Encouraging Consumer's Sustainable Consumption and Behaviour

| Owner | Action | Priority |
|---|---|-------------|
| DCCAIE | To set up a communication advisory panel to inform communication priorities, co-ordinate local, regional and national messages. Members to include EPA, Local Authorities, Repak, Waste and resource sector, Retailers, Consumer's group and NGOs. | Urgent |
| DCCAIE/WMROs | Develop an annual national communication activity plan on the recycling of waste including plastic waste. Funding needs to be set aside annually to fund co-ordinated and targeted campaigns. Repak to contribute to this fund. | Short Term |
| DCCAIE/WMROs /Waste and Resource Sector | Develop mechanisms to update recycling list and communicate changes effectively to the public. This is required to include materials that are not currently on the list but become recyclables because of change in technology/economics/market. This must also include the ongoing education and awareness of both domestic (household) and commercial and industrial customers by the private and public waste sector. | Short Term |
| NWCPO/WMROs/Repak | Provide support to waste and resource sector to develop a communication plan to help create clear and consistent messages that can be targeted to audiences. | Medium-term |
| NGOs, Consumer's Group | NGOs and consumer groups to use their networks to disseminate messages to encourage sustainable consumption. | Medium Term |
| Repak | Repak has a mandate from DCCAIE to encourage behavioural change and keep the recycling of packaging to the fore to further improve our recycling rates. Repak will need to realign it's communications campaigns to deliver the new plastic targets . See current national annual campaigns in Appendix 4. Annual consumer surveys are needed to assess if measures are working. | Ongoing |

How to achieve the Vision

| Owner | Action | Priority |
|--|--|---------------------|
| DCCAIE | To set up a plastic packaging working group and develop terms of reference. | Urgent |
| DCCAIE | Transpose the revised Directives into Irish law and develop a national circular economy strategy framework into which the strategy will be incorporated. The PRI approval basis is to be revised in line with this strategy for the next approval period. | Short Term |
| DCCAIE/EPA/RWMOs | Research to be undertaken to close data gaps and help build evidence to understand areas as to which measures can make the biggest difference. | Short Term |
| Repak | Prepare a fully costed, detailed strategy. | Medium Term |
| Government/Waste and Resource Sector/Producers | Invest to meet the objectives and targets set by the European Commission and address the challenges posed by plastic packaging. | Medium to Long Term |

APPENDIX 3: REPAK MEMBER'S PLEDGE ON PLASTIC PACKAGING WASTE

Our Pledge

As a member of Repak we are committed to reducing plastic packaging waste and helping Ireland to play its part in achieving the key goals set out within the EU Circular Economy Package.

We continue to work with our suppliers, customers and the public to achieve the following objectives:

1. Prioritise the prevention of packaging waste by minimising avoidable single use packaging and promoting packaging reuse where possible.
2. Support Ireland to deliver the Circular Economy Package plastic recycling targets of 50% of all plastics by 2025 and 55% of all plastic packaging by 2030, as set by the European Commission.
3. Reduce complexity within the plastic packaging supply chain by simplifying polymer usage and eliminating non-recyclable components in all plastic packaging by 2030.
4. Help to build a circular economy for used plastic packaging in Ireland and Europe by increasing the use of plastic packaging with a recycled content.
5. Ensure our approach to plastic packaging reduction is aligned to Ireland's goal of a 50% reduction in food waste by 2030 as set out in Ireland's food charter.

APPENDIX 4: REPAK CURRENT COMMUNICATION ACTIVITIES

When it comes to plastic packaging recycling, Repak's objectives are to encourage behavioural change and keep the recycling of plastic packaging top of mind with the public to further improve our recycling rates. Repak will do this through national campaigns throughout the year including:

Repak Recycle Week: Repak Recycle Week is a longstanding pillar of Repak's annual media campaigns to drive awareness of best practice recycling habits, focusing on plastic recycling, showing the tangible benefits of recycling this material and also reinforcing Repak's position as the key recycling authority in Ireland.

