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SPECIAL ISSUE ON DESIGNING LAW AND POLICY TOWARDS MANAGING PLASTICS IN A CIRCULAR ECONOMY

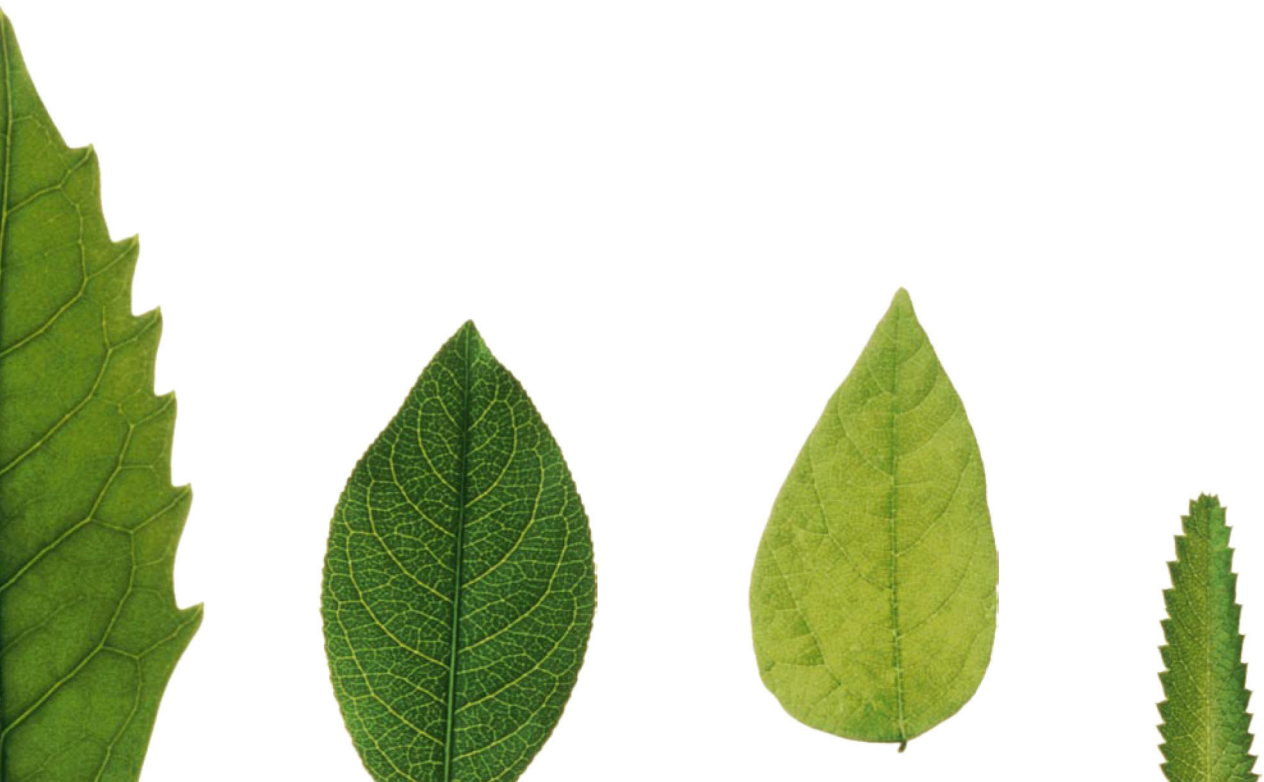

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TABLE OF CONTENTS

Introduction - Special issue on Designing Law and Policy Towards Managing Plastics in a Circular Economy

INTRODUCTION - DESIGNING LAW AND POLICY TOWARDS MANAGING PLASTICS IN A CIRCULAR ECONOMY

Lovleen Bhullar, Philippe Cullet, Feja Lesniewska and Birsha Ohdedar

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This Special Issue is the outcome of a workshop organised at SOAS University of London in June 2018 by the Environmental Regulatory Research Group at the School of Law, University of Surrey, the Law, Environment and Development Centre (LEDC) at the School of Law, SOAS, the Doctoral School at SOAS and the School of Law, Essex University.

The trigger for this workshop was the fast increasing global focus on plastics and plastic waste as an object of concern in recent years. In a context where the world has produced as much plastic since the beginning of the twenty-first century as in the whole of the twentieth century, warning signs observed by scientists have increasingly led to demands being placed on politicians, multinational enterprises, lawyers and policy makers to come up with initiatives that can address the crisis. It is now recognised that we have reached peak-plastic at a planetary scale.

Reversing the trend of increased plastic use, as well as cleaning up existing plastic pollution from the oceans, waterways and land, is an immense law and policy challenge. It will have an impact on all aspects of the global economy, environment as well as citizens. In recent years, some key generators and managers of plastic waste have taken some action. Initiatives include the European Commission's Strategy for Plastics in a Circular Economy, China's 2017 measures to address plastic management that included the banning of solid waste imports, and the organisation of a plastic-centred World Environment Day in 2018.

Efforts to address the plastic surge in different parts of the world notwithstanding, there is a strong North-South dimension to plastics recently highlighted by the Chinese ban on plastic waste imports. In other parts of the Global South, the issue is not just an environmental one but also one linked to livelihoods.

The legal and regulatory challenges to achieve systemic transformation need to be identified, understood and reimagined to deliver outcomes that can lead to a world, which minimises the use of plastics and ensures that no plastic waste ends up in the environment. The measures that need to be taken include strict environmental regulation for supply-side management of commodities, the production and processing by actors associated with plastics including recycling and banning the disposal of waste either domestically or in other countries.

The workshop and this Special Issue started from the premise that plastic production will not stop in the short term and that there is no obvious substitute for various uses of plastics. One of the ways in which we can address the massive environmental problems caused by plastics is by ensuring that there is as little waste as possible and that the majority of plastics are reused. The focus here is therefore on the extent to which the concept of circular economy might contribute to reducing the problem of plastic waste locally, nationally and globally. As such we do not address all the environmental dimensions linked to plastics and plastic waste.

Given the focus on plastics in a circular economy, the articles in this Special Issue do not consider all the underlying challenges that will also need to be addressed in the future. These include, for instance, the need to reconsider the extent to which certain types of plastics and certain uses of plastics are acceptable in legal regimes governed by the precautionary principle, which is the case for a majority of countries around the world. This transforms some of the questions posed from a circular economy perspective that might put emphasis mostly on a cost-benefit analysis to a question of burden of proof and the extent of potential damage caused by plastics. We could also address the difference between the two as follows: A circular economy perspective views plastics as a resource that can be reused, recycled or recovered. From an environmental protection perspective, plastic is a pollutant that is directly linked to oil, itself one of the main causes of anthropogenic climate change, which constitutes one of the greatest environmental threats faced by humankind.

The articles included in this Special Issue address plastics in a circular economy from multidisciplinary perspectives. They include contributions focusing on the international, regional and national dimensions of plastics and the circular economy. The Special Issue starts with a contextual article by Clift et al., which introduces the nature and history of plastics in the economy and in the environment, distinguishes between different plastics, and identifies those with most toxic production processes. The authors are committed to preventing ill-informed regulatory interventions to tackle the global plastics crisis. They argue that regulatory approaches need to recognise the different types of plastics and ensure that used plastic

products are directed to the appropriate route for re-use, recycling or disposal. Clift et al's starting point is that plastics are essential to the modern industrial economy and their elimination would be unwise, as well as impossible. Rather, the challenge that we need to meet is the management of plastics to eliminate leakage into the environment, both from designed release (glitter, microbeads) and un-designed release (litter). The authors see the roots to achieving this in Life Cycle Assessment (LCA) and Industrial Ecology. Using these tools they argue that it is possible to determine the points of leakage and the potential for intervention throughout the lifecycle of any plastics. It is also possible to assess the effectiveness of alternatives such as bio-based plastics and biodegradable plastics. Clift et al conclude that the possibility for a wholesale replacement of durables by bio-plastics is not a panacea, or even a realistic prospect, and that there needs to be global cooperation and action to resolve the ongoing problems from plastics.

Steenmans offers a critical examination of extended producer responsibility (EPR), described by the economist Sachs as one of the most significant developments in global environmental policy in the last decade. EPR is where the producer of a product retains responsibility of some form for the product throughout its life cycle, including when it becomes waste. With EPR there are four types of producer responsibility: physical responsibility, economic responsibility, liability, informative responsibility. The article is critical of the restricted scope of EPRs. Steenmans quotes Stahl arguing that overall the concept of responsibility itself is too weak to be effective. Steenmans uses the European Union (EU) as a case study to trace how the concept of EPR is evolving. The importance of EPR for plastic waste has been highlighted in the EU 2015 Circular Economy Action Plan identifying it as a key tool for providing economic incentives to increase recycling and develop more sustainable plastic products. The EPR was first included in the EU 2008 Waste Framework Directive (WFD) but criticisms about costs, scope and definitions led to amendments in 2018 to the definition of EPR and the introduction of general minimum requirements for EPR schemes. Steenmans notes that it is too early to determine the effect of these changes to the EU Directive. The article concludes that howsoever the EPR is designed and implemented it needs to be part of an integrated regulatory approach that is complemented by other mutually supportive laws and policies if a circular economy that can manage plastics sustainably is to be achieved.

Oguge focuses on the extent to which the existing law and policy framework in Kenya can provide a starting point for developing measures to address plastic wastes from a circular economy perspective. He analyses in detail the existing environmental law framework, including that concerning solid waste management and the various other policy instruments that have been put forward since the beginning of the century. He finds that there are strong bases in the existing instruments that could be used as springboard to move beyond the existing ban introduced in 2017 that is narrowly centred on plastic bags used for commercial and household packaging. The arguments developed centre around the legal bases that exist and the economic and environmental benefits that moving towards a circular economy focused on design, production, use and recycling of plastic products would bring to Kenya.

Zaouaq & Zaouaq address the issue of plastic waste in Morocco. They highlight the regulatory measures that have been taken from the local to national levels to address environmental harm and find that the steps taken until now fall short of what is required in view of the magnitude of the problem. Thus, waste segregation at source, collection and recycling remain insufficiently developed. In addition, there is insufficient coordination between the multiple and different actors involved in addressing plastic waste. At the same time, the article confirms that a number of steps have been taken for a number of years at different levels, indicating a relatively early recognition of the scale of the problem. Issues of institutional, administrative and financial capacity nevertheless hamper the achievement of the goals set out. In addition, more needs to be done to reduce the generation of waste, including enforcing the polluter pays principle more effectively.

Lee traces the history of regulatory measures to curb plastic use in Taiwan. He argues that there have been two distinct phases of regulatory measures: first, in the early 2000s and more recently since 2018. In the intervening years, various reasons were publicly given for inaction, including socio-cultural and economic reasons. Lee questions the validity of these reasons

and evaluates the logical gaps in the regulator's responses. He also brings to light the transnational nature of plastic waste consciousness that is pushing regulatory reform. He argues that the Taiwanese push for regulation has largely been influenced by action in the global North, particularly in Europe. Although the 2018 regulations in Taiwan are much more extensive with its targets and the types of plastics, Lee questions the ability of the regulations enacted to provide the transformative shifts to a circular economy given their top-down, piecemeal nature. He highlights that Taiwan could have looked at examples of plastics regulation in other parts of Asia and Africa to provide lessons in designing its own initiatives, rather than largely being a response to concerns over plastics in Europe. The need to consider heterogeneous alternatives links to the theme of this special issue to draw on lessons from around the globe.

Thomas analyses the role of English personal property law, specifically retention of title (ROT) clauses as a means to achieve circular economy. ROT clauses are a provision in a contract for the sale of goods where the seller retains legal ownership until certain obligations are fulfilled by the buyer. His contribution demonstrates the important role that commercial law has in the day to day transactions over goods that end up as waste and, in turn, the reforms that are necessary towards the designing law and policy in a circular economy. Thomas argues that current circular economy policies and waste regulatory frameworks (primarily in the European context the WFD) rest upon the control of goods, with the act of discarding goods key component of regulation. To minimise the inappropriate disposal of plastics and ensure plastics are captured within the circular economy, Thomas illustrates that ROT clauses provide a mechanism within commercial contracts where control can be retained by a vendor until the goods are properly recycled, reused or disposed of.

Finally, Malcolm argues for the adoption of a radical new holistic approach to regulate the problem of plastic waste and to promote the development of a circular economy in the European Union. This approach focuses on the source of the problem, that is, plastics as the "product". The current legal framework focuses on specific points during the lifetime of the product or on introducing ad hoc prohibitions. In contrast, this article proposes a new model law dealing horizontally with products (a law for things and of things or *codex rerum*), which is based on a life cycle approach and incorporates a holistic environment product policy and product impact assessment. This model law would lead to the reduction of plastic waste (as far as possible) and avoid the use and exploitation of virgin resources.

Article - Special issue on Designing Law and Policy Towards Managing Plastics in a Circular Economy

MANAGING PLASTICS: USES, LOSSES AND DISPOSAL

R. Clift, H. Baumann, R. J. Murphy and W. R. Stahel*

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TABLE OF CONTENTS

1 INTRODUCTION

It has long been recognised that plastic objects released into the environment have harmful impacts on wildlife. Public realisation that plastic pollution is a major global environmental problem is more recent and has been sudden, sparked by publication of an analysis of the flows of polluting plastics into the environment and the accumulated stocks of polluting waste, particularly in the oceans.[1] This contribution aims first to provide an introduction to the history and uses of plastics in the economy and, secondly, to set out the routes by which plastics leak from the economy into the environment in order to inform development of possible strategies to alleviate the problem of plastic pollution.

The word 'plastic' refers to a very broad range of materials with different chemical compositions, mixed with an even broader range of additives to provide specific functional properties. In strict scientific terms, a plastic is a material that deforms permanently when subjected to shear; plasticine and butter are examples of materials with plastic properties. However, in popular usage, *plastics* refers to a group of materials which may or may not have plastic properties: solid substances consisting of polymeric materials made up of macro-molecules containing carbon and hydrogen and sometimes other elements, notably oxygen, mixed with other materials such as plasticisers, fillers and pigments added to enhance properties such as processability, strength, texture and durability. Some of the additives are themselves the cause of environmental problems; for example, some commonly used plasticisers (i.e. chemicals added to impart specific properties, usually to make the 'plastic' material easier to form into a required shape) are recognised endocrine disruptors, implicated particularly in impacts on the health of fish and other aquatic organisms. However, the focus here is on solid objects formed from plastic. More specifically, we focus on *thermoplastics* (roughly, polymers that soften to show plastic or fluid behaviour when heated) rather than thermosetting polymers (which react to become permanently rigid when heated or mixed with a catalyst to promote a polymerisation reaction). Bakelite, polyurethanes and epoxy resins are examples of thermosetting polymers. Thermosetting polymers are generally durable and are therefore used primarily for products with long service lives. Thermoplastics are more commonly used for applications with short service lives and so dominate the flows of plastics through the economy. The focus here on pollution by plastics implies a focus on thermoplastics, which make up the great majority of the problematic plastic waste.[2]

Polythene (more correctly, polyethylene) is the most widely used thermoplastic, and was one of the first to be used in consumer goods. Polyethylene was first made, almost by accident, in March 1933 by researchers at Brunner Mond & Co., a company that subsequently became part of Imperial Chemical Industries (ICI).[3] At first, the commercial value of polyethylene was not recognised. It only went into production to meet the need for an effective electrical insulator in the radar equipment being developed as part of the preparations for the impending World War.[4] Thus, polyethylene was initially seen as a valuable specialised material with properties that made it ideal for specific demanding applications. The originators of polyethylene did not foresee that thermoplastics would come to be used universally (and would have been aghast to see how bulk plastics have been mis-managed).[5]

Widespread non-military use of polythene and other plastics developed after the Second World War, to the current point where they are so embedded in everyday life that there is not (and should not be) any question of eliminating plastics completely from the economy. Global production of plastics rose to more than 400 million tons in 2015.[6] Uses include some for which particular material properties are needed, for example

1 Jenna R Jambeck and others, 'Plastic Waste Inputs from Land into the Ocean' (2015) 347/6223 Science 768.

2 Roland Geyer, Jenna R Jambeck and Kara L Law, 'Production, Use and Fate of all Plastics Ever Made' (2017) 3/7 Science Advances e1700782.

3 William J Reader, *Imperial Chemical Industries; vol. 2 - The First Quarter Century: 1926-1952* (OUP 1975) 349-362.

4 E Raymond Ellis, Polythene Came from Cheshire (ER Ellis self-publication 2005) 11-16 and 25-29.

5 WR Dermot Manning, Personal Communications, 1978 to 1984. Note that Dermot Manning was part of the group that made the first polyethylene and the engineer who developed the first industrial process to produce the material. He was the father-in-law of one of the authors (RC) who recalls his lively anecdotes and regards them as primary source material.

6 Geyer, Jambeck and Law (n 2).

continuing the original use of polyethylene in electronic devices; uses with long lives, such as in construction and other durable products; convenience applications with short service lives, such as packaging; and some consumer uses, such as cosmetics, designed so that the plastic is released into the environment after use. Packaging is the dominant use, accounting for about 40 per cent of the plastics produced,[7] but is by no means the only use for which society depends on plastics. Right from the first use in electronic devices, most plastics have been designed and formulated to be stable and durable. Their persistence is one of the principal reasons why plastics have become a major environmental problem.

The approach to be explored here is not to try to eliminate plastics from the economy, but rather to reduce and eliminate 'leakage' of plastic from the economy into the environment. 'Leakage' and 'waste' are not the same: 'waste' materials (i.e. materials that have been used and discarded) can be re-used, recycled or handled by managed disposal, whereas 'leakage' refers to unmanaged release into the unconfined environment. Improving management of used plastics to avoid leakages requires insights that combine understanding of the material properties of plastics, their uses, how discarded plastics can be managed, and the technological options for re-use, recycling and management of waste. This paper is intended to support this understanding by mapping the main flows of plastics through the economy, identifying where and how leakage occurs, and there by provide a basis for targetting the most leakage-prone items. It differs from other papers,[8] by adopting a perspective rooted in Life Cycle Assessment (LCA) and Industrial Ecology, augmented by insights from waste management and social perspectives on the sources of plastic pollution.

LCA has developed since the 1980s as an approach to assessing the full environmental impacts of delivering a product or service, by mapping the flows and operations in the complete 'cradle to grave' product chain, quantifying the inputs and emissions, and assessing their environmental significance.[9] LCA has been systematised through a series of ISO standards.[10] The approach is used routinely by both private and public sector organisations to assess, manage and improve the environmental profile of economic activities. Life cycle thinking is increasingly used as a basis for regulation. Industrial Ecology extends life cycle thinking to 'study the flows of materials and energy in industrial and consumer activities, of the effects of these flows on the environment, and of the influences of economic, political, regulatory and social factors on the flow, use and transformation of resources'.[11] Industrial ecology thinking underlies concepts like the 'circular economy'.

The focus here is on possible ways to alleviate the environmental problems caused by plastic pollution, not on the much less significant problem of using non-renewable resources to make plastics. Plastics are produced mainly from fossil hydrocarbons (i.e. oil and gas) but account for less than 4 per cent of the chemical output of the oil, gas and petroleum sector,[12] which is in any case much smaller than the sector's output of fuels. Given that known reserves of fossil hydrocarbons are many times larger than the maximum quantities that can be exploited without causing catastrophic climate change,[13] the availability of feedstock to make fossil-based plastics is not a long-term concern. Furthermore, production of 'natural' biotic materials (notably cotton,[14] which is sometimes advocated as an alternative to plastic for uses like shopping bags) frequently requires far more non-renewable resources in the form of fertilisers and other agrochemicals, irrigation water and land. Land and, in many parts of the world, fresh water are already scarce resources. Organic cultivation does not solve this problem: it may reduce fertiliser and agrochemical inputs but at the immediate expense of reduced yield, so that more land must be cultivated to maintain output.

7 ibid.

8 Kara L Law, 'Plastics in the Marine Environment' (2017) 9 Annual Review of Marine Science 205; CJ Rhodes, 'Plastic Pollution and Potential Solutions' (2018) 101(3) Science Progress 207.

9 Henrikke Baumann and Anne-Marie Tillman, *The Hitch Hiker's Guide to LCA* (Studentlitteratur, Lund 2004).

10 International Organisation for Standardisation (ISO), 'Environmental Management – Life Cycle Assessment – Requirements and Guidelines', ISO 14044: 2006.

11 Robert White, 'Preface' in Braden Allenby and Deanne Richards, *The Greening of Industrial Ecosystems* (National Academy Press 1994).

12 John Abbott, 'Reduction in Plastic Use Won't Hurt Petrochemicals Industry' *The Chemical Engineer* (July/August 2018) 4.

13 Jeremy Leggett, *The Energy of Nations: Risk Blindness and the Road to Renaissance* (Earthscan 2013).

14 Valentina Bisinella and others, Life Cycle Assessment of Grocery Carrier Bags (Danish Environmental Protection Agency, Miljøprojekter, No. 1985, 2018).

2 PLASTICS IN THE ECONOMY

2.1 Conventional Hydrocarbon-based Plastics

Figure 1 shows the industrial ecology of thermoplastics produced from fossil hydrocarbons, primarily from petroleum; i.e. it presents a generic map of the flows and uses of thermoplastics in the economy.[15] The figure embodies a 'closed loop' approach to the use of plastics; i.e. it shows a form of 'circular economy' (although this analysis of the use of plastics predates the upsurge of interest in a circular economy). The possible approaches to managing plastics in and following use, i.e. the activities available to promote a circular economy for plastics and reduce leakage, are summarised in Table 1. Current uses of plastics follow the routes mapped in Figure 1 but usually without all the possible re-use and recycling loops.

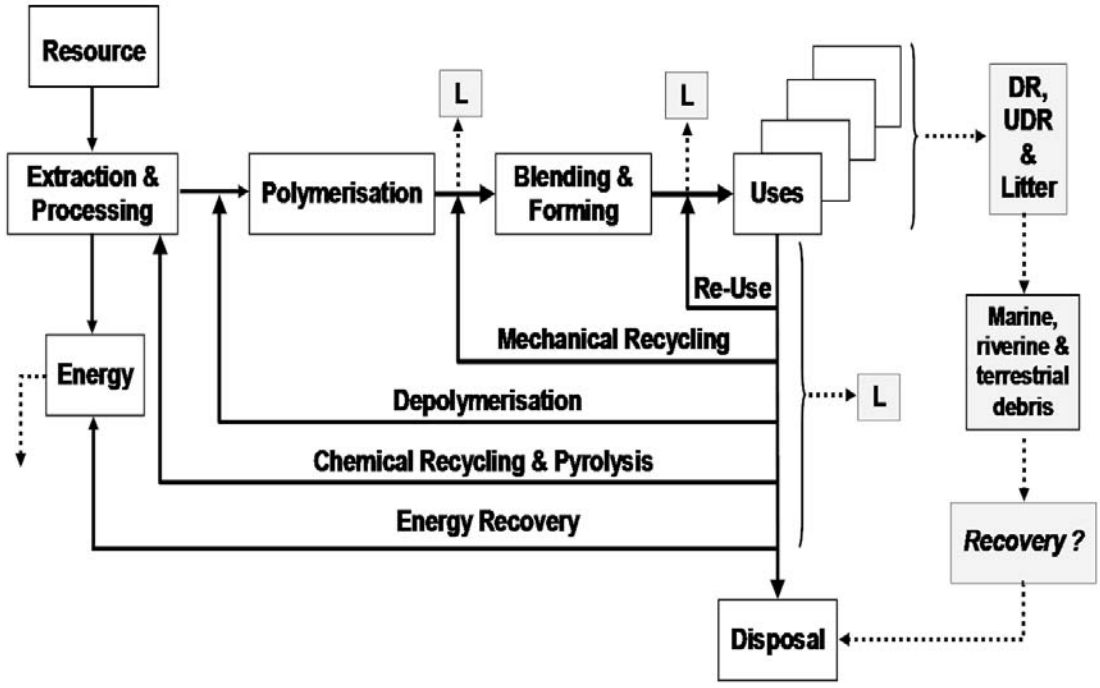

Figure 1. Industrial ecology of oil-based plastics (adapted from Clift)[16]

[DR = Designed releases; UDR = Undesigned releases;
L = Losses from transport and transport packaging]

15 Roland Clift, 'Clean Technology – The Idea and the Practice' (1997) 68 J Chem Tech Biotechnology 347.
16 ibid.

Table 1. Management options for plastics in the economy

Product or Material	Management options
Leakage-prone articles	Eliminate/redesign Reduce Replace
Specific articles	Re-use Remanufacture
Specific materials	Mechanical recycling Depolymerisation Chemical recycling
Mixed plastic waste	Chemical/feedstock recycling Energy recovery
Degraded mixed waste	Landfilling

Starting in the top left corner of Figure 1, oil that provides the feedstock for conventional plastics is extracted and transported to a refinery where it is processed into fuels like gasoline, diesel, kerosene and heating oil (see the 'Energy' box in Figure 1) and also a range of petrochemical products including the different monomers from which plastics are made; e.g. ethylene for polyethylene. Where natural gas is used as the feedstock, the same sequence of extraction and processing is followed. The monomers go through polymerisation reactions to produce raw polymers, commonly in the form of pellets. The pellets are blended with additives (see Introduction) and formed into material products.

Beverage bottles provide an informative and representative example of a specific plastic product. In general, the longer the functional life of the plastic product, the lower is the flow of plastic into the economy to provide the function.[17] Therefore, in principle, a plastic product or component should be re-used as many times as possible, but this requires a well-developed system for separate recovery or separation of used items. Deposit/return systems for beverage containers illustrate this approach to making items less leakage-prone. In principle, recovered containers can be re-used; for example, bottles can be refilled. However, this may be too costly; for example, refilling may require the container to be more robust than a single-use bottle and therefore formed from a larger quantity of plastic.

In any case, any material item will eventually become contaminated or damaged to the point where it cannot simply be re-used (Table 1). Objects that cannot be re-used can sometimes be recycled mechanically: i.e. the plastic is shredded or chipped so that it can be reformed into the same product or into a different product with lower specification so that some degree of contamination is tolerable. However, this recycling route is only open if mingling of different plastic materials is avoided.

For the greatest efficiency in the use of plastics, they should be used as many times as possible,[18] by keeping plastic items within the flows in the top right corner of Figure 1. However, components eventually become so contaminated or co-mingled with different plastics or other materials that they cannot simply be re-used or shredded and reformed. Furthermore, the additives used to make a particular plastic suitable for its first use limit its subsequent uses.[19] There is limited scope for forming mixed waste plastic (Table 1) into low-specification single-life products, such as garden furniture or fencing, but the quantities that can be used in this way are small and there is little prospect that they could grow to be a significant proportion of the total plastic waste. In any case, such secondary products have finite lives, so that they will inevitably end up as part of the mixed plastic waste stream in their turn. Therefore, to avoid complicating Figure 1, these uses are not shown.

More generally, from the point in the industrial ecology where plastic objects have become too contaminated or mixed for re-use or mechanical recycling to be viable, further recycling requires chemical reprocessing rather

17 Walter R Stahel and Roland Clift, 'Stocks and Flows in the Performance Economy' in Roland Clift and Angela Druckman (eds), *Taking Stock of Industrial Ecology* (Springer 2016) 137.

18 ibid.

19 John N Hahladakis and others, 'An Overview of Chemical Additives Present in Plastics: Migration, Release, Fate and Environmental Impact During their Use, Disposal and Recycling' (2018) 344 J Hazardous Materials 179.

than mechanical re-forming (Table 1). A few specific polymers can be depolymerised (a form of chemical recycling); i.e. converted back into monomers which can be returned as input to polymerisation. In principle, this may enable the plastic to be returned to a high-value use by removing biological contamination, but the concentration of additives and level of material contamination or mixing with other plastics must be small. At this point in the industrial ecology, the waste is usually a mixture of different plastics with variable composition and low material value. Processes are becoming available for chemical recycling of mixed plastics: the plastics are converted into a mixture of hydrocarbons that can in principle be returned to an oil refinery to be processed, along with fresh petroleum, into refinery products including the monomers for plastics,[20] or into a synthesis gas that can be used as feedstock to make other chemical products or as a fuel gas for power generation (see Figure1).[21] However, there are barriers even to this form of chemical recycling. Additives can complicate or prevent chemical recycling.[22] Furthermore, petroleum refineries are understandably reluctant to accept a small recycled input whose composition and properties may be variable and which could contain components that would disrupt refinery operations, for example by contaminating catalysts.

Most plastics have high fuel value. For plastics that have become so mixed or contaminated that material recycling would require major processing, energy recovery can be preferable on both environmental and economic grounds. Mixed plastic waste that is not recycled can be used as an energy source, usually mixed with other combustible components of solid waste in the form of Refuse-Derived Fuel (RDF). RDF is most commonly used for industrial or neighbourhood heating or for generation of electrical energy,[23] thereby offsetting some of the demand for fossil fuels.

Finally, to avoid leakage into the environment, waste plastic not recycled or used as a fuel must be disposed of in managed landfill. The durability of most conventional plastics ensures that they remain in the landfill permanently but some additives, notably plasticisers, may leach out and potentially contaminate groundwater.

2.2 Alternatives to Conventional Plastics

As alternatives to the conventional fossil-based plastics whose industrial ecology is described above, two 'new' classes of plastics have been developed over the last 20 years or so: biodegradable and bio-based plastics. These classes are distinct but overlap.[24] 'Biodegradability' refers to the propensity of a plastic to break down under the influence of micro-organisms in landfills, composting and anaerobic digestion waste management systems or in the wider environment. However, only a few types of 'biodegradable' plastic actually degrade within a few weeks in the natural environment (see below). Bio-based plastics differ from Figure 1, being derived from biological materials rather than fossil hydrocarbons, but this difference is restricted to the top left corner of the Figure, up to 'Blending and forming': from there on, uses of a bio-based plastic follow the industrial ecology of a conventional plastic. Bio-based plastics are much less significant in the economy than conventional plastics, representing about 1 per cent of total plastics production.[25] The biodegradability of a plastic depends on its composition, not on how it is made: some bio-based plastics are non-biodegradable, just as some made from fossil hydrocarbons are biodegradable.

20 Mathew Gear and others, 'A Life Cycle Assessment Data Analysis Toolkit for the Design of Novel Processes – A Case Study for a Thermal Cracking Process for Mixed Plastic Waste' (2018) 180 J Cleaner Production 735.

21 Sara Evangelisti and others, 'Integrated Gasification and Plasma Cleaning for Waste Treatment: A Life Cycle Perspective' (2015) 43 Waste Management 485.

22 Hahladakis and others (n 19).

23 Umberto Arena and Fabrizio DiGregorio, 'A Waste Management Planning Based on Substance Flow Analysis' (2014) 85 Resources, Conservation & Recycling 54.

24 Martin K Patel and others, 'Second-Generation Bio-Based Plastics are Becoming a Reality - Non-Renewable Energy and Greenhouse Gas (GHG) Balance of Succinic Acid-Based Plastic End Products Made from Lignocellulosic Biomass' (2018) 12 Biofuels, Bioproducts & Biorefining 426.

25 European Bioplastics <https://www.european-bioplastics.org/market>.

Biodegradable plastics have the property that they can break down, under the influence of natural micro-organisms or other biota, into simple molecules which disperse in the environment, ideally without causing environmental damage. Understanding of biodegradability in various environments and waste management systems is incomplete and remains an active area of scientific investigation and policy development.[26] Decomposition requires suitable environmental conditions of moisture, aeration, acidity etc., with additional food sources for the organisms causing the decomposition, and so will only occur at favourable rates under particular conditions. For example, a number of biodegradable plastics have been designed to break down rapidly in industrial composting systems under aerobic conditions (i.e. with oxygen available), typically alongside food and green waste. For such plastics to be defined as 'compostable' they must comply with standards such as EN 13432.[27] However, plastics that are compostable according to such standards do not necessarily break down in 'domestic' or 'yard' composting systems (typically those in householders' gardens in which the composting temperatures rarely exceed 40°C) nor in anaerobic digestion systems (i.e. in the absence of oxygen).

In general, standards for biodegradability specify breakdown performance under precise test conditions. Table 2 lists several types of plastic that meet some very specific definitions of biodegradability. Polylactic Acid (PLA)-based plastics illustrate the point that biodegradability under one set of conditions does not necessarily mean that breakdown will occur in other systems or other environmental conditions. This is particularly significant for the differences between the terrestrial, freshwater and marine environments, and for plastics that escape from containment in waste management systems to leak into the general environment where conditions are variable and can be unfavourable for their breakdown (e.g. hedgerows, deep oceans, dry terrestrial environments).

26 Patel and others (n 24); Miao Guo and Richard J Murphy, 'Is There a Generic Environmental Advantage for Starch–PVOH Biopolymers Over Petrochemical Polymers?' (2012) 20(4) Journal of Polymers and Environment 976; Tanja Narancic and others, 'Biodegradable Plastic Blends Create New Possibilities for End-of-Life Management of Plastics but they are not a Panacea for Plastic Pollution' (2018) 52(18) Environmental Science & Technology 10441; Juergen Puls, Steven A Wilson and Dirk Hölter, 'Degradation of Cellulose Acetate-Based Materials: A Review' (2011) 19 Journal of Polymers and Environment 152; Anonymous, Review of Standards for Biodegradable Plastic Carrier Bags (Department for Environment, Food and Rural Affairs 2015) <https://www.gov.uk/government/publications/carrier-bags-review-of-standards-for-biodegradable-plastic-bags>.

27 BS EN 13432 2000, 'Packaging - Requirements for packaging recoverable through composting and biodegradation: Test scheme and evaluation criteria for the final acceptance of packaging'. British Standards Institution, London, 2000.

Table 2. Examples of fossil and bio-based plastics showing their biodegradability characteristics under defined circumstances

(adapted from Song and others, Narancic and others, and Puls and others)[28]

		Biodegradable		
Polymer / plastic	**Non-biodegradable**	**Industrial compost**	**Domestic compost**	**Anaerobic digestion**
Fossil-based Polymers				
Polyethylene (PE)	**Yes**	**X**	**X**	**X**
Polypropylene (PP)	**Yes**	**X**	**X**	**X**
Polystyrene (PS)	**Yes**	**X**	**X**	**X**
Polycaprolactone (PCL)	**X**	**Yes**	**Yes**	**?**
Biomass-based polymers				
Polylactic Acid (PLA)	**X**	**Yes**	**X**	**?**
Bio-based PE	**Yes**	**X**	**X**	**X**
Starch (incl. blends)	**X**	**Yes**	**Yes**	**Yes**
Cellulose	**X**	**Yes**	**Yes**	**Yes**
Cellulose acetate*	**X**	**Yes**	**?**	**Yes**
Polybutylene succinate (PBS)	**X**	**Yes**	**X**	**?**

Yes = positive for the character **X** = negative for the character

? = unknown/uncertain (particularly for solid products rather than powders etc)

* highly dependent upon degree of acetyl group substitution (DS) on the cellulose; biodegradability is substantially reduced at DS above 2.[29]

Biodegradability is desirable for some applications and in some waste management systems. However, biodegradability is not a universal solution to the problem of pollution by plastics leaking into the unconfined environment. As noted, plastics classified as biodegradable generally only degrade under rather specific conditions, such as in industrial composting or anaerobic digestion facilities, and it cannot be assumed that they will degrade in uncontrolled natural environments.[30] Biodegradability can also be a disadvantage in landfill sites, where there is a risk of methane production and release from decomposing biodegradable plastics; a significant content of biodegradable plastic also extends the time period before a landfill site stabilises sufficiently for the land to be re-used. Furthermore, mixing biodegradable with non-degradable plastics in recycling systems reduces the performance and durability of the recyclate. For these reasons, an investigation carried out for the government of Sweden has recently counselled against

28 Jim Song and others, 'Biodegradable and Compostable Alternatives to Conventional Plastics' (2009) 364 Philosophical Transactions of the Royal Society B 2127; Narancic and others (n 26); Puls, Wilson and Hölter (n 26).

