

Centre for Science and Policy

Policy Workshop

Plastics: measuring plastics, the circular economy and policy impact

A summary of the discussions held on 19 November 2019

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Background and summary of discussion

Background

Set against the backdrop of the climate crisis, the negative environmental impacts of plastics have been gaining attention. Indeed, it can be suggested that plastic waste is a particularly emblematic issue of the current environmental crisis. Plastics pollution can have wide-ranging impacts on the environment. Plastic waste does not always decompose and so can last for centuries in landfill. When chemicals leach from plastic, habitats are degraded, and animals can suffer. The environment is also impacted through energy use and emissions required to create plastic.

This Policy Workshop was commissioned by the Cambridge Creative Circular Plastics Centre (CirPlas), a UKRI funded programme. Leading academics from CirPlas shared some of their research and aims with participants. The Policy Workshop took place during a pre-election period. A background document was circulated, highlighting the policy landscape under the previous UK Government (see Appendix A). Four commitments made by the previous Government in the December 2018 Resources and Waste Strategy and contained in the Environment Bill, which fell when Parliament was dissolved, were:

- Extended producer responsibility (EPR), where the producer funds the full cost of managing the products they produce
- A deposit return scheme (DRS), where the consumer pays a small upfront cost which is returned once the item has been returned
- Consistency in household recycling
- A tax on plastic packaging with less than 30% recycled content

These built on commitments made in the 2018 Government policy paper “A Green Future: Our 25 Year Plan”. The Plastics Research and Innovation Fund (PRIF) and the Smart Sustainable Plastic Packaging (SSPP) challenge had also been launched to help guide constructive actions.

This Policy Workshop brought together senior policy makers, leading academics, industry and civil society organisations in the field to discuss the challenges and opportunities from a circular economy.

Summary of key points

- Attitudes towards waste, as well as regulation, vary across cultures. An example given was that in the Netherlands waste was charged for by weight. In Japan, high priority is given to sorting waste and the population are generally environmentally conscious.
- From a business perspective, it is important to think about businesses' profit margins and short-term pressures. However, what may not be economically feasible in the short-term may be feasible in the longer-term.
- There is the potential that bio-based plastics could be used instead of plastics made from fossil fuels. However, we must work to ensure that such plastics are disposed of in the correct manner, for example if they are biodegradable.

- Culture and the way people use plastic waste should be considered to enact change. Do we require a change in lifestyle, or should we rely on technological solutions?
- It would be beneficial if different actors across the plastics supply chain were to have a discussion. This could allow for recycling solutions such as plastic type identification.
- The current stock of plastic in construction and consumer products is larger than that of plastic packaging. This stock lasts longer than plastic packaging, but when it needs to be replaced, it will create a large problem.

Roundtable discussion

The key themes of the roundtable discussion have been summarised below.

Scene setting: current problems and potential opportunities

A circular economy would enable us to keep resources in use for as long as possible and extract maximum value from them. As noted below, at the time of the workshop, the previous Government had been moving forward on initiatives designed to create a more circular economy.

Presentations

As part of this workshop, we heard from six speakers on topics ranging from measuring plastic flows in the UK economy to social anthropological approaches to exploring people's attitudes to plastics waste and recycling.

Measuring plastic flows in the UK economy

Dr André Cabrera Serrenho (Department of Engineering) discussed his project, which set out to find evidence to understand the types of plastics, as well as how much plastic, we are using in the UK. This data can be used to answer questions such as "how long are plastics being used for each application?" and enable future work to model the flow of plastics. This will allow the anticipation of the future generation of plastic waste and identify the economic impacts of interventions on the supply chain.

Dr Serrenho found that 1.6Mt of plastic was produced in the UK in primary form. 3.6Mt of plastic was imported to make plastic goods, whilst 3.4Mt was imported as end-use products. Packaging accounts for 40% of the uses, with smaller proportions taken up by the automotive and construction industries in the UK. Agriculture and textiles take up smaller amounts again. It was stated that there had been a decrease in the amount of plastic consumed during the economic crisis, however, since then plastic use has remained stable.