Repak Easter Appeal: Encouraging the recycling of plastics during a heavy packaging period over the Easter holidays.

Pakman Awards: The Pakman Awards are a national awards ceremony that recognises excellence in waste management and recycling among businesses, organisations, community groups and initiatives in Ireland attended by over 400 people annually. We will promote and award entries that have instigated, developed or applied innovative technologies with plastics or entries who have made contributions to the plastics recycling industry.

Repak Green Christmas: Keeping recycling and presentation of materials including plastic top of mind during and the after Christmas which is synonymous as a heavy packaging period.

Repak's Social Strategy: Understanding the power and influence of social media, Repak has an ongoing approach conducting campaigns to reach both young and older audiences, to bring change and build lifetime behavioural norms including plastic packaging recycling. Repak is active across all platforms including Facebook, Snapchat, LinkedIn and Instagram and handles a large volume of inbound queries through social media (on average 100 queries per month) around recycling questions. Repak will continue to embrace new social media platforms as and when is needed over the course of the strategy period.

Repak in Schools: In line with the Primary School *Curriculum* and working with teachers, Repak has recently developed its '*Recycle and Change for the Better*' school's programme targeting 1st to 6th class students in 3,300 primary schools across Ireland. Repak's goal is to educate these children both in English and Irish about the benefits of plastic recycling and best plastic recycling practices in order to inspire change for future generations. Repak has created five fun and engaging videos for the schools, alongside lesson plans, quizzes, colouring sheets, and 'Did You Know' information to educate children about best recycling practices across all materials including plastic bottles and metal cans.

Repak Sponsorships: Repak are the sponsor of the **National Recycling Ambassador Programme** in partnership with the Department of Communications, Climate Action and Environment and the Waste Management Planning Regions including educating the public on what plastics they can and cannot recycle to help improve our plastic recycling rates.

Future Proofing: Repak has recently started a national seminar programme called *Rethinking Ireland's Waste as a Resource - Packaging and the Circular Economy*. To address the significant challenges that this will bring, Repak recognises that we must aim to replace today's linear product life cycles of 'take-

make-use-dispose' with product life cycles that maximise the use of our finite resources and become more circular. This seminar programme will look at the key challenges of dealing with our plastic waste from a packaging engineering, policy development and legislative standpoint. It will look at current solutions that are working, the challenges with current solutions that are not and explore some interesting innovations designed to tackle plastic waste.

APPENDIX 5: REPAK PREVENT & SAVE ACTIVITIES

Prevent & Save Programme – Plastic Strategy

Repak employs a team of Packaging Technologists within the Membership Services team to assist companies in optimising their packaging systems and to prevent or minimise the unnecessary packaging.

This service is available to all Repak members; large and small across numerous industry sectors.

By analysing all types of packaging, both into and out of a company, and by examining product (primary), grouped (secondary) and transport (tertiary) packaging, the technologists can find ways of improving packaging systems as a whole, so that the best use of available resources is achieved.

The benefits of packaging optimisation to Repak members are many:

- Optimised packaging systems minimise the weight of packaging placed on the Irish market.
- Optimisation reduces packaging waste throughout the supply chain and for the consumer.
- Optimisation also reduces both packaging and packaging waste management costs.

Current activities on the programme include the following:

- Working with some of Ireland's leading retailers to help identify opportunities to make the plastic packaging they use more readily recyclable and to optimise the quantities of plastic used.
- Development of case study publications targeting packaging waste prevention within various sectors and covering various themes. The latest publications highlight some of the projects retailers have undertaken to reduce packaging waste overall but with a particular focus on plastics. See www.preventandsave.ie for more information.
- Repak's Packaging Technologists form part of the OceanWise Project team on the Wise Reduction of Expanded Polystyrene Marine Litter. This Interreg Europe36 project examines alternatives and waste management options for Expanded Polystyrene.
- As part of the Prevent & Save education programme Repak not only aims to educate its members but also works with some of Ireland's third level institutions and industry stakeholders to deliver seminars, workshops and guest lectures on packaging optimisation and waste prevention.