29 ibid.

30 Narancic and others (n 26).

regarding supposedly biodegradable plastics as a solution to plastic pollution.[31]

Bio-based plastics, as the name implies, are made from feedstocks of biological origin, typically from crops like corn, wheat, sugarcane or seed oils. As noted above, the feedstock from which a plastic is made does not determine whether it is biodegradable: bio-based plastics can be just as 'durable' as their fossil counterparts. The Green Polyethylene™ manufactured by Braskem is a good example as its polymer properties are identical to those of a fossil polyethylene. Table 2 underlines that biodegradable plastics can be manufactured from either bio-based feedstocks (corn, sugars, plant oils etc.) or from fossil resources (oil, gas), and in some cases can include blends of both types of feedstocks.

A fossil-based plastic burned or exposed to conditions under which it degrades aerobically releases fossil carbon dioxide (CO_2) which contributes to global warming. By contrast, combustion or aerobic decomposition of a bio-based plastic releases CO_2 which derives from the renewable carbon cycle and is therefore defined as climate-neutral. However, if the plastic is digested anaerobically, much of its carbon is released as methane (CH_4) which has a much larger greenhouse warming potential than CO_2. Rather than being released to the atmosphere, some or all of the methane may be captured and used as a fuel to generate useful heat and/or electricity by combustion to CO_2, displacing use of fossil fuels that would lead to release of fossil CO_2. Thus, from a climate-change perspective, the difference between fossil-based and bio-based plastics is not simple: it depends not only on the processing route (including how the feedstock for a bio-plastic is produced) but also on how the plastic is managed after use. Therefore, it cannot be assumed that a bio-based plastic has a more favourable environmental profile than a fossil-based equivalent. Following the life cycle approach, the entire product chain, from feedstock production (agriculture or forestry, or oil and gas production), processing into the plastic, use, through to eventual disposal and waste management, must be examined to reach an informed evaluation.

31 Åsa Stenmarck, *Det Går om vi Vill: Förslag till en Hållbar Plastanvändning* ('We Can if we Want To: Proposals for Sustainable Use of Plastics') (Statens Offentliga Utredningar SOU, Stockholm, 2018) 84.

3 PLASTIC POLLUTION

3.1 Principal Sources of Plastic Pollution

Figure 1 shows the principal points in the industrial ecology at which plastics 'leak' from the economy and are dissipated into the environment; i.e. the principal sources of plastic pollution.

In a few uses, products formed of or containing plastics are not just leakage-prone but are actually designed to be released into the environment (DR in Figure 1). These include microbeads and other materials, such as 'glitter' particles, currently incorporated in some cosmetic and body-care products, and also items such as balloons and confetti released in the course of popular celebrations. Microbeads in particular have been implicated as a major environmental problem because marine creatures may mistake them for food, with especially harmful consequences.[32]

Undesigned releases (UDR in Figure 1) represent a larger proportion of the leakages, and generally represent a more difficult problem for regulation to prevent plastic pollution. Substantial leakages (L in Figure 1) occur at early stages in product life cycles preceding the use phase, including spillages of plastic pellets during production and transport.[33] Losses of objects such as the strapping bands used in transport are also significant.[34]

32 Law (n 8); Mark Brownlow and James Honeyborne, 'Blue Planet II' Television Series (BBC 2017); Yooeun Chae and Youn-Joo An, 'Effects of Micro-and Nanoplastics on Aquatic Ecosystems: Current Research Trends and Perspectives' (2017) 124(2) Marine Pollution Bulletin 624.

33 Therese M Karlsson and others, 'The Unaccountability Case of Plastic Pellet Production (2018) 129(1) Marine Pollution Bulletin 52.

34 OSPAR, OSPAR Intermediate Assessment 2017 - Beach Litter - Abundance, Composition and Trends (2017) <https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/marine-litter/>.

Other undesigned releases are best described as litter: plastic items casually discarded after use so that they are carried by the wind and may enter waterways.[35] Plastic packaging is particularly implicated as a significant source of litter. While some packaging is legitimately considered non-essential (see below), plastic packaging cannot be eliminated from the economy because appropriate packaging is essential to avoid contamination and wastage of food and damage to other material products. Litter on land can be collected but this is extremely labour-intensive and may have a significant carbon footprint.[36] Passive traps to collect plastic litter from waterways appear to hold some promise, with the advantage that the plastics collected are not too contaminated or degraded and may be returned to the economy for chemical recycling or energy recovery.[37] However, it is more effective to cut off these releases at source; this approach is discussed further below.

3.2 Marine Debris

Plastic waste leaking into all environmental compartments tends to follow the natural environmental fluxes and so end up in the oceans unless it is trapped before getting that far. Beach surveys and measurements in the marine environment suggest that waste from marine commercial activities represents the largest fraction of marine macroplastic debris by weight, followed by debris from terrestrial sources, notably packaging and cigarette filters (cellulose acetate).[38] Microplastic debris such as textile fibres, microbeads and particles from tyre wear add to this loading.

The accumulation of plastic debris in the world's oceans is the most dramatic evidence of the problem of plastic pollution, attracting attention following publication in 2015 of a much-cited paper,[39] and highlighted in a popular television series.[40] That paper also pointed out that the debris enters the environment primarily from the 'Global South' where, especially in Asia, the quantities and proportions of mismanaged waste are orders of magnitude higher than in the industrial and post-industrial world. China emerged as much the greatest source of plastic marine debris, followed by Indonesia.[41] By contrast, if the coastal countries in the EU were considered collectively, they would have been numbered 18 in the ranking of countries generating plastic marine debris in 2015, comparable with Morocco and three places above the USA. Thus, plastic pollution in the oceans is as much a global problem as climate change and, even more than with climate change, measures to reduce this type of pollution must embrace the Global South as major players in the response. However, the origin of plastic material leaking from countries in the Global South bears closer examination. In 2015, the Western world was exporting large quantities of mixed waste plastic to the Global South, so that much of the marine debris entering the oceans originated in developed countries. Imports of mixed waste plastic into China have now been terminated,[42] and other Asian countries are introducing or considering similar bans.[43] This is

35 Laurent Lebreton and others, 'River Plastic Emissions to the World's Oceans' (2017) 8 Nature Communications 15611 <https://www.nature.com/articles/ncomms15611>.

36 Isabel Cañete Vela, Options for Closing the Loop for Plastic Debris: Environmental Analysis of Beach Clean-Up and Waste Treatments (ESA Report, Environmental Systems Analysis, Chalmers University of Technology, Göteborg, Sweden, 2017) 4.

37 World Economic Forum, Guatemala's Biofences are Cleaning up Latin American Rivers, and it's Thanks to a Facebook Video (2018) <https://www.weforum.org/agenda/2018/12/guatemala-s-biofences-are-cleaning-up-latin-american-rivers-and-it-s-thanks-to-a-facebook-video/>; Katrien Steenmans, 'Plastic Waste: Floating Parks Made From it Could Unite Communities to Tackle Pollution' (*The Conversation*, 3 January 2019) <https://theconversation.com/plastic-waste-floating-parks-made-from-it-could-unite-communities-to-tackle-pollution-108229>; Jackie Snow, 'Googly-Eyed Trash Eaters may Clean a Harbor Near You' *National Geographic* (17 February 2017) <https://news.nationalgeographic.com/2017/02/mr-trash-wheels-professor-trash-wheels-baltimore-harbor-ocean-trash-pickup/>.

38 Anna Maria Addamo, Perrine Laroche and Georg Hanke, 'Top Marine Beach Litter Items in Europe: A Review and Synthesis Based on Beach Litter Data', EUR 29249 EN (Publications Office of the European Union, Luxembourg, 2017).

39 Jambeck and others (n 1).

40 Brownlow and Honeyborne (n 32).

41 Jambeck and others (n 1).

42 Costas Velis, Global Recycling Markets-Plastic Waste: A Story for One Player–China (International Solid Waste Association—Global Waste Management Task Force 2014) 1-66.

43 Steve Toloken, 'Vietnam, Malaysia Limit Plastic Scrap Imports' *Plastic News* (26 July 2018) <https://www.plasticsnews.com/article/20180726/NEWS/180729919/vietnam-malaysia-limit-plastic-scrap-imports>.

acting as a spur to change approaches to management of plastics in the industrialised world, to avoid an explosion in the quantities of plastic that are consigned to landfill or left unmanaged.[44]

Undesigned losses of plastics during use are a particular difficulty for demanding applications outside the urban or built environment, particularly in the marine sector. Direct leakages into the oceans arise from losses of fishing gear and of ship-borne cargo. These leakages represent economic losses to operators, so that there are already incentives to avoid them and it is difficult to conceive of regulatory measures that would curtail them beyond penalties for deliberately discarding damaged gear (see below). The source most difficult to cut off is likely to be fishing gear, because alternative materials are not available and duties are so arduous that some losses are inevitable. Fishing gear has been estimated to make up about 10 per cent of current marine debris,[45] so that eliminating the other sources would remove about 90 per cent of the flows of plastics into the oceans (although it would not remove the debris that has already accumulated). However, this does not correspond to removing 90 per cent of the problems arising from plastic pollution: fishing gear, together with balloons and plastic bags, is considered to be the waste most harmful to marine life.[46]

There is no doubt that the quantities of waste plastic in the oceans has already built up to worrying levels. The material is particularly concentrated in a few locations, known as the 'ocean gyres', but it is widespread and is found even in the most remote locations such as the Northern shoreline of Svalbard.[47] Unlike global climate change, where removal of climate-forcing gases from the atmosphere is unlikely ever to be practical,[48] it should be possible to collect some at least of the stock of marine debris. What can be done with it is more contentious. Even more than plastic litter collected on land and from fresh water, marine debris is inevitably mixed and contaminated with other materials, including salt. Therefore, mechanical or chemical recycling of marine debris is not feasible without careful sorting, cleaning and pre-treatment. Some processes have been developed to demonstrate recycling of marine plastic, but the quantities of material treated are nugatory; the operations are expensive and unlikely to be generally viable for such a low-value material. Usually, marine plastic is too contaminated even to be used as fuel without prohibitively expensive pre-treatment. Even material recovered in beach clean-ups is so dirty, salty and stringy that it must be sent to landfill,[49] as shown in Figure 1.

In a further parallel with climate change, the effects of marine pollution by plastics are felt in countries other than those where the emissions originate. Small island developing states (SIDS) are particularly vulnerable because the shoreline is important for the natural ecology and the economy.[50] The vulnerability is amplified by another feature of SIDS: the economy may be too small for recycling to be economically feasible - small island states rarely have the kind of processing and refining plant that could accept recycled hydrocarbons (see Figure 1). Furthermore, transport distances are too large for export of low-value materials to be viable. It therefore seems inevitable that marine plastic litter on SIDS must be consigned to landfill, although space with appropriate characteristics for a landfill is often scarce or unavailable. Thus, SIDS are doomed to be 'sinks' for persistent substances that arrive by environmental flows or imports.[51] Even if leakages of plastics into the oceans are prevented, management of plastics and marine plastic pollution will remain long-term problems for small island states in particular.

44 Gear (n 20).

45 Graeme MacFadyen, T Huntington and R Cappell, 'Abandoned, Lost or Otherwise Discarded Fishing Gear' (UNEP Regional Seas Reports and Studies No. 185, 2009).

46 Chris Wilcox and others, 'Using Expert Elicitation to Estimate the Impacts of Plastic Pollution on Marine Wildlife' (2016) 65 Marine Policy 107.

47 Henrikke Baumann (Kiteki), Video: Reversing the Flows <https://vimeo.com/171651682>.

48 Colin L Pritchard and others, 'Thermodynamics, Economics and Systems Thinking: What Role for Air Capture of CO_2?' (2015) 94 Process Safety and Environmental Protection 188.

49 Cañete Vela (n 36).

50 Florina Lachmann and others, Marine Plastic Litter on Small Island Developing States (SIDS): Impacts and Measures (Swedish Institute for the Marine Environment, Report No.4, 2017).

51 Vimi Dookhun, Assessing Environmental Risks Associated with Persistent Toxic Substances in Mauritius: The Case of Mercury (PhD Thesis, University of Mauritius 2016).

3.3 A Systematic Basis For Regulation and Action

The analysis of the uses of plastics and sources of releases into the environment summarised in Figure 1 provides a basis for a systematic and comprehensive approach to curtailing plastic pollution. Table 1 summarises the waste management activities to be promoted to increase the 'circularity' of the economy for plastics. The widespread move towards banning single-use plastic items is also intended to promote circularity. These measures should have some effect in reducing emissions of plastics by reducing the total quantities of plastic entering use and providing economic incentives to retain plastics within the economy. However, increasing circularity will not, as has been suggested,[52] be sufficient on its own to eliminate further plastic pollution completely: action to eliminate plastic pollution must target the losses of leakage-prone items from the economy shown in Figure 1.

Designed Releases (DR in Figure 1) are an obvious target for regulation. Many of these uses are legitimately regarded as non-essential. As a specific example, following bans by some local authorities, Norway has banned the release of helium-filled balloons, a previously popular activity particularly in celebrations on the national day.[53] Plastics in consumer products like cosmetics and personal care products, designed for the plastic to be dispersed into the environment, are also obvious targets for elimination or replacement.

Undesigned Releases (UDR in Figure 1) present a different kind of problem requiring different approaches. Many undesigned releases are associated with packaging. To eliminate these, it is necessary to redesign not only the packaging but also the delivery and collection systems. Some delivery and distribution companies are turning to re-usable or rented packaging, an example of the general move away from single-use plastic items. Reusable and foldable plastic transport crates are used in many countries, notably in delivery chains from agricultural producers to shops for fruit and vegetables, and on to consumers. They belong to fleet managers, are easy to clean and repair (by changing broken components) and protected by a deposit - i.e. they have a value and an owner. There are attempts to extend this approach to containers to distribute liquids using standardised container shapes and materials, although preference is given to metal rather than plastic containers.[54]

Other undesigned releases result from leakage-prone items such as take-away packaging and consumer items such as bags, cups and drinking straws. In some convenience uses, conventional plastics may be substituted by biodegradable materials, including paper and other vegetable fibres as well as biodegradable plastics. However, the scope for replacement of conventional plastics throughout the economy is limited. Furthermore, as noted above, substituting plastics by cotton, e.g. for bags, comes at the expense of increasing consumption of non-renewable resources and use of land for agricultural production. Much plastic litter results from unthinking human action. Therefore, it is essential to modify the behaviour that leads to consumer litter, through education or persuasion reinforced by applying penalties for littering. Appropriate waste collection and packaging design are also needed General elimination of single-use consumer items is primarily a move to prevent casual littering as a source of leakages; i.e. it is primarily intended to rectify the consequences of human behaviour. However, to be effective, moves to eliminate single-use plastics should target the most leakage-prone items.

A notable example is drinking water contained in plastic bottles. Bottled potable water has an important role in some circumstances, primarily in disaster relief or where potable water is not available. However, for general consumer convenience in the developed world, it represents another non-essential use. Some municipalities and local governments have promoted

52 Rhodes (n 8); Patrick ten Brink and others, Circular Economy Measures to Keep Plastics and Their Value in the Economy, Avoid Waste and Reduce Marine Litter (Kiel Institute for the World Economy, Economics Discussion Papers No. 2018-3, 2018) <http://www.economics-journal.org/economics/discussionpapers/2018-3>; A Löhr and others, 'Solutions for Global Marine Litter Pollution' (2017) 28 Current Opinion in Environmental Sustainability 90.

53 'Bans Imposed on Helium Balloons' *News in English* (17 April 2018) <https://www.newsinenglish.no/2018/04/17/bans-imposed-on-helium-balloons/>.

54 This is the idea behind Loop, focusing on reduce, reuse and recycle. For more information, see <https://loopstore.com>.

campaigns against the sale of pre-bottled water, with consumers encouraged instead to use multiple-use containers filled from the piped supply of potable water. Some institutions have gone further and banned sales of pre-bottled water on their premises. Eliminating pre-bottled water has the additional advantage that the environmental impacts of piping water are much lower than delivering it in bottles. For consumers who prefer carbonated water, the approach of adding the carbon dioxide to piped water also has environmental advantages in addition to replacing the plastic bottle by a multi-use container.

Deposit-return schemes provide a superficially obvious way to incentivise behaviour change and reduce littering: the consumer pays a charge on a packaged item which is refunded if the packaging is returned. If returned packages, such as bottles, can be returned to the original packager, there is a possibility of moving from single-use to multiple-use packaging. However, the consequences can be perverse, especially if the packaging is not readily recyclable or reusable, or if there is no direct route back to the original supplier. As an egregious example, South Africa's plastic recovery rate is higher than in Europe but so is the leakage of mismanaged waste.[55] Even if there is a direct and leak-free return route, there are further potential problems in promoting re-use rather than recycling, as noted earlier. Sorting returned bottles and routing them back to the original packager entails significant expense. Furthermore, the bottles themselves need to be robust, usually with thicker walls than single-use items and sometimes with reinforcing sashes or ribs. The additional weight tends to offset re-use so that the objective of reducing the flow of plastics through the economy is thwarted.

The measures outlined above address mainly terrestrial leakages of plastic that then finds its way into the oceans. However, as noted above, much ocean plastic arises from commercial marine activities and is more difficult to regulate. One possible approach is to provide economic incentives for companies to retain damaged gear, analogous to terrestrial deposit/return systems, combined with better provision of facilities in ports for disposal of damaged gear. Iceland has introduced a system under which fishing companies may waive their (substantial) fee to the national recycling system upon return of nets;[56] similar approaches are being trialled in other countries. Fishing nets are made primarily of nylon with other materials for specific components. A chemical recycling route is developing in which nylon threads, mainly from fishing nets, are used to make recycled products such as carpets.[57]

Waste plastic already in the oceans would remain even if measures to eliminate further 'leakage' were rapid and effective. Given the durability of much of the plastic waste and the well-documented environmental damage it causes, there is a strong case for clean-up of seas and shorelines. The problem is global and requires international action. The waste already in the oceans cannot currently be used for any economic benefit, and ways to recycle a significant part of the existing waste are still remote aspirations. For the foreseeable future, material recovered must be disposed of in terrestrial landfills, representing an economic cost. Specific states and jurisdictions have some economic stake in cleaning up their own shorelines. However, waste already dispersed in the oceans represents pollution of the global commons, even though it may eventually wash up on someone's shoreline. We cannot avoid the conclusion that efforts to remove polluting plastics from the world's oceans will require an international initiative with dedicated resources.

4 CONCLUSIONS

Any aspiration to remove plastics completely from the economy is unrealistic. Similarly, wholesale

55 Harro von Blottnitz, Takunda Chitaka and Clare Rodseth, 'South Africa Beats Europe at Plastics Recycling, but also is a Top 20 Ocean Polluter, Really?' *LinkedIn Pulse* (3 September 2018) <https://www.linkedin.com/pulse/south-africa-beats-europe-plastics-recycling-also-top-von-blottnitz/>.

56 Information on Fisheries Management in the Republic of Iceland <http://www.fao.org/fi/oldsite/FCP/en/ISL/body.htm>; Guðlaugur Gylfi Sverrisson, Icelandic System for Fishing Nets (Conference on Plastics in the Marine Environment, Reykjavik, 24 September 2014) <https://www.ust.is/library/Skrar/Einstaklingar/Vatnsgaedi/Plastradstefna/7_Gudlaugur_Sverrisson.pdf>.

57 Aquafil Global Official Website: <https://www.aquafil.com>.

replacement of durable by biodegradable plastics is not a panacea, or even a realistic or attractive approach. Moving towards 'circular' use will have some effect in reducing the leakage of plastics from the economy into the unconfined environment, which is the source of plastic pollution, but requires changes in commercial practices as well as in plastic products and materials. The highest priority is to focus on preventing leakage by ensuring that all plastic materials remain within the economy. Analysis of the industrial ecology of plastics shows where the main leakages arise, and thereby shows where regulatory attention should be directed (Figure 1). Table 1 summarises the options available to manage plastics at different points within the economy. Regulatory approaches need to recognise the different types of plastics and ensure that used plastic products are directed to the appropriate route for re-use, recycling or disposal.

Particularly for marine debris, efforts to reduce the flows of plastics into the environment must be undertaken worldwide, involving the Global South, so that international action and agreement are essential. In addition to measures to reduce 'leakage' of waste plastic, the stock of polluting plastics already in the oceans demands an international clean-up effort, recognising that recovered plastic debris will have to be consigned to landfill and therefore has no economic value.

Article - Special issue on Designing Law and Policy Towards Managing Plastics in a Circular Economy

EXTENDED PRODUCER RESPONSIBILITY: AN ASSESSMENT OF RECENT AMENDMENTS TO THE EUROPEAN UNION WASTE FRAMEWORK DIRECTIVE

Katrien Steenmans*

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TABLE OF CONTENTS

1 INTRODUCTION

The issue of plastic waste has recently gained traction, attributed in part to images of the impact of plastic waste in marine ecosystems shown in BBC's and Sir David Attenborough's *Planet Earth II*[1] series and other headlines reporting on, for example, the Chinese ban on the import of certain plastic wastes[2] and the environmental costs of plastics in fast fashion.[3] Much data exists to warrant the growing concern about plastic waste. Jambeck and others calculate that 4.8 to 12.7 million metric tonnes of plastic waste flowed into the oceans from coastal regions in 2010, which is only expected to have increased since then.[4] Furthermore, there is evidence that this plastic waste ends up in our food chains and is ingested by us, with the overall human health implications of this still unclear and requiring further research (though there is initial evidence that certain plastic waste can have harmful effects).[5]

Beyond environmental and social repercussions of plastic waste, there are also huge economic costs: the report *Valuing Plastic* estimates the cost of environmental damage to marine ecosystems by plastic waste at around US$13 billion;[6] the Asia-Pacific Economic Cooperation calculates the cumulative cost of plastic waste in the Asia-Pacific oceans at US$1.3 billion to local tourism, and fishing and shipping industries;[7] and the European Commission states that the potential costs for coastal and beach cleaning in Europe could reach EUR630 million per year.[8]

The plastic waste crisis can in part be addressed through effective waste management (though other critical issues, including, *inter alia*, the scale of plastic consumption and the composition of certain plastics also need to be addressed, but are beyond the scope of this article). A circular economy approach to plastics has been recommended to improve plastic waste management to prevent plastic waste being 'wasted'.[9] Many circular economy definitions are in circulation. In essence, it is a system based on the reuse, recycling, and recovery of materials to achieve economic

1 Sid Hayns-Worthington, 'The Attenborough Effect: Searches for Plastic Recycling Rocket after Blue Planet II' (*Resource*, 5 January 2018) <https://resource.co/article/attenborough-effect-searches-plastic-recycling-rocket-after-blue-planet-ii-12334>.

2 Eg Laura Parker and Kennedy Elliott, 'Plastic Recycling is Broken. Here's How to Fix It' (*National Geographic*, 20 June 2018) <https://news.nationalgeographic.com/2018/06/china-plastic-recycling-ban-solutions-science-environment>; Karen McVeigh, 'Huge Rise in US Plastic Waste Shipments to Poor Countries Following China Ban' (*The Guardian*, 5 October 2018) <www.theguardian.com/global-development/2018/oct/05/huge-rise-us-plastic-waste-shipments-to-poor-countries-china-ban-thailand-malaysia-vietnam>.

3 Eg Ellen MacArthur Foundation, 'One Garbage Truck of Textiles Wasted Every Second: Report Creates Vision for Change' (*Ellen MacArthur Foundation*, 28 November 2017) <www.ellenmacarthurfoundation.org/news/one-garbage-truck-of-textiles-wasted-every-second-report-creates-vision-for-change>; Patsy Perry, 'The Environmental Costs of Fast Fashion' (*The Conversation*, 27 December 2017) <https://theconversation.com/read-this-before-you-go-sales-shopping-the-environmental-costs-of-fast-fashion-88373>.

4 Jemma R Jambeck and others, 'Plastic Waste Inputs from Land into the Ocean' (2015) 347(6223) Science 768, 770.

5 Lisbeth Van Cauwenberghe and Colin R Janssen, 'Microplastics in Bivalves Cultured for Human Consumption' (2014) 193 Environmental Pollution 65; P Schwabl and others, 'Assessment of Microplastic Concentrations in Human Stool – Preliminary Results of a Prospective Study' (UEG Week 2018, Vienna, 24 October, 2018).

6 UNEP, *Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in Consumer Goods Industry* (UNEP 2014) 12.

7 A McIlgorm, HF Campbell and MJ Rule, 'Understanding the Economic Benefits and Costs of Controlling Marine Debris in the APEC Region (MRC 02/2007)' (2007) Report to the Asia-Pacific Economic Cooperation Marine Resource Conservation Working Group by the National Marine Science Centre (University of New England and Southern Cross University), 11-12 <www.nowpap.org/data/ML%20ref/APEC%27ML-control...Cost-vs-Benefit.pdf>.

8 European Commission, 'Our Oceans, Seas and Coasts – Descriptor 10: Marine Litter' (*European Commission*, 2018) <http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm>.

9 Eg World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy – Rethinking the Future of Plastics* (Ellen MacArthur Foundation 2016); Sofie Huysman and others, 'Performance Indicators for a Circular Economy: A Case Study on Post-industrial Plastic Waste' (2017) 120 Resources, Conservation and Recycling 46; Patrick ten Brink and others, 'Circular Economy Measures to Keep Plastics and their Value in the Economy, Avoid Waste and Reduce Marine Litter' (2018) Economics Discussions Papers No 2018-3, Kiel Institute for the World Economy <www.economics-ejournal.org/economics/discussionpapers/2018-3>.

prosperity, environmental protection, and social equity.[10] Critically, plastic waste would be conceived as a resource to be reused, recycled or recovered. McKinsey estimates that the global value of resource efficiency gains could eventually reach benefits of US$3.7 trillion per year.[11] Moreover, circularity design principles can stabilise a delicate international resource and waste management system, avoiding future scenarios repeating the recent, widespread international repercussions caused by the introduction of a Chinese ban on the import of certain wastes – for example, Indonesia, Vietnam, and Taiwan have introduced heavy restrictions as a result of the increased amounts of plastic wastes being imported.[12]

Laws and policies at different government levels are supporting transitions towards circular economy approaches. Examples include the European Union's (EU) 2015 Circular Economy Action Plan[13], as part of which the Strategy for Plastics in the Circular Economy[14] was adopted in 2018. This includes a proposal for a directive on the reduction of the impact of certain plastic products on the environment.[15] National examples include China's Circular Economy Promotion Law 2008,[16] Germany's Closed Substance Cycle and Waste Management Act of 1996,[17] and Japan's 2000 Fundamental Law for Establishing a Sound Material-cycle Society.[18] Laws and policies have also had a role to play in local manifestations of circular economies (called 'industrial symbiosis' or 'eco-industrial parks') in, for example, Denmark, the Netherlands, Sweden, and the UK.[19] Beyond the top-down approach, there are private and voluntary stakeholders driving implementation of circular approaches: the British Plastics Federation has published *Plastics: A Vision for a Circular Economy*'.[20] PlasticsEurope, a pan-European association of plastic manufacturers in Europe, is examining the circular economy as a sustainable model for plastics;[21] and the Ellen MacArthur Foundation is leading the New Plastics Economy initiative to bring together key stakeholders to rethink and redesign the future of plastics.[22] These are all, however, relatively isolated stories of success[23] and the actual implementation of circular approaches remains 'limited and fragile'.[24] More research is therefore needed on the law and policy instruments that can enable circular economies for resources and waste, including plastics.[25]

10 Julian Kirchherr, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 Resources, Conservation & Recycling 221, 224-225.

11 Richard Dobbs and others, *Resource Revolution: Meeting the World's Energy, Materials, Food, and Water Needs* (McKinsey Global Institute and McKinsey Sustainability & Resource Productivity Practice 2011) 10.

12 Roger Harrabin and Tom Edgington, 'Recycling: Where is the Plastic Waste Mountain?' *BBC* (1 January 2019) <www.bbc.co.uk/news/science-environment-46566795>.

13 Commission, 'Closing the Loop – An EU Action Plan for the Circular Economy' (Communication) COM(2015) 614 final.

14 Commission, 'A European Strategy for Plastics in a Circular Economy' (Communication) COM(2018) 28 final.

15 Commission, 'Proposal for a Directive of the European Parliament and of the Council on the Reduction of the Impact of Certain Plastic Products on the Environment' (Communication) COM(2018) 340 final 2.

16 Circular Economy Promotion Law of the People's Republic of China (promulgated by The Standing Committee of the National People's Congress, August 29, 2008), effective January 1, 2009.

17 Act for Promoting Closed Substance Cycle Waste Management and Ensuing Environmentally Compatible Waste Disposal (Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Beseitigung von Abfällen) v. 27.9.1994, BGBI.I 1994, p. 2705.

18 The Basic Act for Establishing a Sound Material-Cycle Society, Act No.110 of 2 June 2000.

19 Katrien Steenmans, 'Enabling Industrial Symbiosis Through Regulations, Policies, and Property Rights' (PhD thesis, University of Surrey 2018) 256-265.

20 British Plastics Federation, *Plastics: A Vision for a Circular Economy: Improving the Environment for the Next Generation* (British Plastics Federation 2018).

21 PlasticsEurope, 'Plastics' Contribution to the Circular Economy' (*PlasticsEurope,* 2018) <www.plasticseurope.org/en/focus-areas/circular-economy>.

22 New Plastics Economy, 'New Plastics Economy' (2018) <https://newplasticseconomy.org>.

23 John A Mathews and Hao Tan, 'Circular Economy: Lessons from China' (2016) 531 Nature 440, 441.

24 Nicky Gregson and others, 'Interrogating the Circular Economy: The Moral Economy of Resource Recovery in the EU' (2015) 44(2) Economy and Society 218, 218.

25 Steenmans (n 19) 292-293. See also: Katrien Steenmans, Rosalind Malcolm and Jane Marriott, 'Commodification of Waste: Legal and Theoretical Approaches to Industrial Symbiosis as Part of a Circular Economy' (2017) University of Oslo Faculty of Law Legal Studies Research Paper 2017-26.

Extended Producer Responsibility (EPR) is a legal tool that has been identified as one of the key opportunities 'for further development of regulatory and policy instruments to enable' circular economy approaches,[26] and therefore also a potentially valuable tool for incentivising more effective plastic waste management. In essence, EPR is where the producer of a product retains responsibility of some form for the product throughout its life cycle, including when it becomes waste. There has been a substantial increase in implementation and interest in EPR schemes over the last decade, as well as a growth in academic literature on the economics of EPR,[27] with Sachs describing it in 2006 as 'one of the most significant developments in global environmental policy in the last decade'.[28]

The concept of EPR has been incorporated at EU level.[29] The focus of this article is on its inclusion in the 2008 Waste Framework Directive (WFD),[30] the cornerstone of EU waste law. The EU implementation of EPR has, however, been criticised in the literature and is therefore considered to have limited impact.[31] These limitations need to be addressed in order to increase EPR's effectiveness. Directive 2018/851[32] amended the 2008 WFD with its aim in part to clarify the EPR provisions.[33] This article assesses these amendments to EPR by investigating the particular question: To what extent do the Directive 2018/851 amendments to the 2008 WFD EPR scheme address criticisms of EPR for the purpose of facilitating transitions towards circular economies? This question is explored by adopting a doctrinal approach and drawing on examples in the context of plastic waste.

For the purpose of the overarching research question, the remainder of the article is structured as follows. The next section, Section 2, examines the concept of EPR in more detail, including its anticipated benefits and alignment with the circular economy. The subsequent section, Section 3, then evaluates EPR within the 2008 WFD. Section 4 sets out the recent amendments to the EPR scheme introduced by Directive 2018/851 including how these address some of the criticisms, and discusses some of the developments on the horizon that may affect the scope and effectiveness of EPR schemes, particularly within the plastic waste context. The final section concludes.

2 UNDERSTANDING EXTENDED PRODUCER RESPONSIBILITY

In this section, the concept of EPR is detailed by describing the different forms in which it can exist, together with its general advantages and limitations. This understanding is then used in subsequent sections to understand the particular EU implementation of the concept, and identify potential gaps and opportunities.

The concept of EPR, where responsibilities for waste management are shifted from consumers and authorities (those traditionally made responsible) to the producer of a product, has been around for a

26 Steenmans (n 19) 290. See also: Organisation for Economic Co-operation and Development, 'Working Party on Resource Productivity and Waste' (OECD 2015); ten Brink and others (n 9) 6 and 9; Nathan Kunz, Kieren Mayers and Luk N Van Wassenhove, 'Stakeholder Views on Extended Producer Responsibility and the Circular Economy' (2018) 60(3) California Management Review 45, 46; Zhe Liu, Michelle Adams and Tony R Walker, 'Are Exports of Recyclables from Developed to Developing Countries Waste Pollution Transfer or Part of the Global Circular Economy' (2018) 136 Resources, Conservation & Recycling 22, 23.

27 Garth T Hickle, 'An Examination of Governance within Extended Producer Responsibility Policy Regimes in North America' (2014) 92 Resources, Conservation and Recycling 55, 56; Daniel Kaffine and Patrick O'Reilly, 'What Have We Learned about Extended Producer Responsibility in the Past Decade? A Survey of the Recent EPR Economic Literature' (ENV/EPOC/WPRPW(2013)final, OECD, 21 January 2015) 4; Sergio Rubio and others, 'Effectiveness of Extended Producer Responsibility Policies Implementation: The Case of Portuguese and Spanish Packaging Waste Systems' (2019) 210 Journal of Cleaner Production 217, 218.

28 Noah Sachs, 'Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States' (2006) 30 Harvard Environmental Law Review 51, 54.

29 See Section 2.

30 Directive 2008/98/EC of 19 June November 2008 on waste and repealing certain Directives [2008] OJ L312/3 (2008 WFD).

31 See Section 3.

32 Directive 2018/851 of 30 May 2018 amending Directive 2008/98/EC on waste [2018] OJ L 150/109.

33 Directive 2018/851, recital 9. See also Section 4.

number of decades. Xerox, a company offering products including photocopiers, has, for example, been 'taking back' its products since the 1960s, though this was not formalised, for environmental purposes until their Asset Recycle Management Program introduced in 1991.[34] In contrast, it was not until a few decades later that EPR was explicitly recognised at national level. EPR was formulated and developed by Lindhqvist in a 1990 report to the Swedish Ministry of the Environment,[35] and in the same year the German Minister of the Environment, Hans Töpfer, proposed an EPR approach for the Ordinance on the Avoidance of Packaging Waste (*Verpackungsverordnung*).[36] This Ordinance became effective in 1991 and was the first practical application of EPR in the EU (called the German Green Dot scheme).[37] Within a decade, EPR approaches were seen more widely and were incorporated at EU level, first in 2000 in the End-of-Life Vehicles Directive[38] and subsequently in the Waste Electrical and Electronic Equipment Directive[39] and 2008 WFD.

The types of responsibilities that can be assigned under EPR schemes, and the benefits and challenges of the concept are examined in the next sections. These types will be used to examine EPR to facilitate an analysis of the EU implementation of the concept in Sections 3 and 4.

2.1 Types of Extended Producer Responsibility

Lindhqvist distinguished between four types of producer responsibility.[40] These categorisations are useful because they provide a foundational understanding of EPR schemes and the incentives provided by them. The categories are:[41]

- *Physical responsibility* is where the producer is involved in physical end-of-life management of the products and/or their effects through development of technology or provision of services. For example, Xerox physically took products back as part of their Asset Recycle Management Program. The intended advantages included providing 'the necessary leadership, strategy, design principles, operational and technical support to maximize global recycling … resulting in a major competitive, as well as environmental advantage for Xerox'.[42]

- *Economic responsibility* is where a producer covers all or part of the costs (directly or by a special fee) for managing the wastes at the product's end-of-life, for example, for the collection, processing, and disposal. In the Netherlands, for example, the Packaging

34 JA Scott and others, 'Concepts and Methodologies to Help Promote Industrial Ecology' in Christian N Madu (ed), *Handbook of Environmentally Conscious Manufacturing* (Springer Science+Business Media 2000) 40; Wendy Kerr and Chris Ryan, 'Eco-efficiency Gains from Remanufacturing: A Case Study of Photocopier Remanufacturing at Fuji Xerox Australia' (2001) 9 Journal of Cleaner Production 75, 77.

35 Thomas Lindhqvist and Karl Lidgren, 'Modeller för Förlängt Producentansvar' in Ministry of the Environment (ed), *Fran Vaggan til Graven – Sex Studier av Varors Miljöpåverken* (Allmänna förl 1990); Thomas Lindhqvist, 'Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems' (PhD thesis, Lund University 2000) ii.

36 Ordinance on the Avoidance of Packaging Waste (Verpackungsverordnung – VerpackV) v.20.6.1991, BGBI.I 1991, p. 1234. Note that this version is no longer in force.

37 For more information, see eg: Eric Neumayer, 'German Packaging Waste Management: A Successful Voluntary Agreement with Less Successful Environmental Effects' (2000) 10 European Environment 152; Per Olof Busch and Helge Jörgens, 'Breaking the Deadlock – Voluntary Agreements and Regulatory Measures in German Waste Management' (ECPR, Grenoble, 2001) <https://ecpr.eu/Filestore/PaperProposal/13ccd0de-228d-413f-8656-7d61f4fc1f2f.pdf >; Sachs (n 28) 68.

38 Directive 2000/53/ECL of 18 September 2000 on end-of-life vehicles [2000] OJ L269/34. The phrase 'extended producer responsibility' is not used. Instead, the concept is embodied by the responsibilities assigned in the Directive of collecting (art 5), treating (art 6), and reusing and recovering (art 7).

39 Council Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment [2012] OJ L197/38 (WEEE Directive). Similarly to the End of Vehicles Directive, this makes no reference to 'extended producer responsibility' but refer to treatment (art 6) and recovery (art 7).

40 Lindhqvist (n 35) 38-39.

41 ibid.

42 Scott and others (n 34) 40.

Decision 2014 states that the producer is responsible for the costs of separate collection or collection and subsequent separation of packaging (including plastics).[43]

- *Liability* is where responsibility for environmental damages caused by a product is borne by its producer. This may encompass damages occurring at various stages in the life cycle including use and final disposal.

- *Informative responsibility* is where the producer is required to provide information on the product and its environmental effects in various life cycle stages, such as on the polluting effects of waste produced by the product.

The EPR types are not necessarily distinct and can overlap and be simultaneously present, as illustrated in Figure 1. The Dutch Packing Decision 2014, for example, also requires informative responsibility (there are reporting obligations if a producer places and removes more than 50,000 kg of packaging waste annually)[44] and physical responsibility (the producer is responsible for separate intake or collection and separation of packaging)[45] in addition to the economic responsibility highlighted above. When all other EPR types are present, then Lindhqvist states there is ownership,[46] though this has been re-labelled as 'property rights' in Figure 1 to indicate that other property rights may be relevant under other responsibility schemes. A discussion of the property rights in relation to the different types of responsibility is beyond the scope of this article, but it is recommended as a potential useful tool to increase the effectiveness of EPR schemes as property rights in waste can affect treatment of waste.[47]

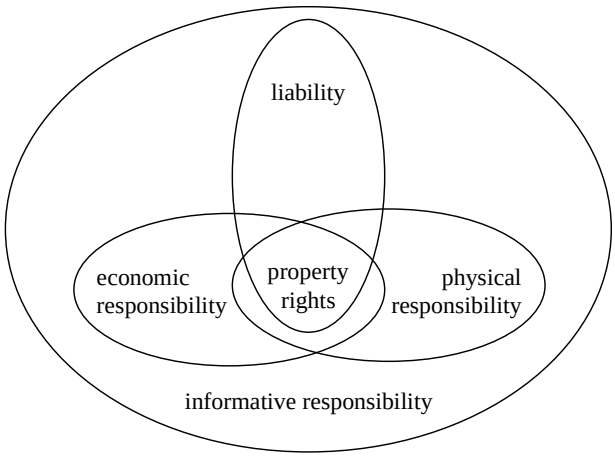

Figure 1. Types of EPR. Adapted from Lindhqvist (2000).[48]

2.2 Advantages and Limitations

There are a number of general advantages and limitations of EPR schemes, which are set out below to understand the general concept of EPR. These are referred to in subsequent sections to examine whether the particular EU implementation of the concept has underpinned or detracted from these advantages, and addressed or disregarded the disadvantages.

First, EPR is a manifestation of the polluter-pays principle, which is that the person who caused the pollution should pay the costs of it and where waste is conceived as pollution.[49] EPR therefore supports a key principle of EU environmental law[50] by operationalising it within a mechanism, while simultaneously the principle provides a legal policy basis in the EU context for EPR. Economic responsibility is a clear 'logical extension' of the

43 Besluit beheer verpakkingen van 2014 [Dutch Packaging Decision 2014], art 5(2).
44 Dutch Packaging Decision 2014, art 8.
45 Dutch Packaging Decision 2014, art 5(1).
46 Lindhqvist (n 35) 38-39.
47 See eg Steenmans, Malcolm and Marriott (n 25).
48 Thomas Lindhqvist, 'Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems' (PhD thesis, Lund University 2000) 38.
49 For a discussion on whether waste is pollution or not, please see: Steenmans (n 19) 6-8.
50 Treaty on the Functioning of the European Union [2012] OJ C326/49, art 191(2).

polluter-pays principle,[51] as the producer of the product has to pay for waste management of product. The other types of responsibility can similarly have cost implications for the producers; financing is required to collect and produce information, and organise physical responsibility of waste. Some industry stakeholders' groups have argued that EPR

> distorts the Polluter Pays Principle because it is consumers, not producers, that are the 'polluters' in the context of product externalities. Consumers actually introduce products into the environment by discarding them, whereas producers are making a useful product, not a waste. In this view, product externalities such as waste disposal cost or environmental impacts of disposal are caused by the consumer's decision to consume, not the producer's decision to produce.[52]

Therefore, the preventive principle, which sets out to prevent the creation of pollution or nuisance at source,[53] may provide a more appropriate basis for EPR as the producer is the original 'creator' of the product that may lead to pollution. Principles of industrial ecology – a field focused on cycling resources like natural ecosystems[54] – can, however, be applied to explain why producers can still be considered the polluters: 'environmental externalities have their origin in the design decisions for the products produced in the factor, and indeed, in the decision to produce a certain product in the first place'.[55] Additional arguments to explain the producers as the polluters can also highlight the role of producers in creating or increasing a demand and desire amongst consumers to consume that product, which then leads to pollution.

Furthermore, the concept of EPR resonates metaphorically with the concept of the circular economy, as both seek to move from linear and unidirectional to cyclical and closed loops,[56] so it can result in similar benefits described by Kirchherr and others.[57] Liu and others have even described EPR as one of the legal mechanisms needed to help reshape and rebalance circular economy approaches.[58] Although some argue that the general concept of EPR deviates from circular approaches, as EPR is largely focused on improving the recycling of materials rather than the reuse and repair, which are prioritised by circular economy approaches.[59]

Another advantage of EPR is the shifting of physical and economic responsibilities, which can incentivise producers, instead of local authorities, to innovate, access specialised expertise regarding the product design and technology development, and incorporate 'green' design and effective waste management schemes into their overall production strategies.[60] EPR is therefore a market-based scheme, as producers internalise the costs of externalities.[61] This has resulted in some scholars describing EPR as a 'next generation' environmental policy that relies on market incentives instead of traditional command-and-control mandates.[62] As this advantage illustrates, the shifting of physical and financial responsibilities are usually

51 KH Forslind, 'Implementing Extended Producer Responsibility: The Case of Sweden's Car Scrapping Scheme' (2005) 13 Journal of Cleaner Production 619, 620. See also eg: Scott and others (n 34) 40; Nicole C Kibert, 'Extended Producer Responsibility: A Tool for Achieving Sustainable Development' (2004) 19(2) Journal of Land Use 503, 504.

52 Sachs (n 28) 65.

53 Included in the WFD in Article 4(1) through prioritising the prevention of waste in the waste hierarchy.

54 Eg Robert A Frosch and Nicholas E Gallopoulos, 'Strategies for Manufacturing' (1989) 189 Scientific American 152, 152.

55 Sachs (n 28) 66.

56 Reid Lifset, Atalay Atasu and Naoko Tojo, 'Extended Producer Responsibility: National, International and Practical Perspective' (2013) 17(2) Journal of Industrial Ecology 162, 162.

57 See text to n 10.

58 Liu and others (n 26) 23.

59 Kunz and others (n 26) 46; Organisation for Economic Co-operation and Development, 'Working Party on Resource Productivity and Waste' (OECD 2015).

60 Maria Lee, 'New Generation Regulation? The Case of End-of-Life Vehicle' (2002) 11(4) European Environmental Law Review 114, 116; Alice Castell, Roland Clift and Chris France, 'Extended Producer Responsibility in the European Union: A Horse or a Camel?'(2004) 8(1-2) Journal of Industrial Ecology 4, 4.

61 Eg OECD, *Instrument Mixes for Environmental Policy* (OECD Publishing 2007) 158.

62 Eg Neil Gunningham and Darren Sinclair, *Leaders and Laggards: Next Generation Environmental Regulation* (Greenleaf Publishing 2002) 198; Sachs (n 28) 53.

highlighted as providing the core rationale for implementing EPR schemes.[63] The emphasis on these types of EPR is mirrored in practice; across an examination of four case studies in Denmark, Netherlands, Sweden, and the UK, where EPR was found to be predominantly present in the form of economic responsibility, and sometimes physical or informative responsibility.[64] This limits the potential overall impact of EPR schemes as it under-utilises the benefits offered by the other types of responsibility.

The final advantage of EPR schemes discussed in this section is the underlying motivation to achieve economic, environmental and social benefits.[65] Evidence exists that EPR schemes have resulted in significant economic and environment benefits both in and outside the EU. For example, it is estimated that the EPR programmes for electronics, mercury thermostats, paint, and mattresses in the US state of Connecticut resulted in: (1) the diversion of more than 26 million pounds of materials from waste; (2) cumulative cost savings of more than US$2.6 per annum to Connecticut municipalities; (3) services worth another US$6.7 million that created more than 100 jobs; and (4) reduced greenhouse gas emissions by more than 13 million kg of carbon dioxide equivalent.[66] In Germany, the Packaging Ordinance between 1992 and 1993 reduced the volume of packaging by 1 million tonnes and saved the cost of waste not gone to final disposal by an estimated US$2.1 billion.[67]

Simultaneously, there are not always economic advantages to EPR schemes; EPR schemes are likely to be implemented with increased costs to industry and society.[68] It can be particularly expensive to set up an EPR system for an individual producer. In order to reduce costs, some companies can organise themselves collectively and create a producer responsibility organisation. The primary task of such an organisation is to set up and manage the infrastructures needed to collect and process waste on behalf of their individual members. But, the formation and operation of producer responsibility organisations 'has garnered scrutiny from competition authorities and often necessitated a legislative response … to facilitate their functioning through exemption from state competitive conduct laws'.[69] Additionally, environmental benefits may not always be reaped. Some EPR schemes that include weight-based fee structures have led to a focus on light-weighting, or, for example, the Dutch Packaging System only applies informative responsibility if a weight threshold is met.[70] Such schemes risk rewarding lighter, and not necessarily more recyclable, materials.[71]

Finally, Stahel argues that overall the concept of 'responsibility' itself is too weak (though this arguably depends on the type of responsibility and could be as a result of a labelling issue of liability v responsibility);[72] he observes that only relatively few producers have changed their industrial design priorities or installed buy-back strategies to components or molecules for reuse as a result of EPR.[73] Watkins and others support this view of EPR,

63 Harri Kalimo and others, 'Greening the Economy through Design Incentives: Allocating Extended Producer Responsibility' (2012) 21(6) EELR 274, 274.

64 Steenmans (n 19) 262.

65 Atalay Atasu, 'Operational Perspectives on Extended Producer Responsibility' (forthcoming) Journal of Industrial Ecology 1, 1.

66 Connecticut – Product Stewardship Institute, *Connecticut Extended Producer Responsibility Program Evaluation: Summary and Recommendations* (Product Stewardship Institute 2017). Note that these figures are estimates as data on recovery rates and recycling/disposal costs were limited.

67 Environment Policy Committee, *Extended Producer Responsibility Phase 2: Case Study on the German Packaging Ordinance* (Working Paper ENV/EPOC.PPC(97)21/REV2, Organisation for Economic Co-operation and Development, May 1998) 24. Based on a conversion rate of US$1 = 1 Deutsche Mark – the exchange rate in 1993 according to: Harold Marcuse, 'Historical Dollar-to-Marks Currency Conversion Page' (7 October 2018) <www.history.ucsb.edu/faculty/marcuse/projects/currency.htm>.

68 Kieren Mayers and Scott Butler, 'Producer Responsibility Organisations Development and Organisations: A Case Study' (2013) 17(2) Journal of Industrial Ecology, 287.

69 Hickle (n 27) 56-57.

70 See text to n 44.

71 Emma Watkins and others, *EPR in the EU Plastics Strategy and Circular Economy: A Focus on Plastic Packaging* (Institute for European Environmental Policy 2017) 2.

72 Labeling theory addresses the effects and influence of labels on individuals their behaviour. See eg: Erving Goffman, *Stigma: Notes on the Management of Spoiled Identity* (Prentice Hall 1963); Howard Becker, *Outsiders* (Free Press 1973); Michael Petrunik, 'The Rise and Fall of "Labelling Theory": The Construction and Destruction of a Sociological Strawman' (1980) 5(2) The Canadian Journal of Sociology 2013.

73 Walter Stahel, *Circular Economy for Beginners* (Ellen MacArthur Foundation forthcoming) 32.

as they find that EPR measures have so far largely failed to incentivise packaging producers towards eco-design.[74] Instead a concept like 'producer liability' would be much more effective as it goes far beyond EPR.[75] The discussion of the respective benefits and limitations of responsibility compared to liability are beyond the scope of this article. In recognition of its weaker nature, EPR should not be adopted as a standalone measure.

As a result of some of its disadvantages and limitations, EPR is more likely to be useful and effective as part of an integrated regulatory approach, where there is a mix of law and policy instruments, including economic instruments and complementary policies to promote innovation.[76] In particular, an economic study by Arnaud demonstrated that EPR could be an optimal policy if combined with bonus and penalty systems.[77] At the same time, combining EPR with such instruments should be carefully evaluated before adoption, as 'we should keep in mind that regulations that are too intrusive would contradict the essence of EPR which is delegation'.[78] Thus, EPR schemes need to achieve the tricky balance of retaining the flexible nature of EPR schemes, while introducing sufficient complementary laws and policies to ensure such schemes are effective. Such an assessment of the EPR concept within the WFD is beyond the scope of this paper, as this paper focuses solely on EPR rather than the other mechanisms set out in the WFD that have to or may be adopted alongside it.

74 Watkins and others (n 71) 2.

75 Stahel (n 73) 30.

76 Annika Gottberg and others, 'Producer Responsibility, Waste Minimisation and the WEEE Directive: Case Studies in Eco-design from the European Lighting Sector' (2006) 359 Science of the Total 38, 49; Brice Arnaud, 'Extended Producer Responsibility and Green Marketing: An Application to Packaging' (2017) 67(2) Environmental and Resource Economics 285; Jooyoung Park, Nohora Díaz-Posada and Santiago Mejía-Dugand, 'Challenges in Implementing the Extended Producer Responsibility in an Emerging Economy: The End-of-Life Tire Management in Colombia' (2018) 189 Journal of Cleaner Production 754, 754; Steenmans (n 19) 254.

77 Brice Arnaud, 'Extended Producer Responsibility and Green Marketing: An Application to Packaging' (2017) 67(2) Environmental and Resource Economics 285.

78 Pierre Fleckinger and Matthieu Glachant, 'The Organization of Extended Producer Responsibility in Waste Policy with Product Differentiation' (2010) 59 Journal of Environmental Economics and Management 57, 66.

3 EPR IN THE WFD BEFORE 2018 AMENDMENTS

In this section the EPR scheme as included in the original version of the 2008 WFD is examined by investigating the following three questions within the context of the waste crises set out in Section 1 and the possible forms, advantages, and limitations of the concept of EPR set out in Section 2: (1) what is EPR under the original 2008 WFD; (2) who is responsible for what under EPR measures; and (3) when does a producer's EPR end, that is: when is a producer no longer responsible under EPR? These questions are both critical for understanding the EU's implementation as well as its limitations.

3.1 What is EPR in the 2008 WFD?

EPR was defined in neither the original 2008 WFD nor its accompanying guidance document.[79] It was described in Recital 27 of the WFD as

> one of the means to support the design and production of goods which take into full account and facilitate the efficient use of resources during their whole life cycle including their repair, re-use, disassembly and recycling without compromising the free circulation of goods on the internal market.[80]

By introducing it as 'one of the means' the WFD highlights that it is one part of a wider mix of law and policy instruments likely to be required (as mentioned in the final paragraph of the previous section). Furthermore, the description in Recital 27 reflects the rationale of EPR schemes generally as discussed in Section 2, and also keeps the concept very open by not

79 European Commission, *Guidance on the Interpretation of Key Provisions of Directive 2008/98/EC on Waste* (June 2012) 28.

80 2008 WFD, recital 27.

aligning with or limiting itself to a specific EPR type (as set out in Section 2.1). Instead, Member States may according to Article 8(1) of the 2008 WFD take 'legislative or non-legislative measures to ensure that any natural or legal person who professionally develops, manufacturers, processes, treats, sells or imports products (producer of the product)' has EPR. The requirement for other measures demonstrates that EPR is not introduced as a regulatory instrument in itself and should instead applied through, for example, economic, legal, and voluntary instruments.[81] Instead, Kroepelien argues that it 'seems to establish itself between an instrument and a goal as some kind of principle or concept',[82] while Forslind refers to it as an environmental strategy.[83] Article 8(1) continues to provide some examples of what such measures may include:

> an acceptance of returned products and of the waste that remains after those products have been used, as well as the subsequent management of the waste and financial responsibility for such activities. These measures may include the obligation to provide publicly available information as to the extent to which the product is re-usable and recyclable.

These examples focus specifically on physical, economic and informative responsibilities in contrast to Recital 27, but as these are non-exhaustive the other EPR types are not excluded.

EPR has therefore been left open to interpretation. Such openness can offer flexibility, which in turn can lead to innovation.[84] This is one of the desired outcomes of EPR as identified in Section 2.2: for producers to innovate and design their products with a 'cradle to cradle' approach to product life cycles.[85] For this reason, EPR schemes are often implemented through dynamic laws and policies schemes to allow producers to respond to changes in market, production and processing technologies.[86] At the same time, the lack of a common approach has led to differing implementation and, more importantly, performances across the EU.[87] The current EU legal architecture can thus promote a plurality of EPR ideas. For example, one way in which the approaches differ is that prevention of waste is not necessarily and consistently prioritised by those implementing EPR schemes.[88] This is then an internal contradiction of the concept, as the preventive principle arguably provides a legal basis for the concept of EPR (see Section 2.2). Article 8(2) of the 2008 WFD does state that EPR measures may be taken 'in order to ensure that the recovery and disposal of products that have become waste take place in accordance with Articles 4 and 13',[89] where Article 4 sets out the waste hierarchy which prioritises prevention as the preferred option for waste management. Article 4(2) of the 2008 WFD permits deviation from the hierarchy where this is justified, thereby altogether allowing different approaches, but overall prevention should still be encouraged.

3.2 Who is Responsible for What Under EPR?

Under WFD EPR schemes, responsibility is assigned to product producers. Product producers are defined widely as 'any natural or legal person who professionally develops, manufactures, processes,

81 Eg Knut F Kroepelien, 'Extended Producer Responsibility – New Legal Structures for Improved Ecological Self-organization in Europe?' (2000) 9(2) RECIEL165, 166; Lee (n 60) 116; Chris van Rossem, Naoko Tojo and Thomas Lindhqvist, *Extended Producer Responsibility: An Examination of its Impact on Innovation and Greening Products* (Greenpeace International 2006).

82 Kroepelien (n 81) 166.

83 Forslind (n 51) 620.

84 Jacques Pelkmans and Andrea Renda, 'Does EU Regulation Hinder or Stimulate Innovation' (2014) CEPS Special Report No. 96/November 2014, 8 <www.ceps.eu/system/files/No%2096%20EU%20Legislation%20and%20Innovation.pdf>.

85 Kunz and others (n 26) 46.

86 Roland Clift, 'The ECTEL Trials' (1997) 1(2) Journal of Industrial Ecology 3, 4; Reid Lifset and Thomas Lindhqvist, 'Trust, but Verify' (2002) 5(2) Journal of Industrial Ecology 9, 9; Reid Lifset and Thomas Lindhqvist, 'Producer Responsibility at a Turning Point?' (2008) 12(3) Journal of Industrial Ecology 144, 144..

87 Watkins and others (n 71) 2.

88 Mark Dempsey and others, *Individual Producer Responsibility: A Review of Practical Approaches to Implementing Individual Producer Responsibility for the WEEE Directive* (Working Paper, INSEAD Collection 2010/71/TOM/ISC, INSEAD 2010) 11; Lifset and others, (n 56) 162 and 165.

89 2008 WFD, art 8(2).

treats, sells or imports products'.[90] Regardless of the relevant form of EPR as set out in Section 2.1, this definition and the literature raises three critical questions in identifying product producers: (1) how is EPR distributed when a number of different actors are involved in the production of a product (as often there will not be just one legal entity that develops, manufacturers, processes, treats, sells or imports products, but instead this will often be different actors across a supply chain, in part as a result of a product being the result of different constituent components); (2) what happens to the EPR of products of which the producers have gone out of business;[91] and (3) who will pay for historical waste, that is those items that are already in use and were not designed for EPR?[92]

In relation to the first question, the Commission requires there to be a clear allocation of responsibilities between the different actors covered by the definition at national level.[93] In addition, some of these actor types may comprise several stakeholders. For example, many products are the result of a product-chain involving a number of different actors (which is also a key feature of the circular economy). A very simplified example is a product containing microbeads, which are manufactured solid plastic particles of less than one millimetre, in a plastic container. Is the producer of the container or the microbeads or the product containing the microbeads responsible? Again, there would need to be a clear agreement defining the responsibility of each producer, or at least clearly stating which producer has subsumed all the responsibility for the final product.

The second and third questions can be addressed together through similar mechanisms; in essence, the waste of out-of-business producers could be treated as historical waste. One of the main approaches proposed to overcome the problem of historical waste in relation to the Waste Electrical and Electronic Equipment Directive is a 'visible fee', which is an additional and identified cost charged to the customer. It would be a defined standard fee that is applied across a product category.[94] But a number of shortcomings of these approaches have been identified in practice, including that visible fees do not provide an incentive for improvement in manufacturing products, and in France where visible fees are mandatory it is uncertain whether it has had any actual effect on the purchasing patterns of consumers.[95] Within the context of the WEEE Directive, it is also arguable whether it clearly aligns, as the WEEE Directive states that the financing in respect of WEEE from private households and other users for the collection, treatment, recovery, and environmentally sound disposal of WEE should be provided by producers.[96] Visible fees could therefore potentially apply to the concept of EPR more generally within the WFD, but still requires further investigation and clarification.

3.3 When is a Producer No Longer Responsible Under EPR?

Following on from the previous question regarding to whom EPR is assigned, the next question is: when does it end? This is a particularly poignant question in the case of littering, which is one of the key issues in relation to plastic waste as highlighted in the introductory section to this article. If a person has littered plastic waste, then they are the 'true' polluters and have committed an unlawful act, as abandonment of waste is not permitted under Article 36 of the 2008 WFD, but this would not necessarily preclude EPR from applying. If an exception is made in the case of littering, how can it be ensured that such a provision is not abused? Similar to the previous questions explored in the preceding sub-sections, clarification is required to mitigate these issues.

90 2008 WFD, art 8(1).

91 Lifset and Lindhqvist, 'Producer Responsibility at a Turning Point? (n 86) 144.

92 Roland Clift and Chris France, 'Extended Producer Responsibility in the EU: A Visible March of Folly' (2006) 10(4) Journal of Industrial Ecology 5, 5.

93 European Commission, *Development of Guidance on Extended Producer Responsibility (EPR)* (European Commission 2014) 122.

94 Eg NIRAS, 'The Danish Voluntary Agreement on WEEE' (February 2015) 10 and 12 <http://di.dk/SiteCollectionDocuments/Miljø/Nyheder/Sarahs%20mappe%20-%20nyheder/WEEE/Differentiated%20Payment%20EN%20report.%20docx.pdf>.

95 Clift and France (n 92) 5; NIRAS (n 94) 9.

96 WEEE Directive, arts 12 and 13. A full analysis of this potential contradiction is beyond the scope of this paper as the focus is on EPR within the WFD.

4 MOVING FORWARD

The previous sections have discussed the potential benefits of EPR as well as the issues with its current implementation at the EU level. This section now sets out whether and to what extent amendments by Directive 2018/851 to the 2008 WFD have addressed the identified issues in Section 3: (1) is there a more narrow understanding implemented of EPR to ensure more consistent performance of EPR schemes (see Section 3.1); (2) who is responsible for what under EPR measures when multiple stakeholders are involved and in relation to historical waste (see Section 3.2); and (2) are there instances where the actions of a user of a product 'invalidate' a producer's EPR (Section 3.3). The amendments have only recently come into force, so this section is limited to hypothesising about the anticipated impacts. This section concludes by looking at a proposed directive that will have an impact on EPR schemes specially in relation to plastic waste.

4.1 2018 Amendments to EPR in the WFD

When considering amendments to EPR within the context of the WFD as amended by Directive 2018/851, the most notable changes are the inclusion of a definition of EPR and the introduction of general minimum requirements for EPR schemes, which are discussed in the following sections, as well as other changes.[97]

4.1.1 Definition of EPR

A definition of EPR has been included as Article 3(21) of the WFD in order to clarify the scopes of the concept:[98]

> 'extended producer responsibility scheme' means a set of measures taken by Member States to ensure that producers of products bear financial responsibility or financial and organisational responsibility for the management of the waste stage of a product's life cycle.

The interpretation of 'producers of products' remains unchanged.[99] This amendment limits EPR to the economic responsibility type in addition to organisational responsibility, which is additional to the four types introduced by Lindhqvist (see Section 2.1). There is however no further description or explanation of EPR, and therefore the measure remains somewhat less open than was the case previously, but nonetheless is still highly flexible and vulnerable to inconsistent performances of EPR schemes across the EU (see Section 3.1).

4.1.2 Introduction of General Minimum Requirements

Minimum requirements for EPR schemes were introduced in acknowledgement that EPR schemes 'form an essential part of efficient waste management. However, their effectiveness and performance differ significantly between Member States'.[100] The minimum requirements can be summarised as:[101]

- Clearly define roles and responsibilities of all relevant stakeholders (including producers of products, organisations implementing EPR obligations on behalf of other stakeholders);
- Set waste management targets in line with waste hierarchy;
- Establish a reporting system in order to gather data on products placed on markets by producers subject to EPR, and their collection and treatment; and
- Ensure equal treatment of producers of products regardless of origin and size.

97 WEEE and other Directives in which EPR schemes are included have also affected EU conceptions and implementations of EPR schemes. These are beyond the scope of this paper in which the focus is only on the EPR scheme generally under the WFD and Directive 2018/851. This is an area recommended for further research.

98 Directive 2018/851, recital 9.

99 2008 WFD, art 8(1).

100 Directive 2018/851, recital 21.

101 2008 WFD, art 8 a(1).

Only the first minimum requirement directly links to the one identified in Section 3: the first requirement addresses the key issue covered in Section 3.2 by requiring the identification of which stakeholder bears what responsibility under an EPR scheme, but does not provide guidelines or suggestions as to what is expected, reasonable, or fair in the allocation of responsibilities.

The other requirements may address and underpin some of the advantages and disadvantages of the concept of EPR described in Section 2. The second listed requirement of setting waste management targets provides an additional instrument, which may support EPR as part of an integrated regulatory approach, as discussed in Section 2.2.

Similarly, the third requirement of reporting was not explicitly identified, but again can contribute to a mix of policy instruments and thus support an integrated regulatory approach. Furthermore, this requirement may also provide key data that can support reviews of EPR schemes to increase their effectiveness.[102] A previous review of EPR for the purpose of managing plastic waste found that EPR schemes are currently not adequately controlled or monitored to ensure effective and efficient functioning and producer compliance.[103] Reporting can ensure that schemes are monitored, though systems will need to be put in place to ensure that reports are then reviewed for monitoring purposes. There are also challenges that need to be overcome, as '[o]btaining accurate and useful data for measuring and comparing collection rates remains a significant challenge' in many regions.[104] This is potentially where technology and innovations have a role – for example, blockchains has been touted as a technology that can support general environmental governance in relation to data collection and monitoring.[105]

The last requirement of equal treatment will ensure compliance with the general requirements of the free movement of goods (which, very briefly, requires there to be no fiscal or non-fiscal barriers on goods within the EU).[106] This helps address concerns about antitrust (anti-competitive behaviour), which was identified as an issue by Clift, Lindhqvist and Lifset[107] (but have not been considered in this paper).

The minimal requirements therefore provide a good platform for improving the effectiveness of EPR schemes, as they at least recognise some of the key issues and challenges that need to be overcome for implementing EPR schemes successfully, though they do not provide detail or guidance on the details required to overcome the challenges. As a result of this openness and flexibility, it remains to see whether the minimum requirements have the anticipated effects in practice and results in increased clarity.

4.1.3 Other Amendments

Other amendments to the 2008 WFD incorporated by Directive 2018/851 include changes to include references to the general minimum requirements provision. Additionally, the 2008 WFD now also explicitly permits collective fulfilment of EPR obligations.[108] Some scholars state that collective EPR undermines the environmental benefits from EPR as it can dilute responsibility.[109] Atasu states that

> collective EPR need not be as bad as it is assumed to be. The challenges regarding the trade-offs between collective and individual EPR implementations … with respect to their cost efficiency and design implications can be overcome by smarter-cost allocations, and more research needs to be done to specifically uncover how collective EPR affects processing technology choices.[110]

102 Kaffine and O'Reilly (n 27) 4; Watkins and others (n 71) 2.

103 Watkins and others (n 71) 2.

104 Jessika Luth Richter and Rob Koppejan, 'Extended Producer Responsibility for Lamps in Nordic Countries: Best Practices and Challenges in Closing Material Loops' (2016) 123 Journal of Cleaner Production 167, 174.

105 Katrien Steenmans, Ine Steenmans and Phillip Taylor, 'Governing the Waste-Water-Energy-Food Nexus: Law and the Role of Blockchain Technology' (under review).

106 Treaty on the Functioning of the European Union [2012] OJ C326/49, arts 30, 34-37 and 110.

107 Clift (n 86) 4; Lifset and Lindhqvist, 'Trust, but Verify' (n 86) 9; Lifset and Lindhqvist, 'Producer Responsibility at a Turning Point? (n 86) 144.

108 2008 WFD, art 8 a(4)(b).

109 Watkins and others (n 71) 2.

110 Atasu (n 65) 4. See also Fleckiner and Glachant (n 78).

The advantages and shortcomings of individual and collective approaches to EPR have not been considered in this paper, but may be a relevant factor when the effectiveness of amendments are assessed in potential future research.

4.2 Developments on the Horizon

The importance of EPR for plastic waste has been highlighted by the EU Strategy for Plastics in the Circular Economy identifying it as a key tool for providing economic incentives to increase recycling and develop more sustainable plastic products.[111] This is further evidenced by its inclusion as one of the key mechanisms in the proposal for a directive on the reduction of the impact of certain plastic products on the environment.[112] This proposal has been provisionally politically agreed by the European Parliament and the Council of the European Union, and is now awaiting formal approval.[113] The proposal requires EPR schemes, as defined in Article 3(21) of the 2008 WFD, to be established for all single-use plastic products listed in Part E of the Annex (ie food containers, packets and wrappers, beverage containers, cups for beverages, tobacco products with filters and filters for use with tobacco products, wet wipes, balloons, and lightweight plastic carriers bags)[114] and fishing gear containing plastic.[115] A single-use plastic product is defined as

> a product that is made wholly or partly from plastic and that is not conceived, designed or placed on the market to accomplish within its life span, multiple trips or rotations by being returned to the producer for refill or re-used for the same purpose for which it was conceived.[116]

Definitions for plastic and fishing gear are also provided in the proposed directive by Articles 3(1) and 3(3) respectively. Extending the scope of EPR schemes is a positive and progressive step as many products are still not covered by EPR schemes – for example, only 45 per cent of product and packaging waste within the EU is covered by an EPR scheme currently.[117]

The EPR schemes in the proposed directive differ from the 2008 WFD as it explicitly requires EPR schemes to cover 'the costs to clean up litter and the costs of the awareness raising measures'.[118] This provision makes two critical contributions. First, it addresses the issue of responsibility for littering discussed in Section 3.3. Second, it highlights the key role of informative responsibility. In particular, the raising awareness measures need to inform consumers of the single-use plastic products listed in Part G of the Annex [ie the same products as those listed in Part E[119] as well as sanitary towels] and fishing gear containing plastic about the following:

> (a) the available re-use systems and waste management options for those products and fishing gear containing plastic as well as best practices in sound waste management …
>
> (b) the impact of littering and other inappropriate waste disposal of those products and fishing gear containing plastic on the environment, and in particular on the marine environment.

This is an important addition to EPR schemes, particularly as recent increased societal awareness of plastic waste problems[120] has resulted in 62 per cent of surveyed UK audiences to make lifestyle changes to reduce plastic pollution,[121] and actions such as the

111 Commission (n 14) 7, 10-13 and 15.
112 Commission (n 15) art 8.
113 European Commission, 'Single-use Plastics: Commission Welcomes Ambitious Agreement on New Rules to Reduce Marine Litter' (*European Commission – Press Release*, 19 December 2018) <http://europa.eu/rapid/press-release_IP-18-6867_en.htm>.
114 Commission (n 15) art 8(1),
115 ibid art 8(3).
116 ibid art 1(2).
117 Zero Waste Europe, 'Extended Producer Responsibility: Creating the Frame for Circular Products' (2017) <www.zerowasteeurope.eu/wp-content/uploads/2017/01/EPRpolicypaper.pdf>.
118 Commission (n 15) art (2).
119 See text to n 114.
120 See text to n 1–3.
121 BBC, 'BBC Announces Major Initiative "Plastics Watch" Following the Global Impact of Blue Planet II' (*BBC,* 23 June 2018) <www.bbc.co.uk/mediacentre/latestnews/2018/plastics-watch?lang=gd>.

proposal of the strongest ban on microbeads in the world to date in the UK.[122] As the traditional emphasis on economic responsibility has so far failed to result in widespread effective EPR schemes, the increased informative responsibility could perhaps result in bigger changes if adopted.

5 CONCLUDING REMARKS

The main contribution of this article has been as a first doctrinal exploration of the anticipated effects of amendments to the 2008 WFD as a result of Directive 2018/851. In particular, this article has focused on the new provisions affecting EPR schemes. Under the original 2008 WFD, EPR could be interpreted very widely and resulted in many different (and ineffective) approaches, and there was uncertainty regarding who was responsible for what in product-chains and how long a producer remained responsible. The amendments have addressed some of these issues. EPR is now defined, albeit still broadly – it has been narrowed to economic, and organisational responsibility, but for the rest remains a very flexible mechanism. It is expected that this will have a negligible effect on current operations of EPR schemes, as economic responsibility is already the dominant type in action. Another key amendment has been the introduction of the minimum requirements for EPR schemes, which does not resolve the issues surrounding allocation of EPR, but at least state that this must be provided when implementing such schemes. Overall, the amendments have addressed some of the issues of EPR schemes, but they have largely been limited to skimming the surface of the problems rather than addressing their crux (such as in the case of introducing a definition without addressing some of the issues of the different content and broad nature of EPR schemes). Further research is therefore needed to explore what would provide an effective solution to reap the intended benefits of EPR schemes.

Currently the impact of EPR schemes is also limited as a result of only being required at EU level for packaging waste and end of life vehicles. There is a proposal to require EPR schemes for single-use plastics, which would be an important step in expanding its scope. It must, however, be remembered that EPR cannot address the problem of plastic (or any other) waste on its own. EPR should be part of an integrated regulatory approach in which it is complemented by other mutually supportive laws and policies, such as targets and eco-design.

122 Louisa Casson, 'Microbeads – We Won' (*Greenpeace*, 21 July 2017) <www.greenpeace.org.uk/microbeads-we-won>.

Article - Special issue on Designing Law and Policy Towards Managing Plastics in a Circular Economy

CIRCULAR ECONOMY MEASURES: AN OPPORTUNITY FOR RETHINKING PLASTICS WASTE GOVERNANCE IN KENYA

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TABLE OF CONTENTS

1 INTRODUCTION

In recent centuries, the earth has experienced major changes due to human-biosphere interactions leading to alterations in ecosystem dynamics with a number of local and regional tipping points.[1] Indicators of global environmental degradation include climate change, habitat loss, and plastics pollution, which singly or collectively lead to loss of biodiversity and nature's contributions to humankind.[2] Discussing regime shifts at local and regional scales due to human drivers is a big task. This article therefore focuses on plastics waste and specifically on the challenges and opportunities through its governance in the Kenyan context.

Plastic, a general term for a wide range of synthetic or semi synthetic organic solid materials,[3] provides functions that are important for many economies, and the durable ones have delivered many benefits, such as water pipes, medical devices and food packaging. There are environmental and social costs to its production, use and disposal. Single use types and packaging contribute substantial amounts of waste, which are objects with no value or liable owner. However, plastics waste is not only a social, economic and environmental problem, but also of public health concern. Inhaled fibrous microplastic can cause inflammation of the lungs and can desorb, leading to reproductive toxicity, carcinogenicity and mutagenicity; while its associated contaminants such as Polycyclic Aromatic Hydrocarbons (PAHs) lead to genotoxicity.[4]

The problem of waste typifies many of the development problems of most sub-Saharan African countries, namely poverty, poor working conditions and environmental degradation. Plastics waste is forecasted to constitute around 13 per cent of municipal waste in sub-Saharan Africa by 2025,[5] while constituting 9-13 per cent of solid waste in major cities of East Africa.[6] The annual national solid waste generation in Kenya for 2017 was estimated at 9.7 million tonnes and growing at 3 percent.[7] Due to inadequate refuse collection and disposal systems in the country, plastics waste, constituting at least 10 per cent (i.e. 970,000 tonnes for 2017) of the solid waste stream,[8] are commonly found to litter the environment causing severe pollution.[9] Its regulatory reform would need to focus on transformation of the design, production, use and recycling of plastic products hence the importance of the application of circular economy measures.

2 PLASTICS WASTE AND ITS GOVERNANCE IN KENYA

In Kenya, plastic is ubiquitous across most facets of the economy delivering many benefits. However,

1 J Rockström and others, 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity' (2009) 14(2) Ecology and Society 32 <http://www.ecologyandsociety.org/vol14/iss2/art32/>.

2 E Archer and others, Summary for Policymakers of the Regional Assessment Report on Biodiversity and Ecosystem Services for Africa of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services 2018).

3 V Singh and VP Sharma, 'Integrated Plastic Waste Management: Environmental and Improved Health Approaches' (2016) 35 Procedia Environmental Sciences 692.

4 J Gasperi and others, 'Microplastics in Air: Are We Breathing It In?' (2018) 1 Current Opinion in Environmental Science & Health 1.

5 Statistica Research Department, 'Forecast of the Composition of Municipal Waste in Sub-Saharan Africa by 2025' (Statistica, 22 March 2012) <https://www.statista.com/statistics/233483/composition-of-municipal-waste-in-sub-saharan-Africa)>.

6 J Okot-Okumu, 'Solid Waste Management in African Cities—East Africa, Waste Management—An Integrated Vision' (2012) InTech Open <https://www.intechopen.com/books/waste-management-an-integrated-vision/solid-waste-management-in-african-cities-east-africa>; L Oyake-Ombis, BJM van Vliet and APJ Mol, 'Managing Plastic Waste in East Africa: Niche Innovations in Plastic Production and Solid Waste' (2015) 48 Habitat International 188.

7 T Elliott and others, 'Plastic Packaging Waste Flows in Kenya' (Report, Danish Environmental Protection Agency, 2018).

8 ibid.

9 NW Mukui, 'Mass Balance of Plastics: Case Study for Nairobi City' (Doctoral Thesis submitted to University of Nairobi, 2015).

environmental and social costs to its production, use and disposal are yet to be determined. Plastics packaging is widespread in the consumer sector in Kenya and include any material 'made of any plastic type or a combination of plastics, which is used to contain, protect, handle, deliver or present items'.[10] The range of plastics products covered in this description would include 'plastic shopping bags, drinks bottles, disposable cups and plastic bags or boxes sold with food, consumer products, or other goods, whether they can be reused or not'.[11] Notably, plastic packaging is manufactured from a wide variety of different types of polymers that can either be post-industrial (PI) or postconsumer (PC). Whilst post-industrial (PI) wastes are usually clean, as they have no organic residues and are of known composition, postconsumer wastes (PC) are often mixed polymer wastes with many organic and inorganic impurities.[12] Plastics waste typically are derived from four polymer types – high density polyethylene (HDPE), low density polyethylene (LDPE), polypropylene (PP) and polyethylene terephthalate (PET) – that dominate the plastic waste derived from PC packaging.[13]

Disposal of plastic packaging is an obvious environmental, health and social concern,[14] contributing to substantial amount of municipal solid waste and clogging drainage systems among other problems.[15] Single use dissipative plastics (packages, straws, etc.) litter are the foremost menace due to deliberate or inadvertent disposals and 'fugitive' losses into the environment leading to pollution. In rural Kenya, they are strewn on trees, hedges and on the ground. Livestock death and quality of livestock products is affected and ultimately results in marine pollution.

Kenya has a plastic packaging consumption of 259,252 tonnes/year characterized by importation of raw plastics (184,708 tonnes/year), plastics packaging importation (44,086 tonnes/year) and recycled secondary plastics (30,475 tonnes/year) of which only 18 per cent (46,988 tonnes/year) are recycled.[16] Approximately 38,565 tonnes/year are managed in landfills or through incineration and 173,698 tonnes/year find their way into the environment or illegal dump sites.[17] Recognition of this problem and the need for a governance structure was discussed in a paper analyzing the political–economic roots of plastic bags waste and implications for environmental justice.[18]

Despite above challenges, there are no national or county policy frameworks specific to the plastics problem in the country. In Kenya, policies are documents of national or county commitments to address an issue of public concern clearly articulating its goals, objectives, values, issues, statements addressing the issues, implementation mechanisms, and a monitoring and evaluation plan. Such documents originate in the Government and are subjected to stakeholder consultations before presentation to National or County Assembly for debate and adoption as sessional papers. Therefore, policy documents are different from laws and regulations as they address only the intent. Sessional papers then require legislations and institutions to be operational. Management of plastics in the country is therefore based on the Kenya Gazette Notice No 2356 of 14 March 2017 and broadly on a number of legislations addressing solid waste management (SWM). The Gazette notice was a ban specific to plastic carrier bags and flat bags, hence other plastics waste is therefore generally managed as other solid wastes. This necessitates discussions on plastics waste as a nested issue within issues surrounding SWM in Kenya.

A systematic analysis of the evolution of solid waste management (SWM) in Kenya,[19] shows that from 77

10 Elliott and others (n 7).

11 ibid.

12 O Drzyzga and A Prieto, 'Plastic Waste Management, A Matter for the 'Community'' (2019) 12(1) Microb Biotechnol 66 <https://onlinelibrary.wiley.com/doi/full/10.1111/1751-7915.13328?af=R>.

13 ibid; Elliott and others (n 7).

14 B Horvath, E Mallinguh and C Fogarassy, 'Designing Business Solutions for Plastic Waste Management to Enhance Circular Transitions in Kenya' (2018) 10 Sustainability 1664.

15 CM Aurah, 'Assessment of Extent to Which Plastic Bag Waste Management Methods Used in Nairobi City Promote Sustainability' (2013) 1(4) American Journal of Environmental Protection 96. 1

16 Elliott and others (n 7).

17 ibid.

18 J Njeru, 'The Urban Political Ecology of Plastic Bag Waste Problem in Nairobi' (2006) 37 Geoforum 1046.

19 Tilahun Nigatu Haregu, Blessing Mberu & Abdhalah K Ziraba, Evolution of Solid Waste Management Policy Landscape in Kenya: Analysis of Evolvement of Policy Priorities and Strategies (Urban Africa Risk Knowledge, Working Paper No. 47, 2016) 21.

statutes of environmental concern between 1948 and 2015, policies have shifted chronologically in focus. The primordial focus was on 'what not to do' by making it illegal to vitiate the environment. The focus shifted to vesting powers to responsible bodies, that is 'who will control'; then to 'what needs to be done' in the enactment of the framework law on environment.[20] The proximate policy approach emphasizes on 'how to manage or address' the challenges. The paper brings to fore that '… only little indication is given about the ultimate focus – 'how can solid wastes be maximally used as resources' to drive economic development that is compatible with the environment'.[21]

One might argue that there is adequate regulatory mechanism to deal with plastic waste under the general SWM policies and legislations. This article, however, stems from the critical conclusion from analytical studies on the lack of focus on use of wastes as a resource.[22] I hereby suggest a governance approach that will maximally use waste as a resource with a focus on plastics. I build my arguments from the constitutional provisions, through development blueprints, national policies and strategies, legislations and regulations. This is in conformity with the governance structure in Kenya that is cascaded from the Constitution, policies, legislations, governmental institutions (national & sub-national (counties)), the civil society and the public. It is important to recognize that national policies and legislations are directly or indirectly influenced by global, continental and regional frameworks.

Plastic governance can therefore be traced to the Constitution, particularly through Articles 42, 43, 69 and 70, with Article 72 addressing legislation relating to environmental protection. Article 42 of the Constitution of Kenya focuses on environmental rights and states that:

> Every person has the right to a clean and healthy environment, which includes the right (a) to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and (b) to have obligations relating to the environment fulfilled under Article 70.[23]

This constitutional provision was influenced by the Stockholm Declaration that was the first formal recognition of the right to a healthy environment emerging from the pioneering global eco-summit in 1972:

> Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations.[24]

In Kenya, all laws, regulations, and policies must be consistent with the Constitution. Hence the inclusion of environmental rights (Article 42) to the country's constitution provides an opportunity for remarkable impact on plastics waste governance, ranging from stronger laws and capacity for landmark court decisions (Article 72) to building interventions that addresses economic and social rights (Article 43).

Article 69 of the Constitution addresses obligations in respect of the environment. Of interest here are the provisions that encourage public participation in the management, protection and conservation of the environment; espouse the elimination of processes and activities that are likely to endanger the environment; and obligate all to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.[25] The above constitutional provisions are enforceable through Article 70 on enforcement of environmental rights.

The country's long-term development strategy, Kenya Vision 2030, sets out a development path aimed at creating a prosperous country with a high quality of

20 Environmental Management and Co-Ordination Act, 1999.
21 ibid.
22 Haregu and others (n 19).
23 Constitution of Kenya 2010.
24 Declaration of the United Nations Conference on the Human Environment, Stockholm, 16 June 1972, UN Doc A/CONF.48/14/Rev.1.
25 Constitution of Kenya 2010, ss 1(d), 1(g) and 2.

life. Actions required to achieve stated development ambitions in this Vision would require a low-carbon pathway, purposing lower GHG emissions than are at business as usual (BAU) practices, but without compromising sustainable development goals.[26] This strategy, however, lacks a mention of plastics as resources or challenges posed by their wastes. Several other national strategies were subsequently developed towards achieving the Vision 2030 goals. Key relevant ones include the Kenya's Climate Change Action Plan,[27] the Kenya Green Economy Strategy and Implementation Plan (GESIP),[28] and the Medium-Term Plan III (2018-2022) – 'Big Four' Plan.[29]

The Kenya's Climate Change Action Plan was developed in 2012 with adaptation and mitigation strategies. While the mitigation strategies analyze the low-carbon options in six mitigation sectors set out in the United Nations Framework Convention on Climate Change,[30] namely energy, transport, industry, agriculture, forestry and waste management; it fails to bring in the component of plastics in the industry or waste management. Industrial processes mitigation strategies focus on charcoal production, while waste management is on methane capture from landfills.

The Kenya Green Economy Strategy and Implementation Plan (GESIP), developed through a participatory and consultative process, recommended five building blocks, namely promoting sustainable infrastructure development, building resilience, sustainable natural resource management, promoting resource efficiency, and social inclusion and sustainable livelihood. Key sectors identified included waste management with a strategic objective of promoting integrated waste management in all the counties by 2020. The strategic actions include the:

1. Roll out pollution prevention programs across manufacturing and service industries
2. Roll out recycling and industrial symbiosis projects through private public partnerships.[31]

The Kenya GESIP does not address plastics as a resource or plastic waste as a challenge but its strategic actions on integrated waste management offers opportunities through circular economy measures.

The third phase of implementing Vision 2030, Medium-Term Plan III, is the government's strategic agenda over a five-year period (2018-2022) and marketed as the 'Big Four' plan. Focusing on four sectors, the idea is to implement projects and policies that will accelerate economic growth and transform lives by creating jobs, enabling Kenyans to meet their basic needs, improve health standards, improve living conditions, lower the cost of living and reduce poverty and inequality.[32] The Big Four revolve around enhancing manufacturing, food security and nutrition, universal health coverage, and affordable housing. Focusing on manufacturing, the Government's objective is to enhance the sector from its current contribution of 9.2 per cent of the Gross Domestic Product (GDP) to 20 per cent by 2022. This is to be realized through 8 sub-sector enablers, namely textile/apparel/cotton, leather, agro-processing, construction materials, oil, mining and gas, iron & steel, ICT, and fish processing. The country is extracting oil and given that plastics constituted 6 per cent global oil consumption in 2014 projected to rise to 20 per cent by 2050,[33] it is plausible that plastics and plastics wastes be planned for as a critical component of the manufacturing sector.

Shifting from development blueprints to policy frameworks, the National Environment Policy, 2013 contains policy statements on waste management, and calls on the government to develop an integrated national waste management strategy. This policy is, however, not explicit in addressing the plastic issue but rather views it as a consequence of poor consumption and production patterns. It thus states that:

> [t]o achieve a clean and healthy environment, unsustainable patterns of production and

26 Government of the Republic of Kenya, Kenya Vision 2030 (2007).

27 Government of the Republic of Kenya, Kenya's Climate Change Action Plan: Mitigation (2012).

28 Ministry of Environment and Mineral Resources (Kenya), Kenya Green Economy Scoping Study (2012).

29 Parliamentary Service Commission and Parliamentary Budget Office (Kenya), 'Eye on the 'Big Four'' (2018).

30 UN Framework Convention on Climate Change, New York, 9 May 1992, 1771 UNTS 107, art 4(1).

31 Government of the Republic of Kenya, Green Economy Strategy and Implementation Plan 2016-2030 – A Low Carbon, Resource Efficient, Equitable and Inclusive Socio-Economic Transformation (2016).

32 Parliamentary Service Commission (n 29).

33 World Economic Forum, 'Future Oil Demand Scenarios' (Report, April 2016) <http://www3.weforum.org/docs/Future_Oil_Demand_Scenarios.pdf>.

> consumption should be discouraged, and intensified awareness instituted.[34]

Perhaps the only aspect attributable to plastic is where the policy calls for creating awareness on environmental impact of using non-biodegradable materials, such as plastics.

It is notable that the country is currently in the process of developing a National Sustainable Waste Management Policy, the draft of which has a provision for 'generating new business and economic opportunities and providing broad environmental and social benefits to all Kenyans' and 'reducing plastic pollution in the marine environment'.[35] The lack of a clear framework for managing plastic waste in current and planned policies is a case for rethinking its governance.

A legal framework for managing plastic wastes developed by the East African Community (EAC) establishes a regional approach for the control and regulation of use, sale and manufacture and importation of polythene materials and products.[36] The ban to all plastic carrier bags and flat bags used for commercial and household packaging in Kenya was influenced by the EAC Bill. It is, however, situated in the Environmental Management and Co-ordination Act, 1999 presumably based on the precautionary principle.[37] Since there is no legislated sessional paper to back this regulation, it remains a stand-alone strategy for subsequent integration into broader national strategies.

Legal frameworks enacted to address the problem of solid waste management in Kenya (SWM) since 1948 has created institutions and systems at different levels of governance that evolved over the years.[38] The Environmental Management and Co-ordination Act, 1999 provided on enforcement an opportunity for a structured approach. Notably, it did not supersede sectoral laws regulating waste, such as the Public Health Act, 1986 which makes provision for securing and maintaining health with respect to sanitation and housing.[39] Other segmentation of legislation on SWM are summarized in Table 1 while regulations and guidelines developed through the Environmental Management and Co-Ordination Act, 1999 to address pollution issues, including SWM are summarized in Table 2.

Table 1: A list of legislations addressing solid waste management (SWM) that may have plastics components in different sectors in Kenya.[40]

Acts (year)	**What the law addresses**
The Factories Act (1987)	*Generation of waste in factories: E*very factory owner to ensure that the factory environment is kept in a clean state, and free from effluvia arising from any drain, sanitary convenience or nuisance. Subsection (a) and (b) include accumulations of dirt and refuse shall be removed daily.
Building Code (1987, 1995)	*Handling construction and demolition waste: S*tates provision on dealing with the depositing of debris on streets. Building Code 1995 serve as an enhanced framework and Revised Building Regulation.
Food, Drugs and Chemical Substances Act (1992)	*Disposal of Solid Waste:* Makes it an offence to use or dispose of any chemical substance in a manner likely to cause contamination of food or water for human consumption or in a manner liable to be injurious or dangerous to health.
Physical Planning Act (1996)	*Waste disposal sites:* Physical Planning Act makes provision for development control and as such provided for waste disposal at designated sites only.
The Occupational Safety and Health Act (2007)	*Operation of plant machinery and incinerators:* Act deals with chemical safety and the securing of dangerous parts of machinery.
The Environmental Management and Co-Ordination Act (1999) (Cap. 387). Kenya Gazette Notice No 2356 (2017)	*Ban on the use, manufacture and importation of all plastic bags used for commercial and household packaging*: (a) Carrier bag- bag constructed with handles, and with or without gussets; (b) Flat bag- bag constructed without handles, and with or without gussets.

34 National Environment Policy 2013, s 5.4.3.

35 Draft National Sustainable Waste Management Policy (September 2018) 4.

36 East African Community Polythene Materials Control Bill, 2016 <http://www.eala.org/documents/view/the-east-african-community-polythene-materials-control-bill2016>.

37 National Environment Management Authority (NEMA), 2006; Environmental Management and Co-ordination (Waste Management) Regulations, 2006 <http://www.nema.go.ke/documents/>.

38 Haregu and others (n 19).

39 ibid.

40 This table is modified from Haregu and others (n 19).

Table 2: A list of regulations under the Environmental Management and Co-Ordination Act, 1999 addressing pollution and SWM.[41]

Legal Notice Number	**Year**	**Issue addressed**	**Description**
121	2006	Waste Management	*Procedure & criteria of handling categories of waste*: Establishes a number of rules for the management of municipal waste.
73	2007	Controlled Substances	*Disposal of controlled substances*: Describes classification of controlled substances and provisions on licensing and permit provision as well as monitoring provisions for manufacture, packaging, import and export of controlled substances.
60	2007	Hazardous Substances	*Disposal of hazardous wastes*: Requires among other things that all unused, obsolete or expired chemicals must be disposed of in an environmentally sound manner.

Despite the existing regulatory framework on SWM, there is a gap as regards sustainable plastic waste management in Kenya. The existing ban has addressed the liability in production and use of limited plastic types, but not the legacy. Coupled with the lack of policy, this means that plastics already in use continue to litter the environment and hence impair quality of life, increase pollution, and potentially impact tourism. One of the problems is that no alternative to various plastics uses has been provided, for instance, for food packaging. Hence continued release of plastic wastes into the environment that may persist, unless whatever is packaged is eliminated.

Plate 1. Dumping of solid wastes, including plastics, in drains emptying into the Nairobi River

41 This table is modified from Haregu and others (n 19).

3 A CASE FOR INNOVATIVE GOVERNANCE APPROACHES TO MANAGING PLASTICS WASTE

Plastic waste mitigation strategies in Kenya, as indicated earlier, is dependent on regional and national drivers characterized by lack of adequate human, financial and technological resources, a poor organization of operational processes,[42] and tendency for political elites in national and sub-national governments to pass self-serving laws that inhibit innovative solutions. Aside the selected plastics banned under the legal notice, the rest end up with other solid wastes in the environment or landfills with a proportion on post-consumer recycling.[43]

Recycling has been practiced in Kenya by private actors since the 1980s by individual waste pickers, yard shop owners and small-scale traders.[44] Lack of policy or strategy has, however, ensured that informality is sustained bringing to fore social issues, health and safety concern, issues of livelihood resources (social capital) and strategies (recycling, reuse). Actors tend to be socially and economically marginalized groups, and depending on where and how material are recovered, may be categorized as itinerant waste buyers, street waste pickers, municipal waste collection crew, or waste pickers from dumps.[45] The social-environmental system of informal waste management depicts a hierarchical value system (Table 3).

Table 3: Hierarchy of informal sector recycling.[46]

Highest value	Manufacturing industries
	Brokers, wholesalers and other processors
	Craftsmen, middlemen
	Recycling micro and small enterprises and scavenger co-operatives
	Family type units involved in waste collection or scavenging/picking
Lowest value	Individual waste scavengers/pickers

The social environment for individuals in informal waste recycling, typically referred to as scavenger system,[47] tends to be deplorable with notable exposure to hazardous, contaminated and toxic materials. They also suffer harassment, social stigmatization, political exclusion and other injustices in the environments in which they operate.[48] This is an adaptive response to chronic poverty and often composed of rural immigrants to urban environments. While scavenging may provide economic and environmental benefits as they supply raw materials largely to either artisans or industry, they often incur social costs.[49] In Kenya, plastics waste recovery at the

42 Oyake-Ombis and others (n 6).
43 Horvath and others (n 14).
44 Oyake-Ombis and others (n 6).
45 DC Wilson, C Velis and C Cheeseman, 'Role of Informal Sector Recycling in Waste Management in Developing Countries' (2006) 30 Habitat International 797.
46 ibid.
47 This table is modified from Nas and Jaffe, 'Informal Waste Management: Shifting the Focus from Problem to Potential' (2004) 6 Environment, Development and Sustainability 337.
48 I Mumuni, 'Examining the Roles and Challenges of Informal Waste Pickers in the Solid Waste Management of the Tamale Metropolis of Northern Ghana' (Unpublished Thesis, International Institute of Social Studies, The Netherlands, 2016) 76.
49 Nas & Jaffe (n 47).

Dandora dumpsite is one of the economic activities that supports the livelihoods of informal waste recyclers.[50] Recent studies in South Africa have shown that individuals in scavenging system for livelihood are 3 per cent more likely to suffer ill-health than those who do not.[51] Hence, waste picking is a health concern requiring pragmatic actions to improve the working conditions of those involved by integrating innovative measures into the informal waste recycling system.

A sustainable solution entails integration of systems, including informal and formal, for social and economic inclusion as well as environmental justice. Socially innovative initiatives in solid waste governance in the informal waste sector has been observed in Nigeria.[52] Such a system should synchronize plastics waste management and plastics production since circularity would increase value of plastics waste, keeping it from the environment for longer while turning it into profitable raw material.[53]

The suggested innovative approach includes the application of circular economy models to inform solutions to the plastics waste challenge by creating new revenue opportunities for industries and inclusive jobs for the vulnerable members of the society, particularly the youth, women and physically challenged. The concept is viewed 'as an operationalization for businesses to implement the much-discussed concept of sustainable development'.[54] Since reducing the adverse interactions between the economy, the environment and its natural resources is key to safeguarding the well-being of future generations in a society, a possible tool for achieving this primary goal of enhancing sustainable well-being is the circular economy.[55] Since the Constitution recognizes sustainable development as a principle of governance, opportunities for applying such measures to the plastic problem abound.

The circular economy is a paradigm that suggests a redesign of the current linear economic system, largely based on linear resource flows, towards closed-loop resource flows that can preserve the embedded environmental and economic value in products over time.[56] It has the potential to lead to increased resource efficiency and generate environmental gains through reduced raw material extraction and waste generation. Its governance entails ownership, positive values and liabilities. As an upstream measure, Kenya needs to create an environment for resilient strategies that take circular economy as the foundation for action on plastics.

The concept of circular economy typically revolves around the 4R framework (reduce, reuse, recycle, recover), with literature showing that reuse, recycling and recovery entails most common applications in this respect.[57] A systematic analysis of literature on circular economy demonstrated that most authors and practitioners applied or referred to recycling (79 per cent), reuse (74 per cent–75 per cent) and reduce (54 per cent–55 per cent) most frequently.[58] The framework and associated aims of circular economy from that analysis are summarized in Table 4. Application of the concept to plastics waste management in Kenya has been attempted through a circular model for recycling plastics waste collected by both public and private solid waste handlers across towns and placed at selected locations for the next process.[59] The model envisages waste sorting into a 95 per cent or more pure and segregated plastics waste types that can be recycled physically; and a less than 95 per cent pure non-segregated plastic waste version considered to have attained end-of-life hence subjected to chemical

50 Kenya National Cleaner Production Centre (KNCPC), 'A Comprehensive Plastic Waste Management Strategy for the City of Nairobi' (2006) 38.

51 K Omotoso, 'Informal Waste Recycling Activities: Implications for Livelihood and Health' (2017) 9(6) African Journal of Science, Technology, Innovation and Development 785.

52 TC Nzeadibe and R Anyadike, 'Solid Waste Governance Innovations: An Appraisal of Recent Developments in the Informal Sector Niche in Urban Nigeria' (2010) 4(9) Geography Compass 1284.

53 Oyake-Ombis and others (n 6).

54 J Kirchherr, D Reike and M Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 Resources, Conservation & Recycling 221.

55 European Academies' Science Advisory Council (EASAC), 'Circular Economy: A Commentary from the Perspectives of the Natural and Social Sciences' (German National Academy of Sciences, 2015) 18.

56 J Nußholz, 'Circular Business Models: Defining a Concept and Framing an Emerging Research Field' (2017) 9 Sustainability 1810.

57 Kirchherr and others (n 54).

58 ibid.

59 Horvath and others (n 14).

recycling.[60] It is their conclusion that the ban of plastic bags in Kenya has led to a decrease in consumption, however, a technological gap exists to effectively recycle plastics waste.[61]

4

ANALYSIS OF KEY POLICY FRAMEWORKS ENHANCING CIRCULAR ECONOMY MEASURES IN KENYA

Since the aim of circular economy measures is sustainable development,[62] in this section I appraise policies and strategies in Kenya that addresses environmental quality, economic prosperity, social equity and temporal dimensions for posterity with relevance to plastics manufacturing and waste management. These measures are anchored in the Constitution, which states that '[t]he national values and principles of governance include sustainable development'.[63] Impetus is further provided by specific articles in the Constitution relating to people's rights to enjoy a clean and secure environment, live a good quality life and participate in governance – including the formulation of policies, laws and development programmes. The economic development blueprint for Kenya, Vision 2030, also entrenches sustainable development through a sustained economic growth of 10 per cent and creation of a just, cohesive and equitable social development in a clean and secure environment.[64] Downstream to these are four key policies and strategies critical for mainstreaming tenets of circular economy measures captured in the constitution and Vision 2030 at sector levels.

Table 4: The 4R framework in relation to sustainable development framework.[65]

Core principles	Aims	
Reduce: Includes refusing, rethinking, redesigning (including prolonging the lifespan of products), minimization, reduction, prevention of resource use and/or preserving of natural capital. **Reuse:** Includes reusing (excluding waste), closing the loop, cycling, repairing and/or refurbishing of resources. **Recycle**: Includes remanufacturing, recycling, closing the loop, cycling and/or reuse of waste. **Recover**: Includes incineration of materials with energy recovery.	Sustainable development	**Environmental quality**: Includes aims of circular economy to maintain, protect and/or restore the environment and/or resource efficiency/enable the transition towards a low carbon economy. **Economic prosperity**: Includes aims of circular economy to maintain, protect, transform and/or strengthen the economy. **Social equity**: Includes aims of circular economy to protect, transform, strengthen and/or develop the society, human well-being and/or jobs. **Future generations (time dimension)**: Future generations and/or the long- term perspective of circular economy.

60 ibid.
61 ibid.
62 Kirchherr and others (n 54).
63 Constitution of Kenya 2010, art 10(2)(d).
64 Government of the Republic of Kenya, Kenya Vision 2030 (2007).
65 This table is modified from Kirchherr and others (n 54).

The Kenya Green Economy Scoping Study indicated that contribution of the manufacturing sector to GDP had stagnated at about 10 per cent for many years, implying limited industrial transformation.[66] Trade and manufacturing generate wastes, yet there is a lack of systematic monitoring of different waste streams resulting from various industries. This would suggest that protection of the environment and resource use efficiency, necessary to enable the transition towards a low carbon economy, is challenged and hence a policy issue.

Social protection was also identified as an important means of reducing poverty and vulnerability in Kenya. It is defined as 'policies and actions, including legislative measures, which enhance the capacity and opportunities for the poor and vulnerable to improve and sustain their lives, livelihoods, and welfare; enable income-earners and their dependents to maintain a reasonable level of income through decent work; and ensure access to affordable health care, essential services, and social transfers'.[67] Upholding this value is critical to attain social justice in innovative and sustainable solutions in plastics waste management.

A number of national policies and strategies may enhance circular economy measures in solid waste management:

The National Industrialization Policy Framework for Kenya, 2012 was formulated 'to provide a stronger and more robust institutional framework within which to synchronize and coordinate the various policies, strategies and activities that underpin Kenya's continuing quest for industrialization'.[68] The policy has 11 core values, including the need to promote sustainable industrial development that upholds environmental protection, management and efficient resource utilization. The policy recognizes polymer production for plastics as key to the petrochemical industry. Although the policy recommends waste recycling as a policy intervention, there is no intervention specifically targeting waste from plastics. It espouses waste as a resource that can be tapped into in order to spur industrial growth. It identifies challenges in the management and disposal of wastes in Kenya to include prevalence of inappropriate modes of transportation, lack of disposal sites, low utilization, poor recycling and treatment technologies, and requirement of high capital outlays in the event of investment in the sector. Hence there is a need to grow the recycling materials industry. This framework has a number of strategies to embrace a 4R approach such as the promotion of the utilization of wood waste for production of chip boards, the production of paper from other raw materials such as bagasse, sisal waste, straw and waste paper, and use of solid waste arising from industrial processing and manufacturing industries, municipal, residential and service waste is a resource.[69] Here the policy advocates for the development of a waste utilization and recycling policy, and promotion of a waste minimization in industry through cleaner production technologies.

The National Environmental Management Policy, 2013 identifies unsustainable land use practices, poor soil and water management practices, deforestation, overgrazing and pollution as the main human activities contributing to environmental degradation in Kenya.[70] Having identified poor waste management as major causes of urban pollution and poor health, the policy suggests a number of strategies to address the problem none of which is specific to plastics waste. These include the high and increasing trends of waste generated despite the efforts to encourage reuse, recycling and recovery, attribution of excessive waste generation to inefficient production processes and unsustainable consumption and production patterns, and the need for enhanced environmental research, training and dissemination of environmental management tools in Kenya. The framework proposes a suite of approaches to address this gap, including the promotion of resource efficient and cleaner production technologies, such as best available techniques and applications, adaptation of the cleaner production concept in all energy production and consumption activities, provision of appropriate incentives to attract the under-represented gender and other vulnerable

66 Ministry of Environment and Mineral Resources (Kenya), Kenya Green Economy Scoping Study (2012).
67 ibid.
68 Government of the Republic of Kenya, 'Transforming Kenya into a Globally Competitive Regional Industrial Hub' (Sessional Paper No.9, National Industrialization Policy Framework for Kenya 2012-2030, 2012).
69 ibid, s 3.6.1(3), 3.7, 3.16.
70 National Environment Policy 2013.

groups into environmental management careers, occupations and programmes, mainstreaming of gender and equity in all sustainable development policies, development of an integrated national waste management strategy, the use of economic incentives to manage waste, establishment of facilities and incentives for cleaner production, waste recovery, recycling and re-use, and support research and development programmes and projects that transfer knowledge and technologies for environmental management and sustainable development.[71]

The National Solid Waste Management Strategy espouses the idea of guiding sustainable solid waste management in Kenya to ensure a healthy, safe and secure environment for all.[72] It identifies challenges with waste management in the country to problems associated with waste management systems, limited knowledge, attitude and practices, political will, technical and financial resources. Although a key policy issue identified is the need to assist the public and institutions to be a 7R oriented society (reducing, rethinking, refusing, recycling, reusing, repairing and refilling their waste), the interventions suggested remain generic with none addressing plastics waste specifically. These include guiding sustainable solid waste management in Kenya to ensure a healthy, safe and secure environment for all, and assisting the public and institutions involved to be a 7R oriented society, by reducing-rethinking-refusing-recycling-reusing-repairing-refilling their waste. To be achieved through eight strategic approaches:

- explore market opportunities for the recovered and recycling materials;
- promote the use of recycled and recovered materials;
- promote modern technologies on recovery and recycling;
- promote public private partnerships in waste management;
- introduction of incentives in the waste management cycle (generation, segregation, collection, transportation, treatment and disposal);
- introduction of extended producer responsibility and public awareness campaigns and education;
- establishment of efficiency and value addition in the waste management cycle; and
- upscaling the activities of the informal sector to link up with the existing formal recycling industries.[73]

The Green Economy Strategy and Implementation Plan (GESIP) is a framework for action towards a low carbon, resource efficient, equitable and inclusive socio-economic transformation.[74] Perhaps the two innovations in its strategies are the push for polycentric governance in transitioning to green economy; and increase in the attractiveness of green jobs by increasing access to social protection benefits and better working conditions. Broadly, it identifies a development path that promotes resource efficiency and sustainable management of natural resources, social inclusion, resilience, and sustainable infrastructure development; and a framework for action towards a low carbon, resource efficient, equitable and inclusive socio-economic transformation. The five strategies to achieve the above include minimising waste and materials, rolling out recycling and industrial symbiosis projects through private public partnerships, promoting resource efficiency at different levels of the economy including the production supply chains, developing a polycentric governance in transitioning to green economy, and increasing attractiveness of green jobs by increasing access to social protection benefits and better working conditions.[75]

The above policies and strategies do set a base from which circular economy measures may be built in addressing plastics waste. The zero-waste strategy, suggested in the National Solid Waste Management

71 ibid, s 5.5.3(5), 5.9.2(2), 5.12.1(1), 5.12.1(2), 6.3.1(1), 6.3.1(2), 6.3.1(3), 7.1.1(4).
72 National Environment Management Authority (NEMA), 2006.
73 ibid, s 4.1.
74 Green Economy Strategy (n 31).
75 ibid, s 4.1.1, 4.1.4, 5.2.

Strategy Zero prioritizes waste prevention and focuses on conserving resources and building a circular economy. This will entail keeping all plastics in the economy and out of the environment. The following section will therefore appraise the gaps needed to attain such a strategy and recommend the need to focus on the 4R framework. Of course, a wide range of enabling activities will be necessary for the strategy to be successful. These would include but not limited to consumer education, research, regulations and market-based instruments.[76]

Reduce: Factors contributing to disincentives to reduce plastics waste emanates from the challenges in taking action that would reduce the waste, particularly among businesses and institutions, whose contribution to the waste stream is significant. Innovative solutions will be required and key to this is public participation in decision making. Some critical knowledge requirement may include:

- analytical work to determine the scope of a legislative initiative on single-use plastics;
- cross-industry agreements to reduce the release of microplastics in the environment;
- adoption of cleaner production by industries as a strategy to reduce waste and emissions flows;
- the economic benefits arising from symbiotic exchanges in industrial zones to be costed and shared with industries, such as - revenues from selling by-products, reduced costs from avoided discharge fees or disposal costs, reduced costs deriving from substituting virgin energy and materials with alternative feedstock obtained at lower prices, etc.;
- framework for domestic action to reduce the leakage of plastics in the environment, prevent plastic waste and increase recycling;
- reduce the quantity of waste that need to be treated and or/disposed of, thus also decreasing the related environmental impact;
- reducing what is produced or consumed in absolute terms (eco- sufficiency strategies);
- reducing all environmental impacts in the life cycle of a product (eco-design).

Recycling: There is a clear opportunity for recycling since recyclable material forms a significant component of solid waste that end up in dump sites. However, studies in Finland show that the thinness and composition (mix of polymers) of plastic carrier bags makes them harder and more expensive to recycle and collect compared to other plastic products.[77] For this to be undertaken sustainably, there will be need for closed-loop recycling of plastic wastes requiring a separate collection system.

Such a strategy has been developed by the European Commission through the European Strategy for Plastics in a Circular Economy and provides a good reference point from which Kenya may draw its own vision for new plastic economy.[78] Key components for consideration would be in targeting manufacturing or importation of plastics designed for recyclability, boosting markets for recycled plastics, upscaling the concept of waste separation, sorting and collection, driving innovation and investment towards circular solutions, and developing a clear roadmap for addressing plastics waste in the country.

Reuse: Integrating reuse and recycling considerations into the design of plastic products is necessary to reduce the costs of bringing these materials back into the economy. It also opens the door to new and innovative products and business models that maximize the usefulness and value of durable products through reuse, repair and refurbishment.[79] The strategy should strive for design of plastics and products containing plastics that allow for greater durability and reuse. Knowledge base here would include:

76 Canadian Council of Ministers of the Environment (CCME), 'Strategy on Zero Plastic Waste' (2018).

77 BIO Intelligence Service, 'Assessment of Impacts of Options to Reduce the Use of Single-Use Plastic Carrier Bags' (Final Report prepared for the European Commission – DG Environment, 2011).

78 European Commission, 'European Strategy for Plastics in a Circular Economy' (2018) 23 <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf>.

79 CCME (n 76).

- strategy to educate and encourage reuse of plastic packaging;
- regulation on production of plastic packaging that can cost effectively be reused;
- develop public procurement that favour reuse applications of plastic products as opposed to dumping.

Recover: Recovery would include all activities at the end of life that recover value from plastics waste, rather than disposing of them in landfills or through incineration without energy recovery. Recovery activities may be prioritized from high to low value and desirability as per waste management strategy in use.[80] The Kenya's Climate Change Action Plan postulates that mitigation actions can contribute to low-carbon pathways in the six sectors set out in the UNFCCC including waste management.[81] One of the strategies in the action plan is to mainstream low-carbon development opportunities into planning processes including planning of waste landfills so that they are well managed and compatible with methane capture. Although the plan provides another enabling framework for circular economy measures, it fails to address plastics waste specifically whose durability, combined with inadequate incentives and infrastructure to recover, nonetheless present challenges as well as opportunities. The knowledge base here would include evidence base for, among others:

- developing standards and tools that inform economic operators on the presence, distribution, concentration of hazardous chemicals in products and materials recovered from waste;
- addressing a transitional period to enforce recycling;
- product life cycle necessary for design, and hence optimization of recovery;
- design of products for dismantling and end-of-life management to maximize the recovery of resources.

80 ibid.

81 Government of the Republic of Kenya, Kenya's Climate Change Action Plan: Mitigation (2012).

5 OPPORTUNITIES AND CHALLENGES IN CIRCULAR APPROACHES TO PLASTICS WASTE GOVERNANCE IN KENYA

The conceptual rationale and business model for application of circular economy measures for plastics waste in Kenya has been comprehensively discussed.[82] This article's focus has been on opportunities, barriers, and enablers for creating a circular economy governance ecosystem from a policy framework perspective. We find from discussions above that despite the lack of a single policy framework dedicated to plastics waste governance, there are several frameworks that would form a pedestal. These are, however scattered in different sectors and a nexus approach would be necessary to harmonies the fragmentation.

That opportunities exist in plastics waste for the development of a circular economy in the country is not in doubt. It is imperative that some empirical information be provided to support such evidence. it is also imperative to bring to forth challenges that will arise from the technical arena while discussing how that may provide further opportunities in the sector. Since packaging material loses their original purpose the moment the products are consumed, in Kenya most such plastics are discarded hence the waste as end-of-life option of practice. Invariably, 71 per cent of such products end up in the environment, 15 per cent in landfills or are incinerated, and only 15 per cent provide for recycling as an end-of-life option.[83] This compares poorly with Europe where up to 69 per cent is either recycled (30 per cent) or used in energy recovery (39 per cent). This suggests that a large resource base of 212,000 tonnes/year of plastics material, currently considered as waste, is potentially available as a resource base in the production system. This present an untapped opportunity for a circular system for plastics waste in collection, sorting, recycling, and energy recovery as an industry. But also, opportunity for robust deposit return system.

82 Horvath and others (n 14).

83 Elliott and others (n 7).

Agreeably, attending to recycling as an end-of-life of goods reveals networks as complex as those in primary production and constitute not only webs of governance, but also entail material flows and transformations.[84] In Kenya, this is particularly true given that the 38,000 tonnes per year of recycled plastics waste are based on un-formalized waste collection systems.[85] That there exists a dearth of technological capacity to seize the opportunities for the circular economy in plastics waste space is not in contention,[86] but in addition, an enabling environment with a clear framework and incentives is also necessary. The technological challenges particularly the complications of recycling postconsumer plastics waste due to their chemical composition is equally a barrier but would require interrogation elsewhere.[87] Available data for Kenya would suggest that recycling of plastics waste is largely or entirely mechanical with operations based on cleaning, shredding or pelletising plastic waste.[88] Mechanical recycling has further challenges of significant degradation of polymers in an uncontrolled manner under certain heat, oxidation, radiation, hydrolysis and mechanical shear conditions; in addition to differences in the melting points and processing temperatures of the different polymers involved.[89] This opens up another opportunity for innovative approaches to plastics waste recycling using chemical and biotechnological recycling technologies. Such an approach was also discussed and notably, the lack of ease in the process of acquiring the necessary technology forms another barrier.[90]

Aside from the paucity on the technological front, enabling environments challenges form a key barrier. Barriers here include but are not limited to lack of a single framework (national and county) to guide efforts purposively to promote a circular economy; overlapping, duplicated and contradicting legislations under different sectoral mandates that complicates compliance and enforcement requirements – obscuring circular economy opportunities; overall (Public & Private) inadequate or lack of awareness of the Circular Economy concept, their applications and benefits in the country; inadequate capacity implementation of Circular Economy measures; and lack of appropriate financing mechanisms.

That consumer attitude can be influenced through expansive learning would suggest that transparency and sharing lessons from users in the value chain may be beneficial towards adjusting behaviour and developing a polycentric governance ecosystem.[91] It would create conditions for new revenue opportunities for industries, and inclusive jobs for the youth and women. This would also directly address eight sustainable development goals concerning poverty, health and wellbeing, gender equality, decent work and economic growth, sustainable cities and communities, responsible consumption and production, climate action and partnerships to achieve goals.[92] The growing of a sustainable circular governance ecosystem would require development and implementation of appropriate policy frameworks with a collective purpose for long term commitments of all stakeholders, clear leadership, communication strategy, and engagements with all networks.

6 CONCLUSION

The medium-term development agenda for Kenya dubbed 'the big 4', lays out immediate priorities and actions of which manufacturing is a key component. However, of the eight manufacturing sub-sectors identified, plastics is omitted despite the potential in the growth of petrochemical sub-sector being an oil exporting country, and its proportion in the waste

84 MA Crang and others, 'Rethinking Governance and Value in Commodity Chains through Global Recycling Networks' (2013) 38(1) Transactions of the Institute of British Geographers 12.
85 Elliott and others (n 7).
86 Horvath others (n 14).
87 O Drzyzga and A Prieto, 'Plastic Waste Management, A Matter for the 'Community'' (2019) 12(1) Microb Biotechnol 66.
88 Elliott and others (n 7).
89 Drzyzga & Prieto (n 87).
90 Horvath and others (n 14).
91 ibid.
92 Sustainable Development Goals and Targets, in UN General Assembly Resolution 70/1, Transforming our World: The 2030 Agenda for Sustainable Development, UN Doc. A/RES/70/1 (2015), goals 1, 3, 5, 8, 11, 12, 13, 17.

sector. Since manufacturing is anticipated to grow from 9.2 per cent of the GDP, as recorded in 2016, to 20 per cent in 2020, and with plastics and rubber anticipated to contribute 5 per cent to the sector, the concomitant waste stream inevitably grows.[93] Hence, in order to achieve prosperity while sustaining a healthy environment, there is need for a paradigm shift towards an innovative, system that would strive for sustainability. A circular governance strategy would aim for zero waste, sustainable management of natural capital, biodiversity conservation, critical ecosystem restoration, and enhanced society resilience to climate change. A key component of such a system will be plastics waste governance based on the 4R framework analyzed above. The long-term goal being a safe and sustainable society in Kenya. This article, aside not being prescriptive, has pointed out some key elements required in a framework to grow a circular economy governance ecosystem around plastics waste in Kenya. Such a governance ecosystem would allow for improving the economics and quality of plastics recycling, design for recyclability, create demand for recycled plastics, develop a harmonized separate collection and sorting system for waste. The anticipated outcomes would include change in consumer behaviour leading to reduced plastics waste littering and waste in the environment. The opportunities will drive innovation and investment towards circular solutions, and harness citizen action towards curbing plastics waste. Ultimately, it will address the issue around how solid wastes can be maximally used as resources to drive economic development that is compatible with the environment.[94]

With the above background, it is important for Kenya to develop a policy framework that would embrace available evidence to seize social, economic and environmental opportunities linked to higher quality waste plastics processing. The framework will need to redefine value with stakeholders for the purpose of preventing plastics waste from arising. This would create a nexus bringing together a host of stakeholders including:

(i) National Government to create conditions for success and provide leadership on policies (economic instruments and incentives, green procurement), legislations, institutions, regulations, guidelines;

(ii) County governments as owners of land, to provide the necessary infrastructure in partnership with private sector developers and to enable county policies, legislations, institutions, regulations, and guidelines;

(iii) Private sector to provide the necessary investment as drivers of the economy;

(iv) System thinkers, such as academic, research institutions, entrepreneurs to trigger change by introducing new concepts and knowledge, for instance, new science, technology, innovations and business approaches; and

(v) Consumers and civil society required in active engagement for ideas, form networks, communication approaches, feedbacks and expansive learning platforms.

93 Kenya Association of Manufacturers, 'Manufacturing in Kenya Under 'the Big 4 Agenda': A Sector Deep-Dive Report' (2018).

94 Haregu and others (n 19).

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LE DROIT ET LES POLITIQUES APPLICABLES A LA GESTION DES DECHETS PLASTIQUES AU MAROC

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TABLE DES MATIÈRES

INTRODUCTION

'*La pollution par les déchets plastiques étouffe les cours d'eau, nuit aux communautés qui dépendent de la pêche et du tourisme, tue les tortues et les oiseaux, les baleines et les dauphins, et se fraye un chemin dans les régions les plus reculées de la planète. À moins de changer de cap, les déchets plastiques pourraient bientôt l'emporter sur tous les poissons des océans*', souligne M. Guterres, Secrétaire Général de l'ONU lors d'un message adressé à l'occasion de la journée mondiale des océans célébrée le 8 juin 2018[1].

Conscient de la nature difficilement biodégradable[2] et des effets néfastes des déchets[3] plastiques qui, selon le Ministère de l'environnement, représentaient en 2001 la moyenne de 6 pour cent à 8 pour cent de l'ensemble des déchets ménagers produits au Maroc[4], et dont l'impact[5] sur la dégradation de l'environnement s'estimait aussi en 2009 à 0,49 pour cent du PIB marocain de l'époque[6], le Royaume s'est engagé à lutter contre ces déchets, en adhérant aux principaux instruments internationaux qui en constituent le cadre, dont entre autres la Convention-cadre des Nations Unies sur les changements climatiques[7] en 1995, le Protocole de Kyoto[8] en 2002, la Convention de Bâle sur les mouvements transfrontaliers de déchets dangereux et de leur élimination[9] en 1995, la Convention de Stockholm sur les polluants organiques persistants (POPs)[10] en 2001, ainsi que la Déclaration d'intention de la coalition internationale pour la réduction de la pollution par les déchets plastiques[11] en 2016.

Ces engagements internationaux du Maroc se sont poursuivis par l'élaboration de nombreuses stratégies et programmes, dont le Programme des déchets ménagers (PNDM) et la stratégie nationale de développement durable (SNDD), ainsi que par l'édiction de plusieurs instruments législatifs et réglementaires visant à réduire et restreindre l'utilisation des matières plastiques et d'en gérer les déchets, tout particulièrement la loi n° 22-10 relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable, la loi n° 28-00 relative à la gestion des déchets et à leur élimination, mais aussi la Charte communale de 2002, la loi-cadre n° 99-12 portant charte nationale de l'environnement et du développement durable et la loi n°77-15 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique.

1 ONU Info, L'ONU appelle tout le monde à réduire la pollution par le plastique qui menace les océans (8 juin 2018) <https://news.un.org/fr/story/2018/06/1016191>.

2 A l'exemple des sacs en plastique dont la durée de la vie dans le sol est de 450 ans et qui perturbent là où ils s'accumulent le processus naturel de leur résorption.

3 Les déchets englobent 'tous résidus résultant d'un processus d'extraction, exploitation, transformation, production, consommation, utilisation, contrôle ou filtration, et d'une manière générale, tous objet et matière abandonnés ou que le détenteur doit éliminer pour ne pas porter atteinte à la santé, à la salubrité publique et à l'environnement' (Art. 3 de la loi marocaine n° 11-03 relative à la protection et à la mise en valeur de l'environnement).

4 Sur l'ensemble des déchets ménagers au Maroc, la moyenne des déchets plastiques est passée de 0,3 pour cent en 1960, au taux de 2 à 3 pour cent en 1990, avant d'enregistrer en 2000 le ratio de 6 à 8 pour cent. Mohamed Hafidi, *L'impact et la gestion des déchets solides (Région Marrakech-Safi),* (Konrad-Adenauer-Stiftung E.V. 2015) 34.

5 Outre les défigurations des paysages, les déchets plastiques engendrent aussi des dégradations à l'environnement, spécialement dans le milieu marin et aquatique. C'est ainsi que '80 pour cent des déchets plastiques finissent dans l'océan, charriés puis déversés par les fleuves. 20 pour cent sont rejetés à la mer par les navires. La majorité se transforme en microplastique si petit que son élimination par filtrage élimerait également la vie aquatique. Resteraient encore les morceaux de plastique de plus grande taille qui sont dangereux pour les plus gros animaux'. Heinrich-Böll-Stiftung, 'Le problème du microplastique : Un horizon de plastique ?', (*Heinrich-Böll-Stiftung*, 2 Mai 2018) <https://ma.boell.org/fr/2018/05/02/le-probleme-du-microplastique-un-horizon-de-plastique>.

6 Conseil national de l'environnement, *Les instruments économiques au service de la protection de l'environnement au Maroc* (2009) 8 <http://www.onhym.com/pdf/Environnement/Instr_Eco_fr.pdf>.

7 Convention-cadre des Nations Unies sur les changements climatiques, New York, 9 mai 1992, 1771 RTNU 107.

8 Protocole de Kyoto à la Convention-cadre des Nations Unies sur les changements climatiques, Kyoto, 11 décembre 1997, 2303 RTNU 162.

9 Convention de Bâle sur les mouvements transfrontaliers de déchets dangereux et de leur élimination, Bâle, 22 mars 1989, 1673 RTNU 57.

10 Convention de Stockholm sur les polluants organiques persistants, Stockholm, 22 mai 2001, 2256 RTNU 119.

11 Déclaration d'intention de la coalition internationale pour la réduction de la pollution par les déchets plastiques, adoptée à Washington lors de la 3ème conférence des chefs d'Etats et de gouvernements sur l'océan, 15 et 16 septembre 2016.

Au Maroc, la mise en œuvre des différentes politiques publiques et dispositions juridiques portant sur la gestion des déchets plastiques incombe bien à une panoplie d'institutions publiques mais qui pêchent du manque de coordination entre elles au niveau de leurs actions territoriales. Ce dernier facteur s'ajoute au degré fortement limité dans le tri, la collecte et le recyclage de ces déchets, ainsi qu'à l'inachèvement des objectifs tracés jusqu'alors dans les stratégies publiques en la matière.

Cette contribution tentera d'analyser dans une première partie le cadre législatif, réglementaire et institutionnel de gestion des déchets plastiques au Maroc, avant d'aborder dans une seconde partie le contenu et la mise en œuvre territoriale des politiques nationales de gestion des déchets plastiques.

1 LE CADRE LÉGISLATIF, RÉGLEMENTAIRE ET INSTITUTIONNEL DE LA GESTION DES DÉCHETS PLASTIQUES AU MAROC

Partant des engagements internationaux qu'il a contractés pour la protection de l'environnement et la réalisation d'un développement durable, ainsi que de la constitution de 2011 qui garantit aux citoyens et citoyennes la jouissance du droit au développement durable, à l'eau et à un environnement sain (art. 31), le Royaume du Maroc s'est efforcé au fil des dernières années d'instaurer un cadre législatif et réglementaire capable de faire face aux nuisances engendrées à l'environnement par les déchets plastiques (section 1). Ce déploiement est corrélé à l'effort fourni par plusieurs institutions, organismes et départements publics conjuguant la plupart des temps leurs actions en matière d'élaboration des politiques et des stratégies nationales, davantage que dans la mise en œuvre de ces dernières dans le ressort territorial des provinces et des préfectures (section 2).

1.1 Cadre législatif et réglementaire

Pour parvenir à assurer une meilleure gestion des déchets plastiques, le Maroc a instauré un arsenal juridique combinant à la fois des instruments généraux en lien ou susceptibles d'être appliqués au plastique comme catégorie de déchets, et d'autres spécifiques portant foncièrement sur cette matière et ses résidus.

Au premier chef des instruments généraux, se trouve tout d'abord la loi-cadre n° 99-12 portant charte nationale de l'environnement et du développement durable[12] qui, pour prévenir et lutter contre toutes les formes de pollution et de nuisance, a insisté sur la nécessité de prendre des mesures législatives et réglementaires visant l'actualisation du cadre législatif relatif aux déchets dans le but du renforcement des aspects liés à la réduction des déchets à la source, à l'instauration d'un système de collecte sélective des déchets, à la promotion des techniques de valorisation des déchets et l'intégration du principe de responsabilité élargie et à la gestion écologique des déchets dangereux (art. 8), puis la Charte communale de 2002[13] ayant dévolu au conseil communal la compétence de décider de la création et de la gestion des services publics communaux dans de nombreux secteurs, y compris celui de la collecte, du transport, de la mise en décharge publique et du traitement des ordures ménagères et des déchets assimilés (art. 39).

A côté de ces instruments généraux, le législateur marocain a établi aussi d'autres textes plus spécifiques à la question de la gestion des déchets plastiques. Il en va ainsi de la loi n° 22-10 de 2010 relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable[14] qui prévoit l'interdiction de la fabrication pour le marché local des sacs et sachets en plastique non dégradable ou non biodégradable, ainsi que de leur importation, leur détention en vue de la vente, leur mise en vente, leur vente ou distribution à titre gratuit (article premier), tout en excluant du champ de ces interdictions les sacs et sachets à usage industriel et agricole, ceux destinés à la collecte des déchets ménagers, ainsi que des sacs et sachets fabriqués à partir

12 Loi-cadre portant Charte nationale de l'environnement et du développement durable, 6 mars 2014 <http://www.environnement.gov.ma/PDFs/loi_cadre_fr.pdf>.

13 Dahir portant Charte communale, 3 octobre 2002 <http://www.sgg.gov.ma/Portals/0/lois/chartecom_fr.pdf?ver=2012-10-16-153820-000>.

14 Loi de 2010 relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable <http://www.environnement.gov.ma/arabe/PDFs/pollution/sacenplastique.pdf>.

du film plastique servant à contenir et à transporter les déchets autres que les déchets ménagers (article 2, paragraphes 3, 4, 5 et 6). Cette loi qui a désigné les autorités compétentes pour procéder à la recherche et à la constatation des infractions enregistrées (chapitre 3, art. 7 : les officiers de police judiciaire, les agents désignés à cet effet par l'administration ou les organismes compétents[15]), a dressé un ensemble de sanctions pécuniaires s'appliquant en cas de non-conformité à la loi (chapitre 4), notamment une amende de 200,000 à 1,000,000 de dirhams pour quiconque qui fabrique pour le marché local des sacs et sachets en plastique (art. 10), une amende de 10,000 à 500,000 dirhams pour quiconque qui détient en dépôt, en vue de la vente dans le marché local ou la distribution à titre gratuit, des sacs en plastique (art. 11), une amende de 20,000 à 100,000 dirhams pour le fait de refuser de fournir à l'administration les informations nécessaires relatives aux caractéristiques des sacs et sachets en plastique fabriqués ou commercialisés ; ou de ne pas marquer ou d'imprimer individuellement les sacs et sachets en plastique conformément aux dispositions de la loi et les textes pris pour son application (art. 12).

Les dispositions de cette loi ont été clarifiées ensuite par deux textes réglementaires, à savoir les deux arrêtés conjoints du ministre de l'industrie, du commerce et des nouvelles technologies et du ministre de l'agriculture et de la pêche maritime et du secrétaire d'Etat auprès de la ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'eau et de l'environnement n°3166-11[16] et n° 3167-11[17] du 7 hija 1432 (4 novembre 2011) pris en application de l'article 2 du décret n° 2-11-98 du 14 rejeb 1432 (17 juin 2011) pris pour l'application de la loi n° 22-10 relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable,.

Par la suite, la loi 22-10 a été complétée en 2015 par la loi n°77-15 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique[18], ayant institué à compter du 1er juillet 2016 une interdiction de la fabrication des sacs en matières plastiques, ainsi que de leur importation, leur exportation, leur détention en vue de la vente, leur mise en vente, leur vente ou distribution même à titre gratuit (art. 2), tout en excluant du champ de cette interdiction les sacs en matières plastiques à usage industriel ou agricole, les sacs en matières plastiques isothermes, les sacs en matières plastiques de congélation ou surgélation et ceux utilisés pour la collecte des déchets (art. 3).

15 A côté des autorités de police judiciaire ayant un pouvoir répressif consistant à constater les infractions, rassembler les preuves et chercher les auteurs (art. 18 du Code de la procédure pénale), il existe au Maroc des autorités administratives exerçant des pouvoirs de police administrative générale à caractère préventif en matière de préservation de la sécurité, la tranquillité et la salubrité publique.
Cette police administrative dévolue au niveau local au président du Conseil communal au même titre que les représentants de l'administration territoriale, a été opérationnalisée plus concrètement par le déploiement en 2018 à Casablanca d'une brigade de police administrative communale dont les pouvoirs touchent également la lutte contre les sources des déchets plastiques et qui a pu établir jusqu'à février 2019 plus de 500 PV suite aux infractions relevées. Hicham Ait Almouh, 'La Police administrative présente dans les 16 communes de Casa' *La Vie Éco* (18 février 2019) <https://www.lavieeco.com/news/en-direct/la-police-administrative-presente-dans-les-16-communes-de-casa.html>.

16 Arrêté conjoint du ministre de l'industrie, du commerce et des nouvelles technologies et du ministre de l'agriculture et de la pêche maritime et du secrétaire d'Etat auprès de la ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'eau et de l'environnement du 4 novembre 2011, pris en application de l'article premier du décret du 17 juin 2011 pris pour l'application de la loi relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable (Arrêté précisant la composition, la couleur, l'épaisseur, les caractéristiques d'écotoxicité et la durée de vie du sac et sachet en plastique) <http://www.khidmat-almostahlik.ma/portal/sites/default/files/reglementation/Arrete%20n%203166-11.pdf>.

17 Arrêté conjoint du ministre de l'industrie, du commerce et des nouvelles technologies et du ministre de l'agriculture et de la pêche maritime et du secrétaire d'Etat auprès de la ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'eau et de l'environnement du 4 novembre 2011, pris en application de l'article 2 du décret du 17 juin 2011 pris pour l'application de la loi relative à l'utilisation des sacs et sachets en plastique dégradable ou biodégradable <http://adala.justice.gov.ma/production/html/fr/176597.htm>.

18 Loi du 7 décembre 2015 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique <http://adala.justice.gov.ma/production/legislation/fr/Nouveautes/Interdiction%20de%20la%20fabrication,%20de%20l'importation,...de%20sacs%20en%20mati%C3%A8res%20plastiques.pdf>.

En outre et compte tenu du fait que les déchets plastiques font partie intégrante des déchets en général et tout particulièrement des déchets ménagers et assimilés, et en constituent même une composante importante, le législateur marocain n'a pas manqué d'en réglementer l'usage, la gestion et la mise en décharge dans toutes les lois et textes réglementaires adoptées dans le domaine des déchets. Ainsi, le décret n° 2-07-253 du 18 juillet 2008 portant classification des déchets et fixant la liste des déchets dangereux[19], a inventorié et classé les déchets en fonction de leur nature et de leur provenance, dans un catalogue dénommé 'Catalogue Marocain des Déchets', dans lequel ont été également insérés les matières et déchets plastiques. Pour sa part, la loi n° 28-00 de 2006 relative à la gestion des déchets et à leur élimination[20], ayant admis dans la 'classe 1' le plastique dans la catégorie des déchets pouvant être reçus dans une décharge contrôlée, puisque faisant partie des déchets ménagers et assimilés (art. 48), a prévu la mise en place dans chaque préfecture ou province d'un plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés qui détermine à la fois les objectifs à atteindre en matière de taux de collecte et d'élimination des déchets ménagers et assimilés, les sites appropriés destinés à l'implantation des installations d'élimination et de stockage de ces déchets, un inventaire prévisionnel de cinq (5) ans et de dix (10) ans, des quantités de déchets à collecter et à éliminer selon leur origine, leur nature et leur type, un programme d'investissement de même durée comprenant l'évaluation des coûts de réalisation des décharges contrôlées et des installations de traitement, de valorisation, de stockage ou d'élimination de ces déchets ainsi que la réhabilitation des décharges non contrôlées, les moyens financiers et humains nécessaires, ainsi que les mesures à prendre en matière d'information, de sensibilisation et de conseil (art. 12). Cette loi a été complétée dans ses dispositions par le décret n° 2-09-285 du 23 rejeb 1431 (6 juillet 2010) fixant les modalités d'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés et la procédure d'organisation de l'enquête publique afférente à ce plan,[21] ainsi que par l'arrêté conjoint n° 2817-10 du 15 joumada I 1432 du ministre de l'intérieur et du secrétaire d'Etat auprès du ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'eau et de l'environnement relatif aux critères d'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés.[22]

A travers ces différents textes législatifs et réglementaires adoptés en matière de gestion des déchets plastiques, le Maroc a cherché à s'aligner sur les objectifs poursuivis en la matière par les principaux instruments internationaux, notamment le Protocole de Kyoto à la Convention-cadre des Nations unies sur les changements climatiques exhortant les Etats à 'élaborer, appliquer, publier et mettre régulièrement à jour des programmes nationaux (…) contenant des mesures destinées à atténuer les changements climatiques et qui devraient concerner notamment les secteurs de l'énergie, (….), et la gestion des déchets' (art. 10, Paragraphe b), la Convention de Stockholm sur les polluants organiques persistants fixant dans sa partie V des directives générales sur les meilleures techniques disponibles et les meilleures pratiques environnementales, y compris en terme de recyclage, de récupération et de gestion des déchets, et la déclaration d'intention de la coalition internationale pour la réduction de la pollution par les déchets plastiques, avec laquelle le Maroc s'est arrimé en adoptant la loi n°77-15 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique.

1.2 Cadre institutionnel

Le paysage institutionnel dans le domaine de la gestion des déchets plastiques au Maroc se distingue par la

19 Décret du 18 juillet 2008 portant classification des déchets et fixant la liste des déchets dangereux <http://www.environnement.gov.ma/PDFs/pollution/decret_207253.pdf>.

20 Loi du 22 Novembre 2006 relative à la gestion des déchets et à leur élimination <http://aut.gov.ma/pdf/Loi_n28-00_relative_a_la_gestion.pdf>.

21 Décret du 6 juillet 2010 fixant les modalités d'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés et la procédure d'organisation de l'enquête publique afférente à ce plan <http://energetique.uae.ma/textes_envir/dechets/decret_2_09_285_plan_prefectoral_provincial.pdf>.

22 Arrêté conjoint du 15 joumada I 1432 du ministre de l'intérieur et du secrétaire d'Etat auprès du ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'eau et de l'environnement relatif aux critères d'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés <http://dmp.uae.ma/textes_juridiques/dechets/arrete_2817_10_dechets.pdf>.

diversité et la pluralité de ses acteurs (divers départements ministériels, établissements publics, collectivités territoriales, organismes semi-publics….), lesquels se concertent davantage en terme d'élaboration de stratégies, réglementations et législations nationales, alors que leurs initiatives au niveau des provinces et préfectures se placent moins dans l'esprit de la coordination, puisque le Ministère de l'intérieur, par le biais du gouverneur et des entités décentralisées que sont les communes, demeure le principal pilier de la gestion territoriale des déchets plastiques.

Parmi les initiatives coordonnées au niveau national, il y a lieu de citer l'action concertée entre différents départements ministériels en matière d'édiction d'instruments réglementaires relatifs à la gestion des déchets plastiques. Tel a été le cas notamment à l'occasion de l'adoption de deux textes d'application du décret n° 2-11-98 de 2011 portant promulgation de la loi n°22-10 de 2010 relative à l'utilisation des sacs et sachets en plastique dégradables ou biodégradables, à savoir d'une part l'arrêté conjoint n°3166-11 du 4 novembre 2011 émanant du Ministère de l'industrie, du commerce et des nouvelles technologies ; du Ministère de la santé ; et du Secrétariat d'Etat chargé de l'eau et de l'environnement auprès du Ministère de l'énergie, des mines, de l'eau et de l'environnement, et d'autre part le décret conjoint n° 3167-11 de 2011 émanant du Ministère de l'industrie, du commerce et des nouvelles technologies ; du Ministère de la santé ; et du Secrétariat d'Etat chargé de l'eau et de l'environnement auprès du Ministère de l'énergie, mines, eau et environnement[23].

De même, la mise en place en 2011 du Programme national de collecte et d'élimination des sacs en plastique, dans le cadre du partenariat entre le Département de l'environnement et le Ministère de l'intérieur, constitue bien un autre exemple de synergie entre les acteurs.

Au niveau des provinces et des préfectures, le dénominateur commun en matière de gestion des déchets plastiques demeure le rôle clé des communes et du Ministère de l'intérieur en tant que ministère de tutelle. En effet, les communes ou leurs groupements qui sont par exemple les seules à décider des modes de gestion du service public des déchets ménagers et assimilés, par voie de régie directe, de régie autonome, de concession ou de toute autre forme de gestion directe ou de gestion déléguée (art. 18 de la loi n° 28-00 de 2006 relative à la gestion des déchets et à leur élimination), sont compétentes aussi pour réglementer les phases de précollecte et de collecte, en décidant à cet effet des modalités et des conditions de collecte et de remise de ces déchets en fonction de leurs caractéristiques (art. 19 de la loi précitée n° 28-00). Les communes qui sont tenues aussi d'assurer l'élimination des déchets ménagers et assimilés (art. 20 de la loi n° 28-00), peuvent également commercialiser le produit des déchets valorisés, les réutiliser à diverses fins ou les concéder à d'autres utilisateurs sous réserve que leurs caractéristiques et les modalités de leur réutilisation soient compatibles avec les exigences de préservation de la santé de l'homme et de protection de l'environnement (art. 22 de la loi n° 28-00).

Cependant, il n'en demeure pas moins qu'il existe au niveau des provinces et des préfectures une forme exceptionnelle de collaboration institutionnelle dans la gestion des déchets plastiques, qui se réalise à travers la commission consultative ayant été établie par la loi n° 28-00 de 2006 relative à la gestion des déchets et à leur élimination (art. 12) et le décret n° 2-09-285 du 23 rejeb 1431 (6 juillet 2010) fixant les modalités d'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés et la procédure d'organisation de l'enquête publique afférente à ce plan (art. 2). Cette commission qui se concerte avec le gouverneur de la préfecture ou de la province pour l'élaboration du plan directeur préfectoral ou provincial de gestion des déchets ménagers et assimilés (y compris la gestion des déchets plastiques), comprend en son sein les représentants de divers départements et organismes publics, notamment ceux des 'autorités gouvernementales chargées de l'énergie, de l'eau, de l'environnement, de la santé, de l'équipement et des transports, de l'industrie, de l'agriculture, de l'habitat et de l'urbanisme, l'administration de la défense nationale, ainsi qu'un représentant de chaque commune relevant du ressort territorial de la préfecture ou de la province concernée, désigné par le président du conseil communal concerné,

23 Commission économique des Nations-Unies pour l'Europe en coopération avec la Commission économique des Nations-Unies pour l'Afrique, *Maroc : Examen des performances environnementales* (Série des examens des performances environnementales, No. 38) 19 <https://www.unece.org/fileadmin/DAM/env/epr/epr_studies/ECE_CEP_170_FRE.pdf>.

un représentant du conseil préfectoral ou provincial, désigné par le président dudit conseil, deux représentants des organismes professionnels concernés par la production et l'élimination des déchets ménagers et assimiles, désignés par le président de la confédération générale des entreprises du Maroc' (art. 2 du décret susvisé n° 2-09-285).

2 LES POLITIQUES NATIONALES DE GESTION DES DÉCHETS PLASTIQUES AU MAROC : CONTENU ET MISE EN ŒUVRE TERRITORIALE

Pour amorcer un système de gestion efficiente des déchets plastiques et lutter contre la pollution due à ces derniers, le Maroc a élaboré différentes stratégies et politiques nationales de gestion de ces déchets (section 1), mais dont la mise en œuvre au niveau des provinces et préfectures n'a pas permis de faire disparaitre les sacs et sachets en plastique, source importante de déchets plastiques, ni d'assurer une couverture de tous les territoires en terme de collecte, de tri et de recyclage des déchets, ce qui a permis la survie, voire l'essor d'un secteur informel dont les récupérateurs informels sont les principaux acteurs (section 2).

2.1 Le contenu des politiques publiques nationales de gestion des déchets plastiques au Maroc

Parmi les programmes et politiques conçus en matière de gestion des déchets de tous genres, y compris ceux plastiques, il y a lieu de citer le programme national des déchets ménagers assimilés (PNDM) pour la période 2008-2023, élaboré en 2007 par le Secrétariat d'État chargé de l'eau et de l'environnement et le Ministère de l'intérieur avec l'appui de la Banque mondiale, et qui s'est fixé à l'horizon 2020 des objectifs ambitieux en terme de gestion des déchets ménagers assimilés, notamment ceux d' 'assurer la collecte et le nettoiement des déchets ménagers pour atteindre un taux de collecte de 90 pour cent, réaliser des centres d'enfouissement et de valorisation au profit de tous les centres urbains (100 pour cent), réhabiliter ou fermer toutes les décharges existantes (100 pour cent), moderniser le secteur des déchets par la professionnalisation du secteur, développer la filière de 'tri-recyclage-valorisation', avec des actions pilotes de tri, pour atteindre un taux de 20 pour cent du recyclage, généraliser les plans directeurs de gestion des déchets ménagers et assimilés pour toutes les préfectures et provinces du Royaume, et de former et sensibiliser tous les acteurs concernés sur la problématique des déchets'.[24] Ce programme national a été pointé pour avoir donné ' la priorité à la collecte et aux services d'élimination par les décharges contrôlées, alors que le système de 'tri-recyclage-valorisation' ne reçoit que 2 pour cent du budget total du programme.[25]

De même, un programme national de collecte et d'élimination des sacs en plastiques usées a été initié en 2011–2012, dans le cadre d'un partenariat entre le Département de l'environnement et le Ministère de l'intérieur, et avait porté sur 'la collecte et l'élimination de ces sacs, la sensibilisation des citoyens à l'utilisation d'autres produits alternatifs de substitution et la mobilisation des acteurs locaux et la société civile sur la collecte et l'élimination'.[26]

Outre ces politiques nationales et compte tenu des engagements internationaux qu'il a contractés lors du sommet de Rio en 1992, dans le cadre du programme Action 21, le Maroc a élaboré en 2017 une stratégie nationale de développement durable (SNDD)[27] à l'horizon 2030, en terme de laquelle il s'est fixé des

24 Secrétariat d'Etat chargé du développement durable et Ministère de l'intérieur, Programme national des déchets ménagers assimilés (2007) <http://www.environnement.gov.ma/fr/dechets?id=226>.

25 Commission économique des Nations-Unies pour l'Europe en coopération avec la Commission économique des Nations-Unies pour l'Afrique (n 23) 143.

26 Abdeslam Abid, Mesures et actions entreprises par le Maroc en matière des déchets marins (Second meeting Plastic Busters Project, Siène, Italie, 28-30 juin 2017) <http://plasticbusters.unisi.it/wp-content/uploads/sites/37/2017/07/Abdeslam.pdf>.

27 En 2018, soit une année après l'adoption de sa stratégie nationale de développement durable, le Maroc s'est classé premier sur le continent africain avec un score de 66.1 en terme de réalisation des objectifs de développement durable. Centre des ODD SDG pour l'Afrique et Réseau de Solutions pour le Développement Durable, *Résumé du rapport | les Indices et Tableaux de Bord des ODD en Afrique 2018* (Juin 2018) 5 <http://unsdsn.org/wp-content/uploads/2018/07/AFRICA-SDGS-2018-Summary-FR-V4-WEB-090918.pdf>.

mesures à adopter en matière de gestion des déchets plastiques, notamment celle de mettre en place un système de tri au sein des administrations publiques pour la collecte des déchets par catégorie, y compris le plastique (2.2, Objectif 2. Inscrire les établissements publics dans la logique de gestion et valorisation des déchets, de l'économie d'eau et de l'énergie), et plus principalement celle de l'élaboration d'un projet pilote sur la filière plastique par le biais de l'écotaxe (67.4, Objectif 67. Passer de l'informel à une économie sociale et solidaire)[28].

Pour la réussite de ces stratégies et politiques nationales de gestion des déchets plastiques, le Maroc s'est appuyé sur un certain nombre d'instruments de financement, dont 'le Fonds National pour l'Environnement (FNE), institué en vertu de la Loi n° 11-03 relative à la protection et à la mise en valeur de l'environnement, le Fonds Capital Carbone Maroc (FCCM), dédié à la finance carbone au Maroc et intervenant entre autres dans les projets d'élimination écologique des déchets[29]', le Fonds du mécanisme de développement propre au titre duquel plusieurs 'projets d'investissement ont été développés pour la collecte, le transport, le recyclage de tous les déchets, y compris le plastique[30]', un fonds de reconversion 'doté de 200 MDH au profit des entreprises impactées par la loi 77-15 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique[31]', et 'un fonds d'appui à la compétitivité des entreprises (Imtiaz) en faveur des projets d'investissement dans les industries alternatives'.[32]

Dans ce cadre, la campagne de sensibilisation 'zéro mika' (zéro plastique', lancée en 2016 par la Coalition marocaine pour la justice climatique peu de temps avant l'entrée en vigueur de la loi 77-15 portant interdiction de la fabrication, de l'importation, de l'exportation, de la commercialisation et de l'utilisation des sacs en plastique, avait été accompagnée d'une forte médiatisation opérée tant par les chaines de télévision nationales (MEDI 1 TV[33], 2M TV), l'Agence Marocaine de Presse (MAP)[34] que les supports de presse et les sites électroniques.

2.2 Déclinaisons territoriales et limites des politiques publiques nationales de gestion des déchets plastiques au Maroc

Les objectifs fixés dans les différents programmes, stratégies, politiques et plans nationaux se déclinent, par le biais des Partenariats Publics-Privés (PPP), au niveau de toutes les provinces et préfectures du Royaume, mais voient leur mise en œuvre effective amplement limitée.

Ainsi, le programme national de collecte et d'élimination des sacs en plastiques usées initié en 2011–2012 et qui avait permis 'la création de comités régionaux pour coordonner la collecte, le stockage, le transport et l'élimination des sacs en plastique dans les fours de ciment à travers 83 provinces et préfectures ; et l'éradication de plus de 2,200 foyers critiques des sacs en plastique',[35] n'a pu, malgré l'entrée en vigueur le 1er juillet 2016, de la loi 77-15 interdisant la fabrication des sacs en plastique, le lancement la même année de

28 Projet de stratégie nationale de développement durable 2030, Rapport final, <http://www.environnement.gov.ma/PDFs/publication/Rapport_Strat%C3%A9gie_Nationale_DD_juin2017_Mai%202017_Web.pdf>.

29 Ministère délégué auprès du Ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'environnement, *Stratégie et plan d'actions national pour la diversité biologique du Maroc, 2016-2020* (2016) 66 <http://ma.chm-cbd.net/implementation/snb_ma/strategie-et-plan-d-action-national-de-la-biodiversite-du-maroc-2016-2020>.

30 Commission économique des Nations-Unies pour l'Europe en coopération avec la Commission économique des Nations-Unies pour l'Afrique, *Maroc : Examen des performances environnementales* (n 23) 143.

31 Amine Tiamaz, 'Deux ans après leur interdiction, les sacs en plastique persistent dans le circuit informel' *Médias 24 (*3 juillet 2018) <https://www.medias24.com/MAROC/ECONOMIE/ECONOMIE/184291-Deux-ans-apres-l-interdiction-des-sacs-en-plastique-la-production-et-l-utilisation-persistent-dans-le-circuit-informel.html>.

32 *Ibid.*

33 MEDI 1 TV, Bulletin d'infos en arabe du 16/08/2016 <https://www.youtube.com/watch?v=Gp-vzEQadIc>.

34 Agence Marocaine de Presse (MAP), La coalition marocaine pour la justice climatique lance la campagne de sensibilisation Zéro Mika (26 juin 2016) <http://www.maptv.ma/Societe-civile-et-vie-associative/Campagne-de-sensibilisation-zero-mika>.

35 Commission économique des Nations-Unies pour l'Europe en coopération avec la Commission économique des Nations-Unies pour l'Afrique (n 23) 144-5.

l'opération 'zéro mika'[36] aux fins de sensibilisation, ou même le soutien apporté par l'Etat à la reconversion des entreprises de fabrication de ces sacs, aboutir à l'élimination définitive des sacs en plastique dans les différentes provinces et préfectures. En effet, le Ministère de l'industrie, de l'investissement, du commerce et de l'économie numérique avait reconnu en 2018 dans un communiqué publié le 1er juillet 2018, que : 'Si le sac en plastique a été éradiqué des grandes et moyennes surfaces ainsi que des points de commerce de proximité, il reste cependant présent dans les souks et le commerce ambulant et non organisé qui s'approvisionnent de cette manière auprès de réseaux clandestins et de la contrebande.[37] C'est dans ce sillage aussi que 'l'association Zéro Zbel (Zéro déchet en arabe), avait visité 8 souks et interrogé 235 personnes dans trois villes dans le cadre d'un sondage ayant été publié le 27 juin 2018, et dont les résultats ont montré que 60 pour cent des commerçants interrogés ont déclaré qu'une grande majorité de la clientèle exige encore des sacs en plastique[38]', de même que la majorité des clients interrogés justifient leur demande en sacs plastiques par le fait que les sacs en plastique sont distribués gratuitement et que 'les produits humides (poisson, viandes, volaille, olives, citron confit, huile...) ne se prêtent pas à l'emballage papier'.[39] Cette association avait également conclu, d'après les résultats du sondage, que : 'Le prix, la difficulté à changer les habitudes et l'aspect peu pratique des alternatives aux sacs en plastique sont identifiés comme les trois principales limites à leur utilisation'.[40] L'élan d'élimination effective des sacs en plastique a été aussi affaibli par l'absence d'alternatives réelles à ces derniers, en ce sens que comme l'a affirmé Mamoun Ghallab, président de l'association Zéro Zbel, 'la seule dans le pays à militer contre la pollution liée aux déchets[41]', 'les principales options proposées sont des sacs non-tissés en polypropylène présentés comme écologiques ; or il s'agit du textile plastique'.[42] Ces sacs, 'plus chers à produire que la matière plastique, ne résistent pas tous aux lourdes charges et finissent par casser ; ils sont fabriqués en partie en deçà de l'épaisseur légale et sont donc moins résistants et plus rapidement jetables'.[43] Pour cela, le président de l'association en question a estimé qu' 'il faudrait impliquer d'autres acteurs et réfléchir à d'autres matières comme le tissu, des matériaux naturels réellement solides et donc réutilisables'.[44]

Pour sa part, le programme national des déchets ménagers assimilés (PNDM) s'est fixé, dans une démarche de territorialisation, des objectifs tenant à la généralisation des plans directeurs de gestion des déchets ménagers et assimilés pour toutes les préfectures et provinces du Royaume, la réalisation des décharges contrôlées des déchets ménagers et assimilés au profit de tous les centres urbains (100 pour cent) à l'horizon 2020, la collecte des déchets ménagers pour atteindre un taux de collecte en milieu urbain de 90 pour cent en 2020 et 100 pour cent en 2030. En vertu de ce programme, 'l'ensemble des villes et centres urbains seront dotés de décharges contrôlées, et

36 Opération lancée par la Coalition marocaine pour la justice climatique (CMJC). Voir : Menara.ma, La Coalition marocaine pour la justice climatique lance "Zéro Mika" (13 juin 2016) <https://www.menara.ma/fr/article/la-coalition-marocaine-pour-la-justice-climatique-lance-zero-mika>.

37 HuffPost Maroc avec MAP, Zéro Mika: Deux ans après l'adoption de la loi, plus de sacs en plastique (ou presque) sur le marché marocain (1 juillet 2018) <https://www.huffpostmaghreb.com/entry/zero-mika-deux-ans-apres-ladoption-de-la-loi-plus-de-sacs-en-plastique-ou-presque-sur-le-marche-marocain_mg_5b390a42e4b007aa2f80eead>.

38 El Mehdi Berrada, 'Maroc : deux ans après leur interdiction, les sacs plastiques n'ont pas disparu' *Jeuneafrique* (6 juillet 2018) <https://www.jeuneafrique.com/589245/economie/maroc-deux-apres-leur-interdiction-les-sacs-plastiques-nont-pas-disparu/>; Ghalia Kadiri, 'Au Maroc, la difficile quête du 'zéro plastique" *Le Monde* (19 juillet 2018) <https://www.lemonde.fr/afrique/article/2018/07/19/au-maroc-la-difficile-quete-du-zero-plastique_5333608_3212.html>.

39 Amin Rboub, 'Opération Zéro Mika: Beaucoup de bruit pour rien!' 5303 *L'économiste* (28 juin 2018) <https://www.leconomiste.com/article/1030354-operation-zero-mika-beaucoup-de-bruit-pour-rien>.

40 Berrada (n 38) <https://www.jeuneafrique.com/589245/economie/maroc-deux-apres-leur-interdiction-les-sacs-plastiques-nont-pas-disparu/>.

41 Kadiri (n 38) <https://www.lemonde.fr/afrique/article/2018/07/19/au-maroc-la-difficile-quete-du-zero-plastique_5333608_3212.html>.

42 *Ibid.* <https://www.lemonde.fr/afrique/article/2018/07/19/au-maroc-la-difficile-quete-du-zero-plastique_5333608_3212.html>.

43 *Ibid.* <https://www.lemonde.fr/afrique/article/2018/07/19/au-maroc-la-difficile-quete-du-zero-plastique_5333608_3212.html>.

44 *Ibid.* <https://www.lemonde.fr/afrique/article/2018/07/19/au-maroc-la-difficile-quete-du-zero-plastique_5333608_3212.html>.

bénéficieront de l'amélioration de leurs services de collecte ainsi que de la réhabilitation de toutes les décharges non contrôlées'.[45]

Au demeurant et outre leur territorialité bornée ne concernant que les centres urbains et non ceux du milieu rural, les différentes politiques publiques nationales de gestion des déchets et leurs déclinaisons territoriales, ont montré leurs limites, dans la mesure où le taux de collecte professionnalisée[46] des déchets ménagers assimilés qui se taillent la part importante dans les déchets et qui comprennent 10 pour cent de déchets plastiques[47], n'a atteint en 2016 que 86 pour cent.[48] De fait et malgré 'l'augmentation des contrats[49] en vertu desquels les communes confient, dans le cadre de la gestion déléguée encouragée par le PNDM, la gestion du secteur des déchets au secteur privé[50]', le taux de couverture de la population urbaine en matière de collecte[51] qui avait été estimé à 40 pour cent en 2007, n'a atteint en 2015 que de 80 pour cent.[52]

Ces limites et insuffisances en matière de collecte se manifestent spécialement à travers l'exemple de la métropole économique de Casablanca, où bien que 'des contrats, à hauteur de 43 millions d'euros, ont été signés par les autorités de la ville de Casablanca avec Sita el Beida (filiale de Suez Environnement) et avec Averda (multinationale libanaise) pour la période 2014-2021[53]', la collecte des déchets n'a pas été suffisamment assurée puisqu' 'environ 20 pour cent de la surface de cette métropole économique ne bénéficie pas d'un tel service'.[54]

Une fois collectés, les déchets se doivent d'être recyclés. Or, le taux de recyclage des déchets[55] demeure très faible au Maroc puisqu'il n'avoisine jusqu'à présent que les 10 pour cent[56] seulement de tous les déchets collectés, ce qui présage un inachèvement dans le futur du taux de 20 pour cent visé à l'horizon 2020.

A côté de la collecte et du recyclage, la mise en décharge contrôlée des déchets constitue un levier essentiel dans la bonne gestion de ces derniers, mais qui n'a enregistré au Maroc qu'un taux fort insuffisant ne dépassant pas les 44 pour cent.[57] En effet, '56 pour cent des déchets (avant recyclage) générés en milieu urbain sont déversés dans des décharges non contrôlées et dépotoirs, c'est-à-dire des sites ne répondant pas aux caractéristiques et prescriptions techniques réglementaires, polluant les eaux souterraines, dégageant du méthane, dépréciant des terrains agricoles ou urbains et affectant négativement la santé'.[58]

Pis encore, le secteur formel embryonnaire d'industrie de tri, recyclage et gestion des déchets plastiques, qui s'est mis en place, peine à se développer laissant ainsi

45 Ministère délégué auprès du Ministre de l'énergie, des mines, de l'eau et de l'environnement, chargé de l'environnement, *L'engagement du Maroc dans la lutte contre les effets du changement climatique* (2014) 58.

46 La collecte professionnalisée correspond à la collecte assurée par le secteur privé dans le cadre de la gestion déléguée. Définition donnée in : Abdeljaouad Jorio, 'Chapitre 7 : Les déchets', *in* Lelia Croitoru and Maria Sarraf (dir.), *Le coût de la dégradation de l'environnement au Maroc* (Washington, DC: Banque mondiale, 2017) <https://www.4c.ma/medias/maroc-etude-cde-final-logo-janv-2017_cout_degradation_env.pdf>.

47 En effet en 2014, la composition des déchets ménagers au Maroc faisait ressortir respectivement 65% de déchets organiques, 10% de déchets plastiques, 10% de papier et carton, 8% de divers déchets, 4% de métaux et 3% de verre. GIZ Maroc - Coopération Internationale Allemande, *La gestion des déchets solides au Maroc* (2014) 7.

48 D'après les données fournies par le Ministère de l'environnement et le Ministère de l'intérieur. Voir à ce propos Jorio (n 46) 75.

49 Le nombre de contrats est passé de 44 en 2008 à 150 en 2015. Jorio (n 46) 78.

50 *Ibid.*

51 Le taux de couverture correspond à la part de la population couverte par la collecte 'professionnalisée'. Il est défini par le nombre de contrats liant les communes aux opérateurs privés. Jorio (n 46) 78.

52 Jorio (n 46) 78.

53 Bénédicte Florin, 'Les récupérateurs de déchets à Casablanca : L'inclusion perverse' de travailleurs à la marge' (2015) 47/1 *Sociologie et sociétés* 77 <https://www.erudit.org/fr/revues/socsoc/2015-v47-n1-socsoc02302/1034419ar.pdf>.

54 *Ibid.*

55 Ce taux qui correspond au recyclage des déchets en milieu urbain par les sociétés spécialisées, ne prend pas en compte dans son calcul les déchets en milieu rural, car selon le Ministère délégué à l'environnement, 'la pratique courante de la population est le recyclage de la quasi-totalité des déchets ménagers. Ainsi, la partie organique sert généralement comme aliment de bétail tandis que (…) les bouteilles et récipients en plastique et/ou verre comme réserves d'eau et/ou des denrées alimentaires (…)'. Jorio (n 46) 79.

56 Statistiques du Ministère de l'environnement, 2016 ; Jorio (n 46) 76.

57 *Ibid.* 76.

58 *Ibid.* 78.

libre cours à l'essor d'un secteur informel où ce sont les récupérateurs et les fouilleurs qui en sont les principaux acteurs, voire s'en retrouve dûment dépendant. Ces nouveaux acteurs informels se dénombrent en milliers, la plupart sont sans emplois et passent toute leur journée à dénicher les déchets recyclables dont ceux plastiques, dans les différents points de ramassage des déchets dans les villes mais aussi dans les décharges publiques. Les récupérateurs ambulants, appelés *bouâra*- dérivé du mot français 'éboueur' -, ou *mikhali* – fouilleurs – se sont substitués dans la ville de Casablanca à titre d'exemple aux autorités municipales dans les tâches de tri des déchets recyclables 'en sillonnant la ville, à pied, en charrette ou pick-up, pour les récupérer avant le passage des camions-bennes municipaux'.[59] D'autres qui sont les récupérateurs sur décharge, 'beaucoup moins visibles dans l'espace urbain que les récupérateurs ambulants, trient les déchets dans la grande décharge publique de Mediouna,[60] située à une vingtaine de kilomètres au sud de la métropole économique marocaine'.[61] Paradoxalement, les acteurs du secteur formel (sociétés de collecte, responsables des décharges…) se sont retrouvés avec le temps dépendants vis-à-vis du secteur informel, et réalisent, en recourant à ce dernier de substantielles économies, en particulier parce que les fouilleurs ou récupérateurs informels qui collectent et trient constituent une main d'œuvre quasi gratuite en raison des bas prix des matériaux vendus et qu'ils délestent la ville ou la décharge d'une grande quantité de déchets'.[62] Il s'agirait ainsi d' 'une forme d"inclusion perverse' de cette main d'œuvre informelle, où cette dernière qui est l'exclue du système social se trouve cependant incrustée à l'intérieur du système économique'.[63] Mais, les activités de ces acteurs informels sont d'une grande importance économique et sociale vu 'le chiffre d'affaires de la récupération informelle des déchets au Maroc qui a été estimé en 2011 à 852 millions de dirhams et sa portée sociale ayant été évaluée à environ 12,000 à 21,000 emplois'.[64]

D'autre part et bien que 'les prêts de la Banque mondiale accordés au Maroc dans le cadre du Plan national des déchets ménagers (PNDM), soient assortis de la condition de prise en compte adaptée et d'intégration des récupérateurs informels[65]', il n'en reste pas moins que dans la réalité il n'y a que très peu d'initiatives pérennes et on en dénombre une seule véritable expérience à Rabat, où '140 anciens récupérateurs informels ont été intégrés en 2010 sous l'impulsion des communes et du Ministère de l'intérieur dans une coopérative de tri et recyclage des déchets nommée Attawafouk et embauchés à ce titre dans le centre de tri mécanisé d'Oum Azza, situé à quelques kilomètres de la décharge d'Akreuch qui reçoit les déchets de Rabat et Salé'.[66] Ces récupérateurs-employés de coopérative qui sont désormais 'payés 8,5 euros par jour, bénéficient d'une protection sociale, d'un suivi médical et d'un service de transport'.[67] A cette expérience s'ajoute aussi celle de la société américaine Ecomed à Fès où elle a pu, contrairement à l'échec qu'a connu son projet à la décharge de Mediouna à Casablanca, parvenir à gérer,

59 Florin (n 53) 73.

60 Gérée depuis 2008 par la société Ecomed sur la base d'un contrat de gestion déléguée, la décharge de Mediouna n'a pas permis de dissiper les inquiétudes environnementales de la population de la métropole dans la mesure où l'enfouissement adopté par la société délégataire comme mode de gestion des déchets a débouché sur une forte pollution de la nappe phréatique et de l'air de Mediouna jusqu'à l'entrée de Casablanca. En conséquence, le Conseil de la ville de Casablanca a décidé la résiliation de son contrat avec Ecomed, ce qui a poussé cette dernière à saisir le tribunal administratif de Casablanca, en réclamant son indemnisation. Mehdi Jaouhari, 'Décharge de Mediouna : le différend entre Ecomed et le Conseil de la ville de Casablanca s'enlise' *Lavieeco* (2 juin 2018) <https://www.lavieeco.com/news/economie/decharge-de-mediouna-le-differend-entre-ecomed-et-le-conseil-de-la-ville-de-casablanca-senlise.html>.

61 Florin (n 53) 74.

62 *Ibid* 3.

63 Bader Burihan Sawaia, *As Artimanhas da exclusão. Análise psicossocial e ética da desigualdade social* (3e édition, Vozes, Petropolis, 2001), Cité in : Florin (n 53) 3; Solène Peremarty, 'Tirer sa subsistance du tri : recyclage collectif ou récupération individuelle ? Une coopérative de *catadores* du Nord-Est du Brésil', in : Cirelli C. et Florin B. (dir.) *Sociétés urbaines et déchets - Éclairages internationaux* (Tours: PUFR, 2015) 121-44.

64 EDIC, *Analyse des impacts sociaux et sur la pauvreté de la réforme du secteur des déchets solides ménagers au Maroc* (2011). Cité in : GIZ Maroc - Coopération Internationale Allemande, *Expériences pilotes de tri à la source des déchets ménagers et déchets assimilés au Maroc : Bilan, orientations générales & recommandations pratiques* (Coopération municipale – CoMun, février 2015) 13.

65 Florin (n 53) 77.

66 *Ibid.* 87 et 93. Voir dans ce sens: GIZ Maroc - Coopération Internationale Allemande, *Réseau marocain de la gestion des déchets urbains : action publique locale et gestion des déchets des villes membres* (Décembre 2014) 47.

67 Florin (n 53) 87.

depuis 2002, la décharge publique contrôlée de la ville et y assurer le traitement des lixiviats et du biogaz provenant des déchets, ce qui a permis de réaliser 'à partir de 2015 environ 30 pour cent de l'éclairage de toute la ville de Fès'.[68]

CONCLUSION

Si les instruments juridiques et les stratégies publiques mises en place au Maroc jusqu'à maintenant sont fort prometteuses du fait de leurs visées et des mesures qu'ils ont énoncés, le doute plane toujours sur la capacité des autorités administratives déconcentrées et décentralisées à résorber les nuisances portées par les déchets plastiques à l'environnement, à assurer une couverture spatialement complète de toutes les artères urbaines quant à la collecte de ces déchets, et à atteindre les objectifs escomptés tant par les politiques nationales que les plan préfectoraux ou provinciaux.

L'heure aujourd'hui est à l'encouragement concret de filières de valorisation et de recyclage de ces déchets, à l'intégration du secteur informel de collecte des déchets, au redéploiement effectif du levier fiscal via l'écotaxe qui saurait freiner l'élan continu de production des déchets, à la recherche d'alternatives réelles et pérennes aux sacs et sachets en plastiques dont l'usage n'a encore pas cessé, sans oublier aussi la prise en compte et l'évaluation du degré de pollution causé par les déchets plastiques dans le milieu rural qui demeure aujourd'hui le maillon oublié de toute la réflexion autour de la question de gestion des déchets plastiques.

Parent pauvre des politiques conçues jusqu'à aujourd'hui en matière de gestion des déchets plastiques au Maroc, le pan de réduction à la source des déchets plastiques devrait être lui aussi promu de façon à exhorter tant les entreprises et les ménages qui les produisent à changer leurs pratiques en la matière. Les actions à entreprendre dans ce cadre ne doivent pas se limiter à l'adoption d'instruments législatifs et réglementaires incitatifs, mais devront actionner aussi le principe du pollueur-payeur en imposant une certaine tarification, comme c'est le cas en ce qui concerne les déchets ménagers aux Pays-Bas et aux États-Unis d'Amérique où sont appliquées des redevances au poids ou au volume, et en Allemagne où un système, dit *Duales System Deutschland* (DSD) permet de 'collecter auprès des producteurs des contributions pour financer la gestion des déchets d'emballage'.[69] Les effets de telles impositions financières sur la réduction des déchets ont été démontrés par de nombreuses études scientifiques, dont celle de Fullerton et Kinnaman qui, à partir des données recueillies dans 959 villes américaines dont 148 ayant introduit des redevances incitatives, ont établi qu'une réduction ou la moindre réduction de la production des déchets résulterait principalement de la redevance financière.[70] Concrètement, il a été constaté que dans les communes appliquant le système des redevances, 'la quantité des déchets produits a été de 170 kg par habitant par an alors que la production moyenne dans l'échantillon, toute commune confondue, est de 413 kg par habitant et par an'.[71]

Ce sont là quelques propositions qui ne sauraient faire dissiper la nécessité d'une vraie synergie territoriale entre les acteurs impliqués dans la gestion des déchets plastiques, au moment où l'actuel gouvernement vient d'entériner une charte de déconcentration administrative, censée jeter les jalons d'une véritable collaboration institutionnelle entre les services extérieurs des ministères et les autorités gubernatoriales dans les préfectures et provinces du Royaume.

68 Mehdi Idrissi, 'Fès – Les prestations d'ecomed impayées depuis 2015' *leseco* (18 février 2019) <http://www.leseco.ma/regions/74468-fes-les-prestations-d-ecomed-impayees-depuis-2015.html>.

69 Matthieu Glachant, 'La réduction à la source des déchets ménagers: pourquoi ne pas essayer la tarification incitative ?' (24 janvier 2003) *Responsabilité & environnement* 69 <http://www.annales.org/re/2003/re29/glachant058-072.pdf>.

70 Fullerton D. & T.C. Kinnaman, 'Household Response to Pricing Garbage by the Bag' (1996) 86/4 American Economic Review 971. Cité in: Glachant (n 69) 70-1.

71 Glachant (n 69) 71.

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Towards Managing Plastics in a Circular Economy

TAIWANESE PLASTICS VERSUS SUSTAINABILITY - FROM THE PERSPECTIVE OF GLOCALIZATION OF SUSTAINABLE DEVELOPMENT AND CIRCULAR ECONOMY

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TABLE OF CONTENTS

1 INTRODUCTION

This paper aims to investigate the case of Taiwan regarding its strategy for plastics in a circular economy, in particular reforms between 2002 to 2018. To do this, the paper analyses the inconsistent regulatory history of regulating disposable plastic products in Taiwan and the recently reinitiated momentum, which reflects the vacillation of Taiwanese people and government. On the one hand, these regulations on disposable plastic products earn strong support from society, which can be seen from polls made by Taiwanese Environmental Protection Administration (EPA) on these regulatory measures. On the other hand, official statistics show that on average each person in Taiwan consumes more than 700 pieces of plastic bags per year.[1] This figure indicates that after more than a decade of restrictions on one-off plastic bags, social norms were not altered to influence individual consumption habits. People are still used to convenient and cheap plastic bags. Similarly, the Taiwanese government has been ambiguous in how it balances environmental protection and economic considerations. The aforementioned vacillation in Taiwan society may be purposely drawn upon by the EPA from time to time as a reason of action or excuse for non-action.

1.1 Background to Taiwan's Reforms: Climate Change, Blue Ocean and China's Ban on Waste

The wider backdrop to Taiwan's 2018 plastics regulation reforms, that are the focus of this paper, are worldwide focus on plastics, as well as long-standing concerns over excessive reliance on petroleum in modern society and the consequent result of climate change. The current policy impetus follows a surge in public support on dealing with marine plastic litter, attributed to documentaries such as David Attenborough's BBC Blue Planet series.[2] The EU's policy reforms around the circular economy may also be consequential to China's announcement on July 18 2017 concerning the ban on the import of 32 scrap categories, which takes effect for 16 categories by the end of 2018, and another 16 by end of the 2019.[3]

This background indicates that the origin, degradation, and solution of plastic pollution are all of transnational or even global nature. Therefore, any success of the municipal regulation on plastic products must have global vision. Furthermore, it must take other jurisdictions into consideration.[4] International cooperation will only be possible through such an

1 吳欣紜, 世界地球日啟動 環團籲減塑 *中央通訊社* [Wu Xinyu], '世界地球日啟動 環團籲減塑'['Environmental NGOs call for reductions in using plastics'] (Central News Agency, 22 March 2018) <https: //www.cna.com.tw/news/ahel/201803220179 .aspx>.

2. Hugo Rifkind, 'Watching David Attenborough's Blue Planet II Turned the Queen Green' The Australian (Sydney, 13 February 2018) <https://www.theaustralian.com.au/world/the-times/watching-david-attenboroughs-blue-planet-ii-turned-the-queen-green/news-story/aef18ae88c7683e578e4681a682cfa48>; Imogen Calderwood, '88 Per Cent of People Who Saw 'Blue Planet II' Have Now Changed Their Lifestyle' Global Citizens (London, 1 November 2018) <https://www.globalcitizen.org/en/content/88-blue-planet-2-changed-david-attenborough/>; Melissa Locker, 'Blue Planet II is Inspiring People to Give up Plastic—And You Should Join in' Fast Company (New York, 21 February 2018) <https://www.fastcompany.com/40534098/blue-planet-ii-is-inspiring-people-to-give-up-plastic-and-you-should-join-in>.

3 Kate O'Neill, 'The New Global Political Economy of Waste' in Peter Dauvergne and Justin Alger (eds), A Research Agenda for Global Environmental Politics (Edward Elgar 2018); Cole Rosengren, 'China Announces Formal Ban on 32 Scrap Categories' (Waste Dive, 19 April 2018) <https://www.wastedive.com/news/china-announces-formal-ban-32-scrap-categories/521735/ >; Yen Nee Lee, 'The World is Scrambling Now that China is Refusing to be a Trash Dumping Ground' (CNBC, 16 April 2019) <https://www.cnbc.com/2018/04/16/climate-change-china-bans-import-of-foreign-waste-to-stop-pollution.html>.

4 Nicky Gregson and others, 'Interrogating the Circular Economy: The Moral Economy of Resource Recovery in the EU,' (2015) 44 (2) Economy and Society 218.

approach.[5] Accordingly, it will be beneficial if researchers can draw upon experience and lessons from others' practices.

Recently, a notable advance on regulating single used plastic products by the European Union (EU) has attracted global attention. In January 2018, the European Commission formulated 'A European Strategy for Plastics in a Circular Economy' (Strategy for Plastics) as communication to the European Parliament and the Council. The Strategy for Plastics put forward a strategic target on reaching the 2030 Sustainable Development Goals and the Paris Agreement through a circular economy.[6] Therefore, the redesigning of plastics industry, from the design, production, consumption, (re)use, repair and recycling to the discard of plastics, must all align with this strategy.

In May 2018, the European Commission began to push through the 'Proposal for a Directive of The European Parliament and of The Council on the reduction of the impact of certain plastic products on the environment'.[7] In October 2018, the European Parliament overwhelmingly approved (571-53) the wide-ranging ban.[8] The law was eventually adopted in 5 June 2019. This Directive impose a complete ban on a range of single-use plastics, and 'where no alternative exists', the use of such single-use plastics still needs to be reduced by 25 per cent across the union by 2025. These goals show that the EU has stepped up its pace toward a circular plastics economy.

1.2 Why the Case of Taiwan is Relevant?

As the introductory paragraph illustrated, the case of Taiwan is significant because of its high plastic usage, but also the way in which recent reforms have mirrored global policy push in curbing plastic waste. Taiwan's potential to be a reference point for EU can be observed from the official document 'EU-Taiwan Relations 2018', which states that 'Being like-minded partners, where Taiwan has also set itself ambitious targets on waste reduction and a target of 61 per cent recycling rate by 2020, cooperation between the EU and Taiwan is deepening. Both sides are making efforts to enhance cooperation on the circular economy and discussing steps towards the creation of a low waste economic model'.[9] From some perspectives, Taiwan is ahead of the EU regarding its ambition toward recycling rates. While EU has had a mission for recycling 65 per cent of municipal waste and 75 per cent of packaging waste by 2030, Taiwan targets to reach the recycling rate of waste beyond 60 per cent by 2020.

This paper hopes to illustrate that each jurisprudence should learn from each other. However, this learning is not as simply as to imitate other's institutional designs or to transplant any universal template. Also, the aim of comparison is not for individual jurisdictions to compete and boast regarding which policy plan is more ambitious or fit onto the universal template the best. Rather, it is more about to inspect and understand the struggle and hesitation on their approaching to global sustainable development in local context through diverse manners.

5 Ansje Löhr and others, 'Solutions for Global Marine Litter Pollution' (2017) 28 Current Opinion in Environmental Sustainability 90, 95.

6 Commission, 'A European Strategy for Plastics in a Circular Economy' (Communication) COM (2018) 28 final.

7 Commission, 'Proposal for a Directive of the European Parliament and of The Council on the reduction of the impact of certain plastic products on the environment' COM (2018) 340 final.

8 Council Directive 2019/904/ EU of 5 June 2019 on the reduction of the impact of certain plastic products on the environment [2019] OJ L155/1.

9 European Economic and Trade Office in Taiwan, '2018 EU-Taiwan Relations' (European Economic and Trade Office 2019) < https://eeas.europa.eu/sites/eeas/files/2018_eu-taiwan_relations_en.pdf>.

2 REGULATORY HISTORY AND MEASURES AGAINST PLASTIC PRODUCTS IN TAIWAN SINCE 2002

This section first outlines the history of regulatory measures against plastics in Taiwan since 2002.

2.1 The 2002 Initiative and its Disappointing Result

In 2002 Taiwan pronounced its first step in phasing out the use of single-use plastic shopping bags and plastic utensils.[10] In order to encourage the uptake of reusable shopping bags, the EPA kicked off the first stage of the plastic restriction policy by ceasing the distribution of plastic bags and starting charging customers accordingly. Seven major sources or categories of targets were subject to these restrictions, namely, government facilities, private schools, department stores/ shopping malls, wholesale stores, supermarkets, chain convenience stores, and fast food chains.

Though the public broadly accepted the underlying idea that the volume of waste could be reduced if fewer products are thrown away after a single use, the regulation was facing serious setbacks due to critics and protests from the plastic industry and the food service business.[11] While fully aware that the disposable plastic bags and eating utensils provided by the eatery, snack stand, or stallholders in night markets are taking toll of the environment, the Taiwanese community also find it is difficult to resist the convenience and affordability of plastic products. Under the enormous pressure, the EPA removed foodservice retailers from the regulation plan on plastic bag in 2006.[12] Similarly, the planned prohibition on the use of single-use utensils for street vendors and stallholders in night markets was also put off.[13] Following the implementation of the measures, the EPA reported a drop in disposable plastic bag use of 58 per cent, from 3.435 billion plastic bags down to 1.43 billion annually, around 10 thousand tons in weight.[14] To many, it looks like an undoubted success as happened in other places around the world.[15]

10 The Environmental Protection Administration, 環署廢字第0910025775號函:「購物用塑膠袋及塑膠類（含保麗龍）免洗餐具第一批限制使用對象、實施方式及實施日期」公告 [Circular No. 0910025775 'The announcement of the first phase of regulation of plastic shopping bags and utensils'] (22 April 2002) <https://mojlaw.moj.gov.tw/LawContentExShow.aspx?id=I00100%2c%e6%b3%95%e8%a6%8f%e6%b1%ba%2c0910015942%2c20020425&type=E&kw=%e5%a1%91%e8% 86%a0%e8%a2%8b&etype=etype5>.

11 台灣環境資訊協會 [Environmental Information Associ-ation], 「生活大革命 - 限制使用塑膠袋塑膠餐具」*台灣環境新聞特刊* ['Revolution in our daily life' Special issue of Taiwan environmental news] (Taipei, 2002) <https://e-info.org.tw/news/taiwan/special/2002/taspr2002-02.htm>.

12 The Environmental Protection Administration「為何不管制或取消管制有店面餐飲業」 [Why the Regulation on Plastic Bag Toward Foodservice Retailers Was Revoked in 2006] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4357915398>>.

13 The Environmental Protection Administration, 「為何不管市場、夜市、攤販」['Why Not Regulate the Use of Single-use Utensils for Street vendors and Stallholders in Night Markets'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4234515405>.

14 The Environmental Protection Administration, '80 Per Cent Reduction in Plastic Bag Consumption Over Six Months' (2003) VI(7) Electronic Environmental Policy Monthly 4 <https://www.epa.gov.tw/isplayFile.aspx?FileID=FEBDA1F6339CF7 DD&P=67df7418-83b7-4ced-9754-0ade10f087db>.

15 Frank Convery, Simon McDonnell and Susana Ferreira, 'The Most Popular Tax in Europe? Lessons from the Irish Plastic Bags Levy' (2007) 38(1) Environmental and Resource Economics 1.

Nevertheless, there are numerous questions regarding the effectiveness of the policy. According to the statistics produced by the EPA from 2002 to 2018, in general, annually each Taiwanese person consumes 18 to 16.5 billion plastic bags, 3 billion plastic straws.[16] On average, each Taiwanese person uses 780 plastic bags a year, equal to more than two plastic bags per day, and a plastic straws every three days.[17] This implies the reliance on plastic products has not changed and the 'success story' of 2002 regulation is not as 'brilliant' as it looks like.[18]

There may be two instinctive answers to the phenomenon: one possibility is that the present regulation is not strong enough. The gap is unregulated objects such as the eateries and stalls in the night markets. The other is that it looks like the previous regulation has not successfully raised the environmental consciousness among the public to the level that alters wasteful consumerist habits.[19] These reasons also constitute the underlying understanding that underpinned subsequent regulation of the EPA.

2.2 Post-2018 and Scaling up Ambition

The EPA has articulated a road map towards a circular economy in the Action Plan of Marine Debris Governance in Taiwan (hereinafter as '2018 plan' or '2018 reform plan').[20] The 2018 plan restricts plenty of plastics and encompasses numerous grace periods which will eventually lead to a blanket ban on the use of single-use plastic products in 2030. However, before 2030, the 2018 plan should be more accurately realised as a price regulation that prohibits giving out plastics for free rather than a behaviour regulation that bans the use of plastics.[21] The 2018 plan has been initiated by reform measures that are in effect since 2018 (hereinafter as '2018 reform'), which is exactly a case of a price regulation in point.

2.2.1 Regulating Plastic Bags

The aim of the current stage of plastic bag reduction measures since 2018 is to make further restrictions on the use of plastic shopping bags to more target industries and wider scope of plastic products. In August 2017, the EPA announced the revised 'Objects, Implementation Means and Effective Date of Restricting the Use of Plastic Shopping Bags', which embracing additional seven major sources or categories of targets.[22] This regulation comes into force from January 2018 and thus called 2018 reform.

The restriction on use of plastic bags now covers 14 targets of business categories. The new categories add 80,000 businesses to the previous 20,000 businesses already subject to the controls. With a total of 100,000 businesses now subject to the restrictions, it is expected that 1.5 billion fewer plastic bags will be used every year. Before 2018, the inspectors shall first give advisory

16 The Environmental Protection Administration, 「為什麼要管制」['Why We Regulate the Use of Single-use Plastic Straws'] (EPA website, 2019) < https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH101>.

17 Li Bingfang, 「台灣人一年用165億個塑膠袋！地球日籲從生活減塑」*民報* ['Taiwanese Consume 16.5 Billion Plastic Bags Annually' Taiwan People News'] (Taipei, 22 March 2018) <https://www.peoplenews.tw/news/a1df0d05-b243-4f88-93eb-d00f01747d9dt>.

18 See Johane Dikgang, Anthony Leiman and Martine Visser, 'Elasticity of Demand, Price and Time: Lessons from South Africa's Plastic-bag Levy' (2012) 44(26) Applied Economics 3339.

19 Qunfang Zhu, 'An Appraisal and Analysis of the Law of "Plastic-Bag Ban"' (2011) 5 Energy Procedia 2516, 2520.

20 The Environmental Protection Administration, 'Action Plan of Marine Debris Governance in Taiwan' (EPA website, 2019) <https://www.epa.gov.tw/DisplayFile.aspx?FileID=C434A8EB6704AFC1&P=7e57ca93-38e7-47fe-896e-a0aa329ba447>.

21 The Environmental Protection Administration, 「限制使用與禁止使用的差別」['2018 Reform is Not a Prohibitive Regulation'] (EPA website, 2018)<https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&ampxdbid=4852915148>.

22 The Environmental Protection Administration, 環署廢字第1060062219號函:修正「購物用塑膠袋限制使 ['Circular No. 1060062219: The proclamation of the amendment of the regulation against plastics shopping bags'] (EPA website, 15 August 2017) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1502.pdf >.

warming to the disobedience, and ever since the first of January 2018, the EPA can fine the breach right away.

Furthermore, the EPA conceives a linear regulation road map (2018 plan) for the following twelve years to impose even broader regulation to more targets so as to achieve a continuously decline in the consumption of plastic products. Retail stores who issue uniform invoices are noticed that all disposable utensils, containers and plastic shopping bags free of charge will become unlawful in 2020. In 2025, surcharges for plastic shopping bags will become mandatory in all stores including conventional market and night market.[23] Finally, in 2030 a blanket ban will outlaw any one-off plastic shopping bag provided by the vendors in all stores, no matter it is for free or not.[24] According to the EPA, on average presently each Taiwanese uses more than 780 plastic bags annually. The EPA aims to reduce the number to four hundred by 2020, one hundred by 2025, and to zero by 2030.[25]

2.2.2 Regulating Microbeads, Dining Utensils and Straws

The 'Ban on Manufacturing, Import, and Sale of Cosmetics and Personal Care Products Containing Microbeads' was announced in August 2017.[26] Six categories of products containing plastic microbeads smaller than 5 mm in diameter are banned from being manufactured or imported as of 1 January 2018. Sales of such products will be banned as of 1 July 2018.

In parallel to the restriction against single-use plastic shopping bag, the regulation on the single-use dining utensil has identical governing strategy, regulator structure and legal basis. It currently stipulates that food

Regulatory period	2002	2018	By 2020	By 2025	By 2030
Regulated business categories	7 categories of regulatory targets (about 20,000 stores)	Additional 7 categories (about 80,000 stores)	Stores issuing uniform invoices (about 100,000 stores)	Conventional market and night market added (about 300,000 stores)	Prohibition in all stores
Estimated amount of plastic bags reduction	Annual reduction from 20 billion to 18 billion (amount to 780 per capita)	Annual reduction from 18 billion to 16.5 billion (amount to 715 per capita)	Annual reduction from 16.5 billion to 9.5 billion (amount to 400 per capita)	Annual reduction from 9.5 billion to 2.5 billion (amount to 100 per capita)	Annual reduction from 2.5 billion to zero

Made by author

23 The Environmental Protection Administration, 'Action Plan of Marine Debris Governance in Taiwan' (n 20).

24 ibid.

25 卓冠齊 [Zhuo Guanqi], 「回收塑膠，真的再利用了嗎？」 ['Do We Really Recycle the Plastics?'] (Taiwan Public Television Service and Initium Media, 30 July 2018) <https://theinitium.com/article/20180730taiwan-pts-plastic-recycle/>.

26 The Environmental Protection Administration, 106.8.3. 環署廢字第 1060059207 號函:修正「限制含塑膠微粒之化妝品與個人清潔用品製造、輸入及販賣」公告 106.8.3 Circular No. 1060059207 The announcement of a regulation against manufacturing, Import, and Sale of Cosmetics and Personal Care Products Containing Microbeads'] (EPA website, 3 August 2017) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1500.pdf>.

and beverage service in government facilities, private schools, department stores/ shopping malls, wholesale stores, supermarkets, chain convenience stores, fast food chains, and food service retailers in store must not provide particular dining utensil required.[27] The EPA plans to restrict the free single-use dining utensil for in-store dining in 2020, and then expand the restriction to all food and beverage service stores regardless of dine-in or dine out in 2025. Eventually, the EPA will prohibit the employment of all single-use dining utensil in all stores in 2030.[28]

The regulation on the usage of plastic straws has been on the stage from 1 July 2019.[29] The regulation stipulates that public sector entities, public and private schools, department stores and shopping malls, chain restaurants are prohibited from providing free single-use straws for customers dining in-store. These four sectors affect around 8,000 business in total.[30] The EPA plans to expand the prohibition on plastic straws to include all Retail stores in the food and beverage industry (dining outlets) in 2020 and to both dine-in and take-out customers by 2025.[31] The end goal for the EPA is a complete ban by 2030.

Altogether, the 2018 plan on plastic bags, microbeads, dining utensil, and plastic straws is expected to constitute one of the most extensive bans on plastic in the world. Numerous regulations build on existing measures and will be phased in over time. Dining outlets will be fined for providing free plastic bags, disposable food containers, and utensils for dine-in consumers in 2020. Customers will have to pay extra for all straws, plastic shopping bags, disposable utensils and beverage cups even when taking out from 2025, ahead of a full ban on all the single-use items five years later. That is, these measures will culminate in a blanket ban on single-use plastic bags, utensils (including cutlery and containers), straws and beverage cups in 2030.[32]

3 A CRITICAL REVIEW OF TAIWAN'S REGULATORY PROCESSES AND FAILURES

This section raises criticisms related to four layers of ambiguities within the normative content and policy-making procedure of 2018 reform and 2018 plan. These ambiguities have contributed to the ambivalence in regulatory rationales and social attitude.

27 The Environmental Protection Administration, 95.6.9. 環署廢字第 0950044991 號函:「免洗餐具限制使用對象、實施方式及實施日期」公告 ['The Announcement of a Regulation Against Single-use Dining Utensil'] (EPA website, 9 June 2006) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1499.pdf>; The Environmental Protection Administration, 108.8.8. 環署廢字第 ['108.8.8 Circular No. 1080056916 號函:「免洗餐具限制使用對象及實施方式」公告 The Announcement of a New Regulation Against Single-use Dining Utensil'] (EPA website, 8 August 2019) <<https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1934.pdf>.

28 The Environmental Protection Administration, 'Action Plan of Marine Debris Governance in Taiwan' (n 20).

29 The Environmental Protection Administration, 108.5.8. 環署廢字第1080031442號函:「一次用塑膠吸管限制使用對象及實施方式」公告 ['108.5.8 Circular No. 1080031442 The Announcement of the Regulation Against Single-use Plastic Straws'] (EPA website, 8 May 2019) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1721.pdf>.

30 The Environmental Protection Administration, 「管制的效益」['The Benefit of the Regulation'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH104&dbid=4111118712>.

31 The Environmental Protection Administration, 'Action Plan of Marine Debris Governance in Taiwan' (n 20).

32 Richard J Kish, 'Using Legislation to Reduce One Time Plastic Bag Usage' (2018) 38(2) Economic Affairs 224.

3.1 Legal Norms and Social Change: Ambiguity on Regulatory Strategy

As discussed, the 2002 regulation was not the success it seemed to be at first glance. However, the 2018 plan still attempts to learn from this 'failure'. The question then is are the lessons it draws upon problematic. Taiwan's latest wave of regulatory plans launched in 2018 sticks to the same regulatory logic or strategy, which asserts that to impose a wider regulation and thus to raise more eco-awareness will be the key to a successful plastics reform.[33] The 2018 reform plan is based on two assumed lessons from the 2002 regulation. The first assumption is that the 2002 regulation failed to successfully raise the eco-awareness in the society. Therefore, one of the major targets of the 2018 plan lies on awaking the public to the significance of plastic issue.[34] Secondly, regarding the relation between legal norms and social change, strict regulations are seen as essential instrument to wake public concern on this issue.

The following sections, however, will argue that these assumptions as well as regulatory strategy are problematic in many ways. The 2018 plan built upon might neglect the real issue and therefore render people difficult to be positive to the future of this 2018 plan. The contradictions can be seen on different levels. On the one hand, the EPA asserts that before the living habits of the public are evidently changed and the executive capacity of the regulatory entity improved, it is not appropriate to make coercive regulation.[35] As the EPA seeks to justify its indolence in the recent sixteen years, it must hold that legal norm barely change social custom and culture. However, the legislative reason of the 2018 plan clearly states a different philosophy. It states that one of the major aims of the regulation is to change people's living habit, which implies to some extent it has the potential to change consumer behaviour in an obvious or subtle way.[36] It seems to suggest though the law requires social grounds, social foundation is not something that is pre-existing or fixed that can be drawn upon before regulation. Accordingly, rather than waiting for such a social foundation (for awareness around plastic waste), the law should actively trigger social change.

While it took sixteen years, between 2002 and 2018, to reduce 2 billion bags, the new targets aim for a 1.5 billion reductions in plastic bag use in two years (from 2018 to 2020) and another 16.5 billion bags in ten years (from 2020 to 2030). On the one hand, if regulators actually believe social change can be made at least to certain extent by means of regulation or 'nudging', the regulator cannot justify why EPA procrastinate for sixteen years to take effective measures to respond the local context. It is worth analysing what the real reasons for this procrastination could be and what the impacts of it have been.

33 行政院 [The Executive Yuan], 「推動循環經濟—創造經濟與環保雙贏」 ['To Promote Circular Economy'] (Executive Yuan website, 2018) <https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/f8d89849-e4f1-41e7-86ec-8fa9c2b496a9 >; Kathryn Willis and others, 'How Successful are Waste Abatement Campaigns and Government Policies at Reducing Plastic Waste into the Marine Environment?' (2018) 96 Marine Policy 243, 246.

34 The Environmental Protection Administration, 「為什麼要推動購物用塑膠袋限制使用政策」 ['The Rationale of the Plastic Bag Regulation'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4616115067>.

35 The Environmental Protection Administration, 「本次修正公告無法全面禁用購物用塑膠袋原因」 [The Reason Why a Complete Ban on Plastic Bag is Impractical'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4739515150 >; The Environmental Protection Administration, 「限制使用與禁止使用的差別」 [Difference Between Restriction Measures and Complete Bans'] (EPA website, 2019) <https://hwms.epa.gov.twDispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4852915148 >.

36 The Environmental Protection Administration, '80 Per Cent Reduction in Plastic Bag Consumption Over Six Months (n 14).

On the other hand, regulator may believe that years of patiently waiting for the 'peak conditions' for social acceptability of such a regulation and perfectly suitable timing are indispensable.[37] If the conditions are eventually mature for taking actions after years of patience, it is not clear why the EPA has taken a relatively small step in 2018 and includes one grace period after another to meet the 2030 target. On the contrary, if the existence of social awareness is still factually thin after sixteen years of patience, so that only piecemeal reform could be seen as appropriate, why, from 2020, is there confidence that Taiwanese society will rapidly foster sufficient awareness or consciousness to bear a massive reduction in consuming plastic waste, that is a more than tenfold reduction from current use? Accordingly, it is worth inquiry what the social change the EPA is currently expecting that can produce this reform.

3.2 Is a Lack of Eco-awareness the Issue?

One assumption of 2018 plan may be that Taiwanese society has not fully embraced environmental concerns, thus regulation was not possible between 2002 and 2018. However, it seems difficult to explain why, since 2002, every poll regarding regulation against single-used plastic bags and products suggests strong support for the 2002 regulation on plastic bags.[38] Furthermore, even though the more stringent and comprehensive reforms in 2018 generate some debate, overall the polls shows that these reforms are still widely accepted.[39] Thus, it seems unreasonable to claim that the lack of public willingness towards reducing plastic waste as an excuse of ineffectiveness of 2002 regulation and the EPA's sixteen years of nonaction since then.

The regulators may argue that these polls do not reflect the full reality; in a sense, they are right. It might be due to a kind of public mind-set call 'yeah-but', which suggests despite the public fully aware and support environmental regulation, they may still perform oppositely due to numerous individual reasons such as inconvenience or costliness.[40] That is, public awareness cannot be simplified as yes or no; it is a more complicated, flexible and ambiguous existence and extremely difficult to identify. It will be extremely challenge to justify how to and who can prove its existence? Therefore, it may not be independently a solid ground for transition. If the regulatory strategy is set on this, it will inevitably be at a loss. Conversely, the regulatory failure should not be blamed solely on shortage of public awareness as well.

3.3 Broader Regulation as the Cure: Ambiguity in Identifying Regulatory Black Holes

Whether the 2018 reform plan could be categorised as pure command and control model is questionable. As stated above, the second presumption the 2018 plan hold is the 2002 regulation did not alter the trend of the plastic consumption, because it is not strict enough to make the change. Since the EPA's report asserts that the 2002 regulation had been fully implemented,[41] it seems that the scope of the 2002 regulation was not wide enough and that is responsible for the ineffectiveness. More specifically, the 2002 regulation does not completely cover all the 'users', including

37 Irina Safitri Zen, 'Nudge to Promote Sustainable Shopping Lifestyle' (2018) 2(22) Multidisciplinary Digital Publishing Institute Proceedings 1394.

38 The Environmental Protection Administration, '80 Per Cent Reduction in Plastic Bag Consumption Over Six Months (n 14); 本報訊 [The Editors], 「環保署宣導限用塑膠袋」['The EPA Promotes the Regulation Toward Plastic Bags'] (The Epoch Times, 31 March 2002) <http://www.epochtimes.com/b5/2/3/31/n180424.htm>.

39 The Environmental Protection Administration, 'Plastic-Free Ocean Promoted in Response to International Trend' (2018) XXI(1) Electronic Environmental Policy Monthly 2 <https://www.epa.gov.tw/DisplayFile.aspx?FileID=16703F059B4FE0AA&P=73c54458-066d-4aa2-91f1-0d7f1f7358ad>.

40 Anne Lane, 'How the 'yeah-but' Mentality Stalls Progress on Bag Bans and Other Green Issues' (The Conversation, 23 July 2018) <https://theconversation.com/how-the-yeah-but-mentality-stalls-progress-on-bag-bans-and-other-green-issues-100330>.

41 The Environmental Protection Administration, '80 Per Cent Reduction in Plastic Bag Consumption Over Six Months (n 14).

producers and vendors, givers and taker, of numerous sorts of plastic products. As such, the 2018 reform plan responds to this by trying to broaden the scope of the 2002 regulation.

Before examining how the scope would be extended, it is important to consider the findings of the EPA's account on the 2002 regulation.[42] The EPA claimed a drop of 2 billion pieces in disposable plastic bag annually.[43] Roughly speaking, 2 billion pieces equals a reduction of 10 thousand tons of plastic bags. This conversion ratio is essential in further analysis. Interestingly, the Department of Statistics, the Ministry of Economic Affairs reports that the annual sell of all sorts of plastic bags in Taiwan's domestic market range from 126 to 171 thousand tons.[44] In comparison to EPA's numbers, there is an obvious gap varying from 116 to 161 thousand tons of plastic bags need to be regulated to achieve the zero-plastics mission. Maybe we can roughly say the real challenge is many, let's say ten, times bigger than resolved part in 2002 reform. It left an intractable puzzle for the 2018 plan to puzzle out.

The 2018 reforms affect four times more stores (around eighty thousand stores) than that of 2002 regulation, but only smaller amount of reduction of 1.5 billion plastic bag has been created (about 7.5 thousand tons) by 2020. Parts of the 2018 plan's main targets, the conventional market and night market, are estimated to consume 7 billion plastic bags, and around 35 thousand tons each year according to the conversion ratio. Nevertheless, adding up the contributions of four regulatory periods conceived in the 2018 plan, by 2030 altogether there will be a reduction of 100 thousand tons of plastic bags. That is, in comparison with the data from the Department of Statistics, still 26 to 71 thousand tons are missing and unregulated. It appears that even in 2018 plan there is a still regulatory blackhole has been untracked and not been fully explored, which makes to assess if the target of comprehensively restricting plastic bags is achieved impossible.

In addition, people get used to finding alternative plastics or materials to evade the regulation. The apparent reduction is factually a trade-off to other categories of the balance sheet. The response from the market to the regulation is to offer alternative options of plastic or hybrid product that are popular with consumers and beyond the regulation. For instance, so-called more environment-friendly shopping bags made of non-woven material is unregulated in 2018 plan. However, it is still a plastic product and can produce the same environmental issues if they are not fully reused. That is, the existing consumerist economy can easily find the way to bypass or counteract the regulation and offer more options of plastic products. It may lead to a ridiculous scenario in consequence: the stricter the regulation is, the more flourishing the plastic industries are. These points are further discussed, in the context of more meaningful broader changes, in Section Five.

A further point can be made regarding the empirical evidence that underpin the regulator's claims. Are there sufficient investigations or researches made preceding the reform? What is their methodology? Can the regulator explain where these schedules and targeting figures are coming from? Is it a plan made behind the closed door? Most importantly, balancing of different interests cannot be made in a tick box exercise. It is of importance for any policy-making to be set on the empirical foundation of reason and to reveal its evaluation of values, which are essential to the legitimacy of policy under discussion. Unfortunately, official documents concerning the policy making process are not transparent in providing answers to these questions. Quite opposite, these contradictions, inconsistency, disconnection between measures, actions and words, and non-transparency in policy

42 Note – there is no single review here, rather a compilation of documents referred to by the author.

43 The Environmental Protection Administration, 107.7.12 **環署廢字第**1070055055 **號函** [Communication from the Environmental Protection Administration to the Control Yuan No. 1070055055].

44 The Environmental Protection Administration, 107.7.10 **經授工字第**10720419360 號函 [Communication from the Ministry of Economic Affairs to the Control Yuan No. 10720419360].

unpreventably raise concern to the ambivalence in the regulation.[45]

3.4 Ambivalence in Regulatory Rationales and Social Attitude

To sum up above discussions, we may now revisit lessons from the regulatory failure of 2002 regulation and the stumbling process since then. As stated, currently Taiwan annually consumes 1.8 billion single-use plastic bags, which is four times more than that in EU. From this perspective Taiwan's plastic regulation is hardly a success as claimed. In fact, research in other areas of environmental regulation has demonstrated similar challenge to disconnect between a strong set of binding legal provisions and slow progress towards the situation on the ground.[46] This research points out the ambivalence within regulator's mind is a more precise reason to the source of the regulatory failure than the lack of social awareness and insufficiency in regulation. As a result, despite the formally full compliance, the factual 'noncompliance' (different from feign compliance) make the usage of plastic bag remain popular. In order to cope with this ambivalence, the next section will begin with exploring the origin of it.

4 DIAGNOSING THE CAUSE AND EFFECT OF REGULATORY AMBIVALENCE

The ambivalence in both public and private sector and the consequent circumvention of the law owes to the lack of a sincere drive or whole-hearted motivation based on substance local need. Obviously, this difficulty cannot be solved simply through broader regulation or awareness. However, with a real drive missing, it jeopardises the chance of success for the 2018 plan. This section explores the fundamental reasons for that ambivalence and the actual drive to the 2018 plan and its impacts.

4.1 Pursuing 'International' Benchmarks

In a global era, domestic regulations, to some extent, can have transnational effects particularly where those regulations are in the fields of global nature (such as climate change governance). In other words, state agencies are also affected by the international socio-cultural structure by means of international value-orientation, trend, pressure, and competition.[47] Taiwan is no exception. For instance, the press release of the 2018 reform plan reflects these interactions outright.[48] Other than being the relay to expand the plastic ban that has been running for sixteen years, it clearly frames it as a response to international trend and labels the 2018 reform plan as a promotion of 'Plastic-Free Ocean'.[49]

45 吳欣紜、陳妍君、黃旭昇、李怡瑩、李郁欣 [Wu Xinyi, Chen Yujun, Huang Xusheng, Li Yiying, Li Yuxin],限塑16年我們改變了什麼？」['What Have We Changed in the 16 years of Plastic Regulations'] (The Central News Agency , 30 July 2018) <https://www.cna.com.tw/project/20180730-Plastic/>; 黃靖軒 [HuangJingxuan], 「臺灣新限塑政策起跑半年，成效如何？」['What are the Effects of the Taiwan's New Plastics Regulations?'] (National Geographic, 22 June 2018) <https:/ /www.natgeomedia.com/environment/article/content-3047.html >.

46 See for example, in relation to sanitation: Philippe Cullet, 'Policy as Law: Lessons from Sanitation Interventions in Rural India' (2018) 54 Stanford Journal of International Law 241-258, 243.

47 Riley EJ Schnurr and others, 'Reducing Marine Pollution from Single-use Plastics (SUPs): A Review' (2018) 137 Marine pollution Bulletin 157, 158.

48 The Environmental Protection Administration, 'Plastic-Free Ocean Promoted in Response to International Trend' (n 39).

49 The Environmental Protection Administration, 「為什麼要推動購物用塑膠袋限制使用政策」['The Rationale of the Plastic Bag Regulation'] (n 34).

Since restricted use of plastics is a major global environmental trend, Taiwan's stringent regulation and seemingly ambitious target is welcomed by observers. Not surprisingly, these regulatory measures earn applause from international media and environmental groups. Their positive feedbacks surely lend support to those measures. Notwithstanding that, Taiwan's case reveals that this positive feedback loop may not always be positive to the regulatory target.

4.1.1 Drawing Solely From the Global North

The first notable phenomena in the deliberative process of the 2018 reform plan lies in that it did not thoroughly look at existing experiences and advanced legislature in other jurisprudences with similar background conditions. To be more precisely, the EPA did not draw lessons from the existing advanced legislature cases in Asia & Africa countries such as Bangladesh,[50] South Africa,[51] or Kenya.[52] The regulator ignored developments in developing Asian and African countries, even though it is obvious that in terms of restriction on single-used plastic product, developing countries are usually the forerunner and adopted more ambitious measures.[53] Any ensuing regulation can choose diverse path, but it stands on no ground to neglect previous achievements and experiences.

There is no doubt that benchmarks and mutual learning are essential to international interactions and improvement. The problem is, to the EPA, it seems that lessons can only be learned from economically developed countries, which suggests the benchmarks are defined by economic development rather than substantive performance in environmental sustainability.

On the contrary, despite the Taiwanese initiative sixteen years ago and a great number of plastic regulations that have be applied all over the world in last decades, the timing for the EPA to revisit plastics regulation and prioritize 'plastic-free oceans' as a major focus perfectly coincides with the agenda set by the developed countries such as those in the EU or the so called 'global trend'. According to the EPA this is not a coincidence. However, while providing momentum to the sluggishness in terms of regulation, this 'global' trend may also divert the regulatory goal from the right track.

4.1.2 Learning Lessons or Seeking Global Acknowledgement: Questioning the Motivation Behind the Regulation

Since there is no compulsory enforcement to rely on, the way international socio-cultural structure affects state agency is through social, political pressure and involve some sort of politics. A case in point is the dispute dubbed 'straw war' regarding which side of the (English) Channel is one step ahead on measures regarding single-use plastics and who is the follower aligning with the benchmark set by the leader.[54] After European parliamentary voted, the environment commissioner, Karmenu Vella, stated that 'Europe is ready to … lead international efforts to make our oceans plastic-free'.[55]

In the case of Taiwan, because of its unique position in the international community and the difficulty in

50 Alice R Baker, 'Fees on Plastic Bags: Altering Consumer Behaviour by Taxing Environmentally Damaging Choices' (Expresso) <http://works.bepress.com/alice_baker/1>.

51 Johane Dikgang, Anthony Leiman and Martine Visser, 'Analysis of the Plastic-Bag Levy in South Africa' (2012) 66 Resources, Conservation and Recycling 59; Johane Dikgang, Anthony Leiman and Martine Visser (n 18) 3339.

52 Jeremia Njeru, 'The Urban Political Ecology of Plastic Bag Waste Problem in Nairobi, Kenya' (2006) 37(6) Geoforum 1046; John Kariuki Njuguna, 'The Efficacy of the Ban on Use of Plastic Bags in Kenya' (2018) Journal of Conflict Management and Sustainable Development 91.

53 Doris Knoblauch, Linda Mederake and Ulf Stein, 'Developing Countries in the Lead—What Drives the Diffusion of Plastic Bag Policies?' (2018) 10(6) Sustainability 1, 3.

54 Arthur Neslen, 'European Parliament Approves Sweeping Ban on Single-Use Plastics' The Guardian (24 October 2018) <https://www.theguardian.com/environment/2018/oct/24/european-parliament-approves-ban-on-single-use-plastics-uk-eu-brexit>.

55 European Commission, 'Press Release', EC Daily News (25 October 2018) <http://europa.eu/rapid/press-release_MEX-18-6206_en.htm>.

participating in international regimes, international acknowledgement, recognition, even national identity and glory are much valued. For these reasons, Taiwan is usually sensitive to the agenda set by UN, US and European countries as well as their sentiments. The 2018 reform plan can serve as a vivid example. While officially announcing that microbeads will be prohibited across the island as of the beginning of 2018, the EPA highlights that by doing so Taiwan now could be in sync with developed countries.[56] Taiwan further stressed that associated countermeasures had received applause from delegates of other countries.[57] The official website of the EPA even deliberately list relevant positive feedbacks and applauses received from international community and media.[58] It is worth of thinking what are the diverse implications it will bring if the EPA, in comparisons, demonstrates the municipal communities, sectors, and, reasons that are pro and con these 2018 reform plan.

4.2 Potential Consequences of Regulating Without a Grassroots Approach

To be clear, to take regulatory action under the consideration of international pressure is not a bad thing. The problem is, on condition that the motivation behind these regulations is out of external drive instead of sincere practical concerns from the root, will its policy-making procedure and institutional designs be adversely distorted? Will the regulation possibly draw upon local resources, cope with domestic negative factors and concerns, and bring about fundamental transformation on the ground? Furthermore, as this 2018 reform plan becomes part of the national propaganda, will this big show be reduced to victim of opportunism when the focus of pressure or spotlight has shifted?

4.2.1 Insufficient Empirical Understandings

When the rationale of a regulation or institutional transplantation is misplaced or coming out of irrelevant or indirect concerns, it will generate defects in policy-making procedure. In such cases, the most efficient and convenient way to hit the regulatory target is to follow the agenda and transplant similar regulation or borrow their measures from other jurisdictions without comprehensive investigation into domestic contexts and conditions. The regulator may not even bother to find the factually best practice to copy from, because regarding the aim of seeking for acknowledgement and recognition, what really important, at the end of the day, is the 'brand name' or the symbolic implication of the 'product' instead of its suitability or quality. Looking back to the policy-making procedure of the 2018 reform plan, there seems hardly any empirical surveys or research to justify the plan. The official documents do not offer scientific evidences to explain the regulatory scope, content, schedule, and way of compliance. Nevertheless, further research could explore this policy making procedure through interviews to verify this cognition. If this is indeed the case, it is by far the ideal way of enacting legal regulation.[59]

In addition, post facto investigation is an essential to verify the compliance and to adjust future regulation. Unfortunately, from the published data, it seems the EPA had not systematically and actively kept track of the compliance of the 2002 regulation; instead it depends on the manufacturers, importers and vendors to provide the data, including the variation on consumers' behaviour and the reduction amounts of

56 The Environmental Protection Administration, 'Plastic-Free Ocean Promoted in Response to International Trend' (n 39).

57 The Environmental Protection Administration, 「塑膠3R策略與創新:環保署力推塑膠循環經濟 ['3R Plastic Strategy and InnovationsÿThe EPA is Dealing with Plastic in a Circular Economy'] (EPA website, 25 September 2017) <https://enews.epa.gov.tw/enews/fact_NewsPrint.asp?InputTime=1060925155515>.

58 The Environmental Protection Administration, 「我國限塑政策國際相關報導」['International Reports on Taiwan's Plastic Regulation'] (EPA website, 2018) < https://www.epa.gov.tw/SWM/D409BC765D 94324 >.

59 Dirk Xanthos and Tony R Walker, 'International Policies to Reduce Plastic Marine Pollution from Single-Use Plastics (Plastic Bags and Microbeads): A Review' (2017) 118 (1-2) Marine Pollution Bulletin 17, 21.

plastic bags to assess the effectiveness of the regulation.[60] The 2018 reform plans follow the same route and impose each regulatory subject obligations for self-surveillance.[61] The EPA will only dispatch personnel to collect the reported statistics number quarterly, and basically there is no check to verify the correctness of the numbers.[62] People may cynically predict that all, or at least most of, the regulatory subject will claim a full compliance of the regulation, and the EPA will have a noticeable transcript to advertise for internationally, while the substantive situation remains.

4.2.2 A lack of Coherent Regulatory Strategy

There are several consequences from the defects in policy-making processes. First, without appropriate investigations and research, the substance of the regulation will unavoidably be unsound. This is because it will be detached from local problems and factors originated from different social backgrounds, contexts and priorities, and development goals. In addition, it definitely will fail to look into diverse concerns from different policy fields and social classes within peculiar domain and not to mention to balance interest of difference.

The EPA itself is fully aware that different countries have different ways of controlling plastics, in that each of them has its own context and peculiar factors, which is different from other states.[63] Nevertheless, looking back to the 2018 reform plan, the regulator does not mention too much factual investigation into local conditions. Hence, it is also not evident to what extent the EPA draws upon local resources and tackle local concerns.

However, the Head of the Department of Waste Management, Ms. Ying-Ying Lai, once stated that the living habit and conditions of Taiwan is utterly alien from those in Europe and North America. She states that 'The diet mostly contains hot soup and the weather is usually humid and rainy, these factors make people get used to require more plastic bags than that in the EU'.[64] It wouldn't be surprising that there are numerous inquiries raised against this statement. For one thing, there are also local societal and cultural factors that are supportive to the regulation on single-used plastics. For example, Taiwanese traditional culture that

60 The Environmental Protection Administration, 106.8.15. 環署廢字第 1060062219 號函:修正「購物用塑膠袋限制使用對象、實施方式及實施日期」公告 三、(二) [106.8.15 Circular No. 1060062219 'The proclamation of the amendment of the regulation against plastics shopping bags'](EPA website, 2017) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLocation=PJ-EPATW%5cFiles%5c&FileName=1502.pdf >; The Environmental Protection Administration, 「要請業者配合 的事情」['The Business's Must Do'] (The EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4234515405>.

61 The Environmental Protection Administration, 106.8.15. 環署廢字第 1060062219 號函:修正「購物用塑膠購物用塑膠袋限制使用對象、實施方式及實施日期」公告 三、(二) N0(ŒN) [106.8.15 Circular No. 1060062219 The proclamation of the amendment of the regulation against plastics shopping bags'](EPA website, 2017) <https://hwms.epa.gov.tw/dispPageBox/getFile/Get.aspx?FileLoc ation=PJ-EPATW%5cFiles%5c&FileName=1502.pdf >.

62 The Environmental Protection Administration, 「相關法規」['Related Regulations'] (EPA website, 2019)<https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffList.aspx?ddsPageID=EPATWH4>.

63 The Environmental Protection Administration, 「為何不管制或取消管制有店面餐飲業」['Why the Regulation on Plastic Bag Toward Foodservice Retailers was Revoked in 2006'] (n 12).

64 The Environmental Protection Administration, 「問與答」['Q&A'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4357915398>; 黃靖軒 [Huang Jingxuan], 「臺灣新限塑政策起跑半年，成效如何？」['What are the Effects of the Taiwan's New Plastics Regulations?'] (n 45).

encourages frugal lifestyle and three R (Repair, Reuse, Recycle) may explain the social support to these plastic regulations despite all these inconveniences.[65] Also, it does not take advantage of Taiwan's industrial and technical strong suit in separate collection and recycling circuit while making the 2018 reform plan. In sum, there is a need for field research and investigation by the regulator, looking at local resources, rather than the current approach that has tended to use local factors as excuses for inaction.

5 CALLING FOR FUNDAMENTAL (BOTTOM UP) REFORMS TO THE GLOBAL PLASTIC INDUSTRY

There are several consequences from the defects in policy-making processes. First, without appropriate investigations and research, the substance of the regulation will unavoidably be unsound. This is because it will be detached from local problems and factors originated from different social backgrounds, contexts and priorities, and development goals. In addition, it definitely will fail to look into diverse concerns from different policy fields and social classes within peculiar domain and not to mention to balance interest of difference.

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5.1 The Control Yuan's Official Investigation and Corrective Measures

In 2018 the Control Yuan launched an official investigation into the work of the EPA regarding its

65 See also: J. Thøgersen, 'Frugal or Green? Basic Drivers of Energy Saving in European Households' (2018) 197 Journal of Cleaner Production 1521.

66 The Environmental Protection Administration, 「為何不管制或取消管制有店面餐飲業」['Why the Regulation on Plastic Bag Toward Foodservice Retailers was Revoked in 2006'] (n 12).

67 The Environmental Protection Administration, 「問與答」['Q&A'] (EPA website, 2019) <https://hwms.epa.gov.tw/dispPageBox/onceOff/onceOffDetail.aspx?ddsPageID=EPATWH74&dbid=4357915398>; 黃靖軒[Huang Jingxuan], 「臺灣新限塑政策起跑半年，成效如何？」['What are the Effects of the Taiwan's New Plastics Regulations?'] (n 45).

68 See also: Thøgersen (n 65) 1521.

plastic reform.[69] This investigation sets the ground for the sequential case against EPA's measures and policy-making procedure. The Control Yuan eventually proposed Corrective Measures to the EPA and the Executive Yuan for improvement in 13 May, 2019.[70] It is a forceful legal action with constitutional weight against the government, as according to the Constitution, the Executive Yuan (the government) and related subordinate organs (in this case the EPA) shall accepted this Corrective Measures and make improvement accordingly or take other actions immediately, and reply to the Control Yuan in writing in two months to see if the improvement is satisfactory.

These papers in short condemn the EPA's procrastination and reluctance in taking actions and failure in building up effective recycle system and circular economy. Overall, the Corrective Measures conclude that the plastics restriction policy has been detached from the policy aim of circular plastics economy.[71] The report points out that on the side of producer, despite the first stage of plastics regulation launched in 2002, the EPA falls through in making appropriate institutional design and legal arrangement to encourage the plastic industries to make industrial transformation. Accordingly, the plastic industry remains the status quo. In consequence, the recycle industries have no intention to collect, segregate and process plastics waste, especially when the government only subsides very limited sorts of plastics waste As a result, the production of plastic bags in recent decade even increases, while the usage of recycled materials remains extremely low.

On the consumers' side, even though the recycling has been carry out seriously, the high usage of plastic bags in recent decade is still a normality. As consumers believe that such waste have been or will be recycled, people seems to be at ease to use even more plastics. But the reality is, at least in most of the cases, people made arduous effort in recycling only to find that the recycled plastics are factually treated as general waste. This claimed recycling is at most a garbage sorting, for the materials are not reused. It is not difficult to see why the Control Yuan came to the conclusion that the circular plastics economy claimed by the EPA is basically an illusion, as underlie the disguise of propaganda is the remaining unsustainable economic mode that features unrestricted exploitation, production and consumption.

Although the Control Yuan's report criticizes the EPA's measures against the plastics by far, it may not explicitly object the 2018 plan. Nonetheless, since the 2018 plan follows the path of the 2002 regulation and similarly avoid transformation in fundamental economic structure, it is difficult to deflect the same criticism for the 2018 plan.

5.2 Building a Bottom Up Circular Economy

The Control Yuan entrenches circular economy as the policy goal of the plastics regulation and made criticisms accordingly. The EPA also see the 'circular economy' as its intended aim.[72] However, the evaluation of the plastics regulation from the Control Yuan reveals a number of gaps and challenges that will spark more debates over the notion of circular economy. Accordingly, this section stresses the theoretical ground of the Control Yuan's architecture and therefore illustrate in what sense the EPA's vision or version of

69 監察院 [The Control Yuan], 「調查報告」 ['Official Investigations Report'] (Control Yuan website, 13 May 2019)108 財調 0027 <https://cybsbox.cy.gov.tw/CYBSBoxSSL/edoc/download/27292>.

70 監察院 [The Control Yuan], 「監察成果」 ['Attainment of the Control Yuan'] (Control Yuan website, 13 May 2019) <https://www.cy.gov.tw/sp.asp?xdURL=./di/RSS/detail.asp&ctNode=871&mp=1&no=6547>; 監察院 [The Control Yuan], 「糾正案文」 ['Corrective Measures'] (Control Yuan website, 13 May 2019) 108 財正 0013 <https://cybsbox.cy.gov.tw/CYBSBoxSSL/edoc/download/27293>.

71 ibid.

72 The Environmental Protection Administration, 「我主辦永續物料國際研討會暨工作會議-推展循環經濟成果」 ['The 5th International Conference on Sustainable Materials Management'] (Environmental policy monthly, December 2018) 3 <https://www.epa.gov.tw/DisplayFile.aspx?FileID=23EBF40CF1BD6BA8&P=2eb27ce6-1a6b-4600-8010-72ec8cf4c113>; The Environmental Protection Administration, 「循環經濟」['Circular Economy'](EPA website, 19 April 2019) <https://www.epa.gov.tw/Page/3CC3DE65CAA48921>.

circular economy is defective and in what way it should be reconsidered.

To relocate and redirect circular economy, the primary step is to find the guiding values or goal of circular economy. For example, under international policy the Sustainable Development Goals (SDGs), in particular SDG12, should be the primary policy goal for the operation of circular economy toward a genuine sustainability.[73] Furthermore, there is a need for the regulator to make comprehensive empirical research before proposing single-use plastic products regulation under sustainable development approach and circular economy model.[74]

The main ideas of the SDG 12 (incorporating sustainable production and consumption) and circular economy are widely admitted as a mutual reinforcement of each other.[75] Furthermore, the SDG 12.5 clearly states that 'By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse'.[76] The 12.C further demands to 'Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, …, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts …'. [77] This suggests that the SDG 12 is expecting to see a circular plastics economy that is not activated by distorted subsidies but on the base of a restructured taxation.

As a starting point, in Taiwan there will be little disagreement to require more comprehensive regulation against plastics. The results of polls indicate that Taiwan society is expecting functional measures to handle plastics issues, but also in an efficient way. However, as the above discussions have illustrated, incomplete and piecemeal regulations against diverse forms of plastics and products is insufficient. Differentiation in different form of dining industries and grace period between drink or food service, dining-in or take-out are also widely seen as unnecessary. These complex institutional designs are not welcomed because they do no good for better compliance; on the contrary, they become detrimental to the reform, in that it generates more costs to advocate, understand, and comply with the ban.[78] If the regulator has made localized investigations and sufficient communications in the policy-making process, these obstacles can absolutely be removed.

For similar reason from previous experiences and discussions, it seems both legal regulation and social awareness alone are not enough to play that pivot role. Even the EPA, as regulator, did not buy into a simple 'command and control' logic that regulatory measures alone can alter the social structure. Also, the actions that Taiwanese people are looking for is not only to perform a gesture of goodwill or a superficial propaganda with educative implications.

Accordingly, a first step is to go beyond piece-meal regulation of plastics. A regulation that does not cope with the complete life circle of plastic products will not trigger a fundamental transition and shall be categorized

73 United Nations, Sustainable Development Goal 12: Ensure sustainable consumption and production patterns <https://www.un.org/sustainabledevelopment / sustainable-consumption-production/>.

74 Similar approach can refer to: Elaine Ritch, Carol Brennan and Calum MacLeod, 'Plastic Bag Politics: Modifying Consumer Behaviour for Sustainable Development' (2009) 33(2) International Journal of Consumer Studies 168.

75 Luca Marrucci, Tiberio Daddi and Fabio Iraldo, 'The Integration of Circular Economy with Sustainable Consumption and Production Tools: Systematic Review and Future Research Agenda' (2019) Journal of Cleaner Production 240; Sébastien Sauvé, Sophie Bernard and Pamela Sloan, 'Environmental Sciences, Sustainable Development and Circular Economy: Alternative Concepts for Trans-disciplinary Research' (2016) 17 Environmental Development 48.

76 UNGA, 'Transforming Our World: The 2030 Agenda for Sustainable Development' (2015) A/RES/70/1, 22.

77 ibid.

78 See the QA section in the EPA website to realize how many trivial problems are raised for the compliance of the 2018 reform. The Environmental Protection Administration, 'Q&A' (n 64).

as propaganda instead of solid actions.[79] A seemingly blanket but actually linear regulation set on calculation in number is certainly unrealistic to reach the goal, given all the grace period being set. The same, eco-awareness must evolve into motivational willingness to have real impact. The key solution is to make the 2018 plan substantively enshrined into living economic activities and gradually transform them.

Second, any proposed regulation needs to go beyond targeting consumption of plastics only. An effectual strategy must have potential to make substantive structural transitions that can animate or nudge the community and accordingly build up considerable momentum for fundamental reform. This plastic free economy (zero plastic economy) or at least zero-waste economy may only be achieved through a ban that can further responsible production and consumption on single-used plastic product that are recommended by SDG 12.

The 2018 plan also claimed that there would be more extensive regulations, but it is broadly unsatisfactory not because of the number of regulations but the target or scope of regulation. This may explain why there is an obvious regulatory blackhole or blind spot within this plan. A regulation that mostly limits itself to the side of consumption is insufficient, which may cripple the momentum for further reform. Taiwanese consensual demand for effectual actions do not refer only to more regulations to consumers and selling stores. Rather, it should be a request of change in behaviour in every segment of the economic activities, i.e. different participants from the side of production, including cargo, packing, or production industries, to the side of consumption.

Third, broader regulation needs to entail both environmental and social concerns. Environmental protection actions, including single-use plastic regulation against the pollution of plastic waste, must involve societal consideration. It needs to consider the fact that most of the impact caused will be undertaken by the most vulnerable citizens. The 2018 reform, for instance, affected at least four times more small businesses (around eighty thousand stores) than that of 2002 regulation. The coming measures will affect more small businesses who sell street food to earn their living. On the other hand, this could have a disproportionate impact on the poor through driving up prices, because the poor rely on frugal meals that and are sensitive to the elasticity of price.[80]

Notwithstanding these societal concerns, relevant regulations should not be deterred or deferred. Rather, the important message is that the regulator needs to think of local, social issues and protect the interest of the poor. The reform should integrate different parts, turn conflicting interests into impulse of the system, and in turn benefit all participants. For instance, the sensibility to the price can be converted into incentive to reuse and recycle, while benefits from the collected tax (or fee) and recycle industries should reward the destitute and waste-picker. In summary, a sustainable development approach emphasizing systematic consideration to local factors including societal dimension is pepping up as the firm belief and vision of Taiwan society.[81]

79 The Environmental Protection Administration, "Why Not Regulate the Use of Single-use Utensils for Street Vendors and Stallholders in Night Markets' (n 13).

80 Qamar Schuyler and others, 'Economic Incentives Reduce Plastic Inputs to the Ocean' (2018) 96 Marine Policy 250; Nicholas Rivers, Sarah Shenstone-Harris and Nathan Young, 'Using Nudges to Reduce Waste? The Case of Toronto's Plastic Bag Llevy' (2017) 188 Journal of Environmental Management 153, 154.

81 The Environmental Protection Administration, 'Sustainable Resource Utilization via Circular Economy' (2019) 1 Electronic Environmental Policy Monthly <https://www.epa.gov.tw/DisplayFile.aspx?FileID=8E2B6233B5C61F3E&P=fbf2d30f-e269-4fc9-acfc-34491520c68a>.

Finally, the transition to a circular economy needs to be based upon building a localised and closed loop, formulating a local and independent circuit.[82] As suggested above, reforms need to target both production and consumption. Especially when the community cannot sustainably and responsibly utilise its wastes for future production and consumption, the community should reduce its exploitation and production at the very beginning. Essentially, a circular economy must not largely rely on others to handle its own problems.[83] This is different from the current reform track that is largely entrenched in present economic model. The existing economic system features mass-production of plastic products, wide-spreading consumption and heavy reliance on petroleum resources, it also equips with effective disposal system and particularly high recycle rate.[84]

The 2018 plan looks progressive in the sense of circular economy, but it in effect makes little progress in fundamental transformation regarding present economic model featuring the extensive productions of plastics, the source of all plastics pollutions. At most, this economic model can be realised as a neo-liberal approach to circular economy.[85] It holds that environmental protection should be approached through technological innovation and economic rationale, particularly free market mechanism.[86] What's more, environmental protection could even become a good business for everlasting economic development.

On the contrary, suppose that the 2018 plan can put more stress on the side of production or supply side, that is, to target the plastics industries to have a structural and systematic reform. Of course, this requires efforts: preparation work, including investigations, considerations, deliberations and balancing, need to be coped with beforehand. However, it is much easier to track its implementation and to have factual effect. It is because the production is at the core of the entomic activities, regulation on the side of production will profoundly link and affect the rest parts of the economic system including consumption, exploitation, and recycling at once. In this way, the regulation can thus form the circuit of the economy, and the effect of the regulation can be expanded to the entire loop of life circle.

82 AK Winans and H Deng Kendall, 'The History and Current Applications of the Circular Economy Concept' (2017) 68 Renewable and Sustainable Energy Reviews 825; Denise Reike, Walter JV Vermeulen and Sjors Witjes, 'The Circular Economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options' (2018) 135 Resources, Conservation and Recycling 246.

83 Mark Anthony Camilleri, 'The Circular Economy's Closed Loop and Product Service Systems for Sustainable Development: A Review and Appraisal' (2019) 27 Sustainable Development 530; Commission, 'Closing the Loop - An EU Action Plan for the Circular Economy' (Communication) COM (2015) 614 final.

84 行政院新聞傳播處 [Department of Information Services], 「推動多元化垃圾處理—讓垃圾變資源」 ['Promoting Diversified Approaches in Managing Waste'] (Executive Yuan website, 21 July 2017)<https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/70ee13a1-d525-4d92-8bc1-9901e3d1e605>; Kathy Chen, 'Taiwan: The World's Geniuses of Garbage Disposal' The Wall Street Journal (Taipei, 17 May 2016) <https://www.wsj.com/articles/taiwan-the-worlds-geniuses-of-garbage-disposal-1463519134>; Marcello Rossi, 'How Taiwan Has Achieved One of the Highest Recycling Rates in the World' *Smithsonian* (Taipei, 3 January 2019) <https://www.smithsonianmag.com/innovation/how-taiwan-has-achieved-one-highest-recycling-rates-world-180971150/>

85 A Flynn and N Hacking, 'Setting Standards for a Circular Economy: A Challenge Too Far for Neoliberal Environmental Governance?' (2019) 212 Journal of Cleaner Production 1256; A Murray, K Skene and K Haynes, 'The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context' (2017) 140(3) Journal of Business Ethics 369.

86 J Stiglitz, 'Neoliberalism Must be Pronounced Dead and Buried. What's Next' The Guardian (30 May 2019) 13.16< https://www.theguardian.com/business/2019/may/30/neoliberalism-must-be-pronouced-dead-and-buried-where-next>.

As such, the circular economy requires a strong determination to a thorough revolution and to overturn existing economic arrangement.[87] It demands collaboration from different departments of the government and various sections in private sectors.[88] There must be a complicated process and a suffering transition period.[89] A transition toward circular economy must involve painful economic reform and cannot be produced merely on paper in the government office. In the case of Taiwan, up to date, it has largely been formulated through government policy on paper, and hence reports of the circular economy in Taiwan sounds very much like a win-win story rather than a struggling battle where there are sacrifices must be made.[90]

In practice, since this ideal model of circular economy must accompany with difficult transformation, it needs to learn how to find local conditions and model to maintain the circular. As global trend and popularity cannot support this painful process, there is no universal template that regulators can copy from. This requires more cogent social support and political consensus toward a commonly shared and desirable future, which can only be possible after continuous discussion and deliberation. To make the local model of circular economy sustainable, the first step is to expose the illusion that we are already on the right track to circular economy. If this paper may have some contribution, it is hoped to do its bit in this regard.

87 Roberto Merli, Michele Preziosi and Alessia Acampora, 'How do Scholars Approach the Circular Economy? A Systematic Literature Review' (2017) Journal of Cleaner Production 703.

88 Anna Whicher and others, 'Design for Circular Economy: Developing an Action Plan for Scotland' (2018) 172 Journal of Cleaner Production 3237; Valerio Elia, Maria Grazia Gnoni and Fabiana Tornese, 'Measuring Circular Economy Strategies through Index Methods: A Critical Analysis' (2017) 142 Journal of Cleaner Production 2741; Patrizia Ghisellini, Catia Cialani and Sergio Ulgiati, 'A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems' (2016) 114 Journal of Cleaner production 1, 8.

89 Whicher and others ibid.

90 Executive Yuan, 'To Promote Circular Economy' (n 33).

6 CONCLUSION

Observing from the simple fact that to date Taiwan annually consumes 1.8 billion single-use plastic bags, four times more than that in EU, Taiwan's plastic regulation is hardly a success as claimed. However, Taiwan's case can still be an important lesson people can learn from. This paper demonstrates that despite its goodwill, the 2018 plan stands on a questionable diagnosis and target and may therefore lead to unwanted results. This research points out the ambivalence within regulations referred is a more precise description to the reason of the regulatory failure than the claimed lack of awareness and insufficiency in regulation. The solution to the regulatory failure, therefore, does not consist simply in transplanting foreign regulations as benchmark or in educating the subject. The hope of success rests on reflecting local concern and priority agenda, as well as finding grass-roots manner and resources in dealing with global plastic issue.[91]

By saying that, this paper by no means suggests environmental issue should get away from global vision. It only says that domestic sustainability can no longer be attained in an isolated manner or by exporting waste or outsourcing polluting industries through the neo-liberal global trade to the ignored corners of the world.[92] It is essential to integrate local dynamic into global goal and to resist the temptation to regard and transplant foreign regulatory measures as a universal model of solution. To mimic or imitate alien institution designs does no good to international cooperation and

91 Xanthos and Walker (n 59) 19.

92 Peter Dauvergne, 'Why is the Global Governance of Plastic Failing the Oceans?' (2018) 51 Global Environmental Change 22, 24.

linkage for the sake of global governance. The appearance of these copied measures may possibly be identical, but since the underlying philosophies distinct, regulatory effects will differ. The purpose of this argument is to highlight global environmental issues should be tackled from the ground.

All the single-used products are irrational use of nature resource and detrimental to global sustainability.[93] To refuse and reduce the usage of plastic bags and products, or at least to reuse and recycle plastic bags so as to avert from the reliance on petroleum might be the only way to approach global sustainability. The circular use of nature resource should not be realized as an excuse for consumerism[94] and novel boom for economic development.[95] As ecologically there is always a price to pay for the usage of nature resource, even in a circular use. In this sense, Taiwan's 2018 reform plan can only be celebrated until a zero-plastic commitment entrenched and executive measures adopted.

93 Jouni Korhonen and others, 'Circular Economy as an Essentially Contested Concept' (2018) 175 Journal of Cleaner Production 544, 551.

94 Kish (n 32).

95 Patrizia Ghisellini, Catia Cialani and Sergio Ulgiati (n 88).

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Article - Special issue on Designing Law and Policy Towards Managing Plastics in a Circular Economy

PERSONAL PROPERTY LAW FOR A ZERO-WASTE CIRCULAR ECONOMY: USING RETENTION OF TITLE CLAUSES TO REDUCE PLASTICS WASTE

Sean Thomas

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TABLE OF CONTENTS

1 INTRODUCTION

The enormous volumes of waste plastics are well known,[1] and the environmental costs are clear.[2] The term 'single-use' is fixed in public knowledge.[3] The resultant 'backlash' against plastics,[4] renders favourable plastics waste reduction strategies.[5] There have been international and domestic government waste limitation strategies alongside commercial responses.[6] Such strategies have added impetus following decisions in other countries to stop importing of waste plastics.[7] On 18 December 2018 the UK Government published its waste strategy for England,[8] which notably included specific reference to plastics waste as well as explicit engagement with circular economics, with global and domestic action continuing since.[9] March 2019 saw the European Commission publish *A Circular*

1 For the volumes of plastics waste see Department of Environment, Food and Rural Affairs, *Our Waste, Our Resources: A Strategy for England: Evidence Annex* (18 December 2018) <www.gov.uk/government/publications/resources-and-waste-strategy-for-england>, 106-108; see also Edward Humes, *Garbology: Our Dirty Love Affair with Trash* (Penguin 2012) 65, referring to the 'plasticization of America', and chs 5 and 6 generally on the extent and (environmental) costs of plastic use.

2 Less well known is that plastics waste is not necessarily the most significant source of waste: Her Majesty's Revenue and Customs, *Tackling the Hidden Economy: Public Sector Licensing* (8 December 2017) <www.gov.uk/government/consultations/tackling-the-hidden-economy-public-sector-licensing> 12; see also BBC News, 'Anti-Plastic Focus "Dangerous Distraction" from Climate Change' *BBC News* (22 October 2018) <www.bbc.co.uk/news/uk-45942814>.

3 'Single-use' has been declared word of the year by Collins Dictionary: BBC News, 'What is 2018's Word of the Year?' *BBC News* (7 November 2018) <www.bbc.co.uk/news/uk-46121787>.

4 Stephen Buranyi, 'The Plastic Backlash: What's Behind our Sudden Rage – And Will it Make a Difference' *The Guardian* (13 November 2018) <www.theguardian.com/environment/2018/nov/13/the-plastic-backlash-whats-behind-our-sudden-rage-and-will-it-make-a-difference>.

5 See Jessica Elgot, 'UK Public Backs Tough Action on Plastic Waste in Record Numbers' *The Guardian* (18 August 2018) <www.theguardian.com/environment/2018/aug/18/uk-public-backs-tough-action-on-plastic-waste-record-numbers-consultation-latte-levy-tax>; Sandra Laville, 'Plastic Waste Set to Beat Price as UK Shoppers' Top Concern – Study' *The Guardian* (10 September 2018) <www.theguardian.com/environment/2018/sep/10/plastic-waste-set-to-beat-price-as-uk-shoppers-top-concern-study>.

6 See BBC News, 'Iceland Supermarket Chain Aims to be Plastic Free by 2023' *BBC News* (16 January 2018) <www.bbc.co.uk/news/business-42692642>; BBC News, 'McDonald's Aims for Fully Recycled Packaging by 2025' *BBC News* (16 January 2018) <www.bbc.co.uk/news/business-42704291>: BBC News, 'What are Supermarkets Doing to Fight Plastic?' *BBC News* (14 January 2018) <www.bbc.co.uk/news/science-environment-42652937>.

7 Roger Harrabin, 'UK Faces Build-up of Plastic Waste' *BBC News* (01 January 2018) <www.bbc.co.uk/news/business-42455378>; Karen McVeigh, 'Huge Rise in US Plastic Waste Shipments to Poor Countries Following China Ban' *The Guardian* (5 October 2018) <www.theguardian.com/global-development/2018/oct/05/huge-rise-us-plastic-waste-shipments-to-poor-countries-china-ban-thailand-malaysia-vietnam>. China's prohibition on waste imports was pursuant to WTO Notification G/TBT/N/CHN/1211 of 18 July 2017 and G/TBT/N/CHN/1233 of 15 November 2017; most recently: Hannah Ellis-Petersen, 'Treated like Trash: South-East Asia Vows to Return Mountains of Rubbish from West' *The Guardian* (28 May 2019) <www.theguardian.com/environment/2019/may/28/treated-like-trash-south-east-asia-vows-to-return-mountains-of-rubbish-from-west>; BBC News, 'Why Some Countries are Shipping Back Plastic Waste' *BBC News* (2 June 2019) <www.bbc.co.uk/news/world-48444874>.

8 Department of Environment, Food and Rural Affairs, *Our Waste, Our Resources: A Strategy for England* (18 December 2018) <www.gov.uk/government/publications/resources-and-waste-strategy-for-england>.

9 Emily Holden and Aagencies, 'Nearly All Countries Agree to Stem Flow of Plastic Waste into Poor Nations' *The Guardian* (11 May 2019) <www.theguardian.com/environment/2019/may/10/nearly-all-the-worlds-countries-sign-plastic-waste-deal-except-us> reporting on the Meetings of the conferences of the parties to the Basel, Rotterdam and Stockholm Conventions, April-May 2019, Geneva <www.brsmeas.org/2019COPs/Overview/tabid/7523/language/en-US/Default.aspx>, requiring government consent for importation of plastics, notably the US has not agreed to this.

Economy for Plastics,[10] which is discussed further below.[11]

In general, these responses to plastics waste have varied.[12] At a technical level, there are responses such as reducing the diversity of polymers (and thus making it easier to recycle).[13] There are also planned prohibitions on the use of certain single-use plastics.[14] This would be a laudable move, but it will not be a panacea,[15] especially as the ubiquity of plastics makes widespread elimination arguably impossible.[16] A more subtle approach, which acknowledges the continuing necessity of plastic to the economy, might be that of pricing plastics so they 'reflect life-cycle costs'.[17] The rationale for this simple suggestion, that plastics (whether as individual goods or as ingredient material for complex artefacts) are currently priced so low as to justify their abandonment after limited use, is justifiable to an extent. However, such price increases will invariably fall on end-users, which may not be the fairest approach. More directly in the context of this article, pricing goods to reflect their life-cycle costs will not of itself aid moves towards circular economics.[18]

A circular economic approach would thus be to look to supply-side mechanisms, such as altering the design, production and use of goods to reduce the incidence of waste, rather than merely taxing waste away at the

10 European Commission (Michiel de Smet and Mats Linder eds), *A Circular Economy for Plastics: Insights from research and innovation to inform policy and funding decisions* (2019) <https://publications.europa.eu/s/mTES>.

11 Text following n 85.

12 See Resource Futures and Nextek, *Eliminating Avoidable Plastic Waste by 2042: A Use-Based Approach to Decision and Policy Making* (June 2018) <ciwm-journal.co.uk/wordpress/wp-content/uploads/2018/06/Eliminating-avoidable-plastic-waste-by-2042-a-use-based-approach-to-decision-and-policy-making.pdf>, 91 (a long-list of 57 potential interventions to improve plastics use efficiency).

13 DEFRA, *Our waste, Our Resources: Evidence Annex* (n 1) 108.

14 DEFRA, *Our waste, Our Resources* (n 8) 54; DEFRA, *Our waste, Our Resources: Evidence Annex* (n 1) 113; Bernie Thomas, George Cole and Howard Walker, *A Preliminary Assessment of the Economic, Environmental and Social Impacts of a Potential Ban on Plastic Straws, Plastic Stem Cotton Buds and Plastics Drinks Stirrers* (May