As part of this analysis it was found that whilst most plastic packaging is disposed of in the same year it was purchased, there is a larger stock of plastic in construction and consumer products, due to the long lifetime of these products. It was recognised that this stock of plastics may cause a large problem in the future when it needs to be replaced.

Measuring circularity of a business/locality

Professor Khaled Soufani (Cambridge Judge Business School), as an economist, noted that in considering circular economies, we must think about the main decision makers in the system, such as consumers, producers, government and international trade stakeholders. From a business point of view, we must analyse what impact reducing plastic may have on the business model and how value can be created through responsible business models

Whilst a circular business model in the plastics industry will help minimise the negative impacts of plastics and maximise the benefits, it needs to make economic sense. This is because businesses will have to stop operating if they are unable to make a profit. Therefore, interventions must be made in a considered manner. It was raised that there can be a positive correlation between environmentally responsible companies and stock price.

Novel biodegradable plastics (characterisation)

Professor Paul Dupree (Department of Biochemistry) explained that while recycling will help to reduce the flow of plastic from manufacturing to disposal, it won't reduce it to zero. There is therefore a desire to find a replacement for traditional plastic. The question raised was, to what extent can we replace existing plastics by plastics made from sustainably sourced plants?

The advantages of creating plastics from plants is that there is no net release of carbon dioxide. One disadvantage of some plant based plastics, however, is that they are not resistant to water, oxygen or oils. Professor Dupree explained that there is the potential to improve these materials with additional knowledge. For example, we do not yet fully understand plant cell walls or even, at a molecular level, materials such as paper.

Novel biodegradable plastics (synthesis)

Professor James Elliott (Department of Materials Science & Metallurgy) presented about novel biodegradable plastics and focused on the synthesis of these materials. Professor Elliot began by raising the fact that cellulose is a very strong crystalline material, and that cellophane is made from cellulose. However, cellophane has been replaced in some versions of food packaging by products made of polyethylene and PVC due to some disadvantages of cellophane. The traditional route to producing products from cellulose is via an energy intensive viscose process, which involves the use of carbon disulfide. However, this could be done by using natural processes with the use of plants or bacteria.

Professor Elliott and his team have been working on novel materials as a solution to this. Certain materials have been mixed with pectin to help it stick together, which has been able to produce samples with very high strengths. It was stated that the materials are as strong as some carbon fibre that has been made. However, it is important to note whether these new materials have the desired mechanical properties. For instance, can this material be injection moulded, extruded, and fit into the normal processes that they would use for bottle derived properties? It is also important to work on the material's permeability to air and moisture.

Social anthropological approaches to exploring people's attitudes to plastics waste and recycling

Dr Teresa Perez (Faculty of Asian and Middle Eastern Studies) presented the work package led by Dr Brigitte Steger (Faculty of Asian and Middle Eastern Studies) on the topic of social anthropological approaches to exploring people's attitudes to plastics waste and recycling. She argued that we can't reduce plastics without considering how people use plastics and deal with their waste. As part of the project, work is being undertaken to understand local needs as well as building an academic community. This work has been done so that policy makers, NGOs, scientists and other change makers create solutions in response to how problems are defined. It was argued that how problems are approached may be strongly influenced by the language used.

It is also important to define what we mean by circular when talking about the circular economy. Which place do people occupy within these circles? Who benefits from the economics of a circular economy? It was raised that the state policy of the circular economy in China led to profits accumulating in the hands of the local elites.

Circular resource flows in industry

Dr Laurie Wright (Warsash School of Maritime Science and Engineering) made the point that we are not addressing the full problem by focusing on recycling. It is a lifestyle problem, not a circular economy problem. Plastic products are designed to last indefinitely, however, it is important to design products by taking the end-of-life in mind. He argued that we need to design out problems such as toxicity.

It was also stated that all the plastic that has been produced equates to 3.8% of greenhouse gas emissions. Solutions to this could be a move to a zero emissions grid, which would roughly half the emissions. Bioplastics could bring this down further, but Dr Wright raised the fact that there may not be enough land. Another potential solution would be demand reduction. Dr Wright ended with the fact that Coca-Cola produced 111bn plastic bottles in the year 2018 - having switched from glass to reduce the weight, and the prediction that plastic would be more recyclable than glass in the future – yet only 12% of these bottles are estimated to be recycled each year.

Labelling and tracking plastics

Dr Ronan Daly (Department of Engineering) focused on technological interventions to help track flows of plastic and improve our ability to recycle them. One strategy is to place ink on plastics for material identification. A question raised was: should we be placing the technology at the point of manufacturing? Another point raised was: is there a technological intervention that could be made at the sorting facility to minimise rejection?

Spin-off projects have developed from Dr Daly's work, such as the potential of low-cost devices that could be placed in the home. These devices could enable the identification of types of plastics for sorting in the home.

Challenges and areas of debate

- What are we trying to achieve - do we want to reduce overall consumption? Are we trying to continue the same lifestyle we live but find new materials? It was posited that we should reuse and repair before recycling. However, we do not know what the future will look like, and therefore everything is a scenario that requires planning.
- It was identified that there is a large stock of plastic in construction which stays in use for several years or decades. This is a problem that will have to be handled.
- It was discussed, however, that large stocks of plastic acts as a form of carbon capture.
- It is not just the amount of plastic which is important to track, but also the type of plastic. This is because certain plastics, for instance microplastics, may have a disproportionate impact.
- Whilst certain solutions to the problem of plastic waste may not be economically viable in the immediate future, there is a possibility that things can be made economically viable over the long-term. A historical example of a shift in attitudes towards the cost/benefit analysis of making significant change was the removal of lead from petrol.
- There are different national and local cultures when it comes to waste. For example, in the Netherlands, citizens pay for their waste to be disposed by weight.

Potential solutions

- The joining up of the segregation process with the design of the product was raised as an issue that could help with plastic waste. This would require conversations between multiple different actors across the supply chain.
- There was debate about the fact that plants grown for biodegradable plastics may compete with land used for food. However, it was argued that the amount of plastic made from fossil fuels is about the same order of magnitude of paper made each year, and therefore there is an example of plant-based materials being produced on that scale.
- Confusion amongst the general public as to how to dispose of biodegradable plastics was discussed. Biodegradable plastics (which achieve product standard EN13432) should be put into organic compost bins and not recycling bins. An example raised was soft drinks companies producing packaging made from PLAs, which are difficult to distinguish, without significant investment for chemical analysis in recycling infrastructure, from PETs.
- For public messaging purposes, it would be possible to inform the general public how to dispose of novel materials, for instance if new packaging was used for bottles of bleach. However, for this to be possible all bottles of bleach must be changed rapidly, which would require a conversation between industry.
- Certain colours of plastic are easier to recycle than others. It may, therefore, be worthwhile to explain that certain colours have been chosen for recycling purposes, even if focus groups prefer other options.
- Currently, delivery trucks become emptier as time progresses. Could this additional space be used for targeted collection, enabling better segregation of resource?
- Another idea for recycling is to reuse products from a company like Jaguar Land Rover to create new products, and market them in such a way to highlight the high quality of Jaguar Land Rover's materials.

Language and culture

- Changing the way we use language was highlighted as a step towards changing public attitudes. For example, using the term resource as opposed to waste could highlight the fact that these items have value. It was also argued, however, that waste implies a resource of value that is not being used. When plastic is in the sea, is it still a resource, or is it a contaminant? Does the length of time that plastic is in the sea or out of place impact the language that should be used?
- The perceived worth of the labour and effort involved in the manufacture of foods and goods was described as culturally specific. While plastic has a high level of embodied energy and should be treated as a resource, it is often the case that the British public doesn't take into consideration the resources, energy and effort involved in producing plastics when deciding to throw them away. In contrast, the Japanese were described as more environmentally conscious, and prioritise sorting waste because of a culturally-embedded awareness of the energy involved in the initial production of goods.

Challenges of recycling

- Some plastics are embedded into other products making it difficult to gain access to them for recycling.

- The devolved administrations are enacting policies such as with deposit return schemes. This is leading to divergence.
- Whilst challenging, there is a need for a global solution due to the geographical nature of plastic.
- Certain types of plastics cannot be recycled in the UK due to the high costs.
- Currently, 10% of the cost of dealing with packaging waste is typically paid for by the producer. With EPR, producers would have to pick up 100% of the cost, meaning that there is greater value in dealing with packaging.

Attendees

- **Professor Susan Owens (Chair)**, Emeritus Professor of Environment and Policy, Department of Geography, University of Cambridge
- **Dr Shafiq Ahmed**, Coordinator, Energy Transitions, University of Cambridge
- **Dr André Cabrera Serrenho**, Senior Research Associate, Department of Engineering, University of Cambridge
- **Paula Chin**, Sustainable Materials Specialist, WWF
- **Beverley Cornaby**, Programme Manager, Cambridge Institute for Sustainability Leadership
- **Dr Ronan Daly**, University Senior Lecturer, Department of Engineering, University of Cambridge
- **Professor Paul Dupree**, Professor, Department of Biochemistry, University of Cambridge
- **Professor James Elliott**, Professor in Macromolecular Materials, Department of Materials Science & Metallurgy, University of Cambridge
- **Sue Mawe**, Senior Logistics Manager, AMT Fresh
- **Antoinette Nestor**, Founder & Director, A Toy's Life and Beyond
- **Trevor Nicoll**, Assistant Director (Waste and Special Projects), South Cambridgeshire District Council
- **Dr Patrick O'Hare**, Research Associate, Faculty of Asian and Middle Eastern Studies, University of Cambridge
- **Naomi Pendleton**, Head of Technical, AMT Fresh
- **Dr Teresa Perez**, Research Associate, Faculty of Asian and Middle Eastern Studies, University of Cambridge
- **Matthew Polaine**, Aurora Innovation Manager, British Antarctic Survey
- **Raheela Rehman**, Energy Transitions, University of Cambridge
- **Bryony Rothwell**, RECAP Partnership Manager, Cambridgeshire County Council
- **Professor Khaled Soufani**, Director, Circular Economy Centre, Judge Business School, University of Cambridge
- **Dr Brigitte Steger**, Senior Lecturer in Modern Japanese Studies, Faculty of Asian and Middle Eastern Studies, University of Cambridge
- **Michel Steinecke**, R&D Sustainable Packaging Manager, Britvic Soft Drinks Limited
- **Dr Laurie Wright**, Senior Lecturer, Science & Engineering, Solent University
- **Defra**, representatives

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- **Nicola Buckley**, Associate Director
- **Lauren Milden**, Policy Adviser
- **Kate McNeil**, Communications Coordinator
- **Alex Kell**, Policy Intern (Note taker)

Appendix A

CSaP Background Paper: for Policy Workshop on Plastics: measuring plastics, the circular economy and policy impact, 19 November 2019

Note: The policies outlined below have been developed by the current Government, and a future Government may wish to take a different course, following the outcome of the general election being held on 12 December 2019.

The nature of the problem

Plastics pollution can have wide-ranging impacts on the environment. Plastic waste does not always decompose and so can last for centuries in landfill. When chemicals leach from plastic, habitats are degraded, and animals can suffer. The environment is also impacted through energy use and emissions.¹

In 2016 it was estimated that the UK produced 1.53 million tonnes of plastic waste. This has increased by 24% since 2010 and 13% since 2014. Households contributed just over 8%, with the service sector contributing 53%.¹ A report for WWF, however, calculated that total plastic waste generation in the UK in 2014 was around 4.9 million tonnes.² The WWF-UK report calculated that recycling rates for single use plastics were at 29% for 2018, with landfill rates of 48% and 22% going to energy recovery.

There are still significant information gaps. The House of Commons Environment, Food and Rural Affairs (Efra) Select Committee's Inquiry into Plastic food and drink packaging³ published its report in September 2019⁴, including the statement that the Government does not know how much plastic packaging is placed on the market in the UK, nor how much is recycled.

Land-based sources account for approximately 80% of marine pollution, globally.⁵ The UK Government is involved at an international level with several initiatives to tackle ocean plastics. These include the Commonwealth Clean Oceans Alliance, the UN Clean Seas Campaign and the Global Partnership on Marine Litter, the UN resolution on marine litter and microplastics and the OPSAR Regional Action Plan on marine litter.

Current UK policy development

"Our waste, our resources: a strategy for England"⁶, published in December 2018, contributing elements then incorporated into the Environment Bill, set out the Government's ambition to move towards a more circular economy. It hopes to achieve this by becoming a world leader in using resources efficiently, reducing the amount of waste created and working towards all plastic packaging placed on the market to be recyclable, reusable or compostable by 2025. This strategy follows on from and is intended to support commitments made in the 2018 Government policy

¹ <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-8515>

² https://www.wwf.org.uk/sites/default/files/2018-03/WWF_Plastics_Consumption_Report_Final.pdf

³ <https://www.parliament.uk/business/committees/committees-a-z/commons-select/environment-food-and-rural-affairs-committee/inquiries/parliament-2017/plastic-food-and-drink-packaging-17-19/>

⁴ <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvfru/2080/2080.pdf>

⁵ https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/The-ocean-plastic-pollution-challenge-Grantham-BP-19_web.pdf

⁶ <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

paper “A Green Future: Our 25 Year Plan”,⁷ to leave the environment in a better condition for the next generation.

On 15 October 2019, the Government introduced an Environment Bill to tackle environmental priorities.⁸ This included measures to tackle air and water quality, reduce plastic pollution and move to a more circular economy, and restore habitats. It also includes a new public body – the Office for Environmental Protection, to hold government and other public bodies to account on fulfilling their obligations on the environment. Included in the Environment Bill’s approach to tackling plastic waste are provisions for Extended Producer Responsibility schemes (which make producers responsible for the costs of managing products they place on the market once they become waste), a consistent approach to recycling collections, measures to tackle waste crime, provisions for Deposit Return Schemes and powers to introduce new charges to minimise the use and impacts of single use plastics.

On 28 October 2019 the Environment Bill passed its second reading.⁹ Comments raised during the second reading included:

- The UK could place further restrictions on the exportation of plastics for recycling. This would allow for plastics to be recycled domestically, restoring confidence and boosting jobs and investment.
- The UK should invest more in recycling infrastructure.
- By increasing targets for recycled content being used by manufacturers of plastics, more recyclate will stay in the UK.
- Some members of Parliament commented on lack of ambition around some of the plastics elements of the bill, a position reported to be shared by the waste management company Biffa.
- It was suggested that it could be made simpler to recycle plastics by limiting the number of plastics categories that can be used. Norway was given as an example for this, where there are 18 categories of plastic.
- The need for consistency across the UK for deposit return schemes for plastic bottles was raised.

The Environment Bill fell at the dissolution of this Parliament. Whether or not to introduce the Bill following the 2019 General Election will be a matter for the next government.

These policies have been developed by the current Government, and a future Government may wish to take a different course, following the outcome of the general election being held on 12 December 2019.

More information on plastics waste plans, within Environment Bill and separately introduced

- Packaging producer responsibility reform included incentives to encourage producers to design and use packaging that can be recycled, and mandatory labelling on all packing to indicate if it is recyclable or not. In February 2019 the Government published a “Consultation on reforming the UK packaging producer responsibility system.”¹⁰ This was based on the

⁷ <https://www.gov.uk/government/publications/25-year-environment-plan>

⁸ <https://services.parliament.uk/bills/2019-20/environment.html>

⁹ <https://hansard.parliament.uk/commons/2019-10-28/debates/20307757-BDEF-4057-8976-5EE8CAF823E1/EnvironmentBill>

¹⁰ https://consult.defra.gov.uk/environmental-quality/consultation-on-reforming-the-uk-packaging-produce/supporting_documents/packagingepconsultdoc.pdf

outline in “Our waste, our resources: a strategy for England” **Error! Bookmark not defined.** to incentivise reducing unnecessary and difficult to recycle packaging, for producers to fund the management of packaging at the end of its life and the collection of a nationally agreed set of packaging materials for recycling.

- A plastic packaging tax to address the situation that it is often cheaper to use new, non-recycled plastic material was announced at Budget 2018. This tax would only apply to plastic packaging with less than 30% recycled content. HM Treasury published a “Plastic packaging tax: consultation”¹¹ on 18 February 2019. On 23 July 2019 the Government published a “Plastic packaging tax: summary of responses to the consultation.”¹² The summary of the document confirmed that Government would set out the next steps for the tax at Budget 2019, and that draft legislation for consultation would be published in 2020. The report of the House of Commons Environment, Food and Rural Affairs (Efra) Select Committee Inquiry into Plastic food and drink packaging, published in September 2019¹³ concluded that the plastic packaging tax applying to packaging with less than 30 per cent recycled content was too blunt an instrument, and called for the tax to be modulated, so that there are lower fees for higher levels of recycled content.
- The Government, in its Budget 2018 document, ruled out a levy on disposable cups. However, the UK-wide “Consultation on reforming the UK packaging producer responsibility system”¹⁰ proposed that disposable cups could be encompassed within the extended producer responsibility system.¹⁰ The Welsh Government are exploring a Welsh tax on disposable single use cups.
- Deposit return scheme (DRS) for drinks containers: in February 2019 the UK and Welsh Governments, alongside the Department of Agriculture, Environment and Rural Affairs in Northern Ireland published a Consultation on introducing a Deposit Return Scheme in England, Wales and Northern Ireland.¹⁴ The impact assessment accompanying the consultation assumed a deposit level of 15 pence per container. The Government confirmed that “the specific details of a DRS, including the material and drinks to be included in scope, will be developed further and will be presented in a second consultation in 2020.” The report of the House of Commons Environment, Food and Rural Affairs (Efra) Select Committee Inquiry into Plastic food and drink packaging, published in September 2019¹⁵ supported the introduction of a deposit return scheme, but urged that the Government should monitor the financial impact on local authorities as material is diverted away from kerbside recycling.
- In May 2019, the Scottish Government confirmed its plans for a DRS and said that it would cover metal cans, polyethylene terephthalate (PET) and glass, but that it would not cover high-density polyethylene (HDPE) due to concerns about contamination.
- At the Commonwealth Heads of Government Summit in April 2018, the UK Government announced its intention to ban the sale of plastic straws, drink stirrers and plastic-stemmed cotton buds in England. This was confirmed in May 2019 to start from April 2020. The Scottish Government introduced a ban for cotton buds that came into force on 12 October 2019.
- All countries within the UK have introduced a 5 pence levy on single use carrier bags, however in England the charge applies only to retailers with over 250 employees. On 27

¹¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820798/181213_Plastic_packaging_tax_condoc_template_final_1.0.pdf

¹² <https://www.gov.uk/government/consultations/plastic-packaging-tax>

¹³ <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvfru/2080/2080.pdf>

¹⁴ https://consult.defra.gov.uk/environment/introducing-a-deposit-return-scheme/supporting_documents/depositreturnconsultdoc.pdf

¹⁵ <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvfru/2080/2080.pdf>

December 2018, the Government published a Consultation on extending the Single-use Carrier Bag Charge in England.¹⁶ The UK Government consulted on proposals to amend regulations to extend the single use carrier bags charge to all retailers and to increase the charge to 10 pence.

- In February 2019 the Government published a Consultation on Consistency in Household and Business Recycling Collections in England.¹⁷ It proposed that local authorities should have to collect the same set of core materials for recycling, including a number of plastic items. The executive summary and government response was published in July 2019 which confirmed that the government would seek to amend legislation to require at least the following dry materials from 2023: glass bottles and containers, paper and card, plastic bottles, plastic pots tubs and trays and steel and aluminium tins and cans.¹⁸
- Defra held a consultation between July and October 2019, to identify gaps and gain expert advice on a) the overall sustainability of bio-based and biodegradable plastic products in comparison with those made from other materials, b) existing relevant plastic degradation standards and how, or if, they might be promoted without any adverse effects to the environment and disposal routes and c) the design and implementation of standards for biodegradable plastics to ensure that they fully biodegrade in a reasonable time-frame in specified environments. Feedback is now being analysed.

Devolved administrations and plastics policy

As well as the elements of (potential) variation in plastics policy outlined above, there are some strategy documents published by the devolved administrations, and particular funding schemes.

The Welsh Government has an overarching waste strategy which is set out in the document “Towards Zero Waste.”¹⁹ In April 2019 the Welsh Government launched a £6.5 million circular economy fund which offers grants to businesses of any size seeking capital investment funding to increase their use of recycled materials in manufactured products, components or packaging.²⁰

The Scottish Government launched Scotland’s first Zero Waste Plan²¹ in June 2010, which sets out a vision for a zero-waste society. The plan set out several new measures including introducing a 70% recycling target for all waste by 2025.

The “Delivering Resource Efficiency – Northern Ireland Waste Management Strategy”²² published in 2013 includes sections on resource re-use and recycling for Northern Ireland.

EU policy

Currently, UK recycling policy is aligned with the EU Waste Framework Directive.²³ An overarching requirement of the EU Waste Framework Directive is that the UK applies the waste management

¹⁶ <https://consult.defra.gov.uk/environmental-quality/extending-the-single-use-bags-charge/>

¹⁷ <https://consult.defra.gov.uk/environmental-quality/consultation-on-consistency-in-household-and-busin/>

¹⁸ <https://www.gov.uk/government/consultations/waste-and-recycling-making-recycling-collections-consistent-in-england/outcome/consistency-in-recycling-collections-in-england-executive-summary-and-government-response>

¹⁹ <https://gov.wales/sites/default/files/publications/2019-05/towards-zero-waste-our-waste-strategy.pdf>

²⁰ <https://gov.wales/circular-economy-fund-launches-increase-use-recycled-materials>

²¹ <https://www.gov.scot/publications/scotlands-zero-waste-plan/>

²² <https://www.daera-ni.gov.uk/publications/delivering-resource-efficiency-northern-ireland-waste-management-strategy>

²³ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098>

hierarchy to move towards a circular economy. The management hierarchy sets out an order of priority to apply to waste, where prevention and re-use are considered before recycling.

In December 2015, the European Commission adopted a new Circular Economy Package to stimulate Europe's transition towards a circular economy.²⁴ The package includes new targets for recycling of municipal waste and of packaging waste, for example to recycle 55% of municipal waste by 2025. On 21 May 2019 the Council of the EU agreed a proposal on the reduction of the impact of certain plastic products on the environment.²⁵ This includes a ban on selected single-use products made of plastic, measures to reduce consumption of food containers and beverage cups made of plastic and extended producer responsibility schemes covering the cost to clean-up litter. The UK Government's December 2018 Resources and Waste Strategy confirmed that the UK would match or where economically practicable exceed the Directive's ambition. Error! Bookmark not defined.

Research and innovation funding

In the Spring Statement 2018, the Chancellor announced a £20 million "plastics research and innovation fund"²⁶ (PRIF) this includes funding for smart waste tracking data collection, storage and reporting services, new alternative materials, the improvement of sorting and separation technology and identification of substances of concern. The EPSRC funding scheme supporting the University of Cambridge Cirplas centre and five other UK centres, is part of this PRIF funding.

²⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>

²⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0904&rid=1>

²⁶ <https://www.gov.uk/government/speeches/spring-statement-2018-philip-hammonds-speech>