³⁶ Interreg Europe helps regional and local governments across Europe to develop and deliver better policy. It offers opportunities to share ideas and experience on public policy in practice and provides financial support for projects in the categories of research and innovation, SME competitiveness, low carbon economy and environment and resource efficiency. See <https://www.interregeurope.eu/> for more information.

APPENDIX 6: EXAMPLES OF TYPICAL PACKAGING POLYMERS

Common packaging plastics (applications and properties)

Source (Soroka, Emblem, & Emblem, 1996)

| Plastic | Consumer Packaging Applications | Why is it used in Packaging |
|----------|--|--|
| PET (1) | Bottles, Meat Trays, Fruit and Veg Trays, Films. | <ul style="list-style-type: none"> - High moisture barrier. - Good gas barrier properties - perfect for processing into bottles to hold water and soft drinks. - Durable - has largely replaced glass for on the go drinks products for safety reasons. - Can be produced in a wide range of shapes and colours. - Lightweight and can be transported in parison (preform) form for transport efficiency. |
| HDPE (2) | Milk Bottles, Shampoo Bottles, Detergent Bottles, motor oil and garden care bottles, Trays, Crates, Large Drums for industrial chemicals and solvents. | <ul style="list-style-type: none"> - Versatile and economical. - Low softening point resulting in low processing energy costs. - Excellent moisture barrier for applications such as coated papers where a plastic layer is a requirement to hold out water |
| PVC (3) | Cling films for meat, fruit and vegetables and cheeses, blister packaging for items such as medical devices, tablets, batteries and toys. | <ul style="list-style-type: none"> - Good clarity - Excellent stiffness for applications such as blister packaging. - Useful in film format for cling film and product |
| LDPE (4) | Packaging films such as bin bags, fresh produce bags, bread bags, shrink-wrap films and pallet wraps. Other applications include thin wall bottles. | <ul style="list-style-type: none"> - Preferred for bagged product where good clarity and economy are required. - Excellent heat sealing properties for applications such as flow wrapping, shrink-wrapping or as a heat seal layer for multi-layer laminated materials. - Can be blended with other polymers to improve its tensile strength and stretch properties making it ideal for pallet wrap. |
| PP (5) | Trays for meat and fresh produce, flexible IBCs and woven sacks, bottle caps and other closures and films. | <ul style="list-style-type: none"> - By orienting PP you can improve its tensile strength, moisture and grease barrier properties that allow for use in heat sealing applications. |

| Plastic | Consumer Packaging Applications | Why is it used in Packaging |
|---------------------------------|--|---|
| PS (6) | <p>Extruded PS - Thin Wall Containers e.g. yogurt pots, food trays, closures, disposable cups.</p> <p>Expanded PS - Take Away packaging, closures, EPS cushioning materials and fish boxes.</p> | <ul style="list-style-type: none"> - Extruded PS - good dimensional stability. - Extruded PS - good chemical resistance to food acids and alkalis. - Expanded PS - excellent insulation properties and is commonly used to pack fish and some meat. - Expanded PS also has excellent cushioning properties making it ideal for protective packaging applications. |
| Other (7) All other polymers | <p>Huge variation of applications such as returnable Polycarbonate (PC) water bottles, Polyvinylidene Chloride (PVDC) and Polyamide</p> <p>- Nylon (PA) films, Ethylene Vinyl Acetate (EVA) adhesives and biopolymers such as PLA.</p> | <ul style="list-style-type: none"> - Polycarbonate is a high strength, high clarity material. - PVDC is used in food applications for moisture, flavour and gas barriers. - Polyamides have excellent clarity, abrasion and puncture resistance as well as oil and grease resistance. - The properties of PLA make it useful for rigid packaging formats. |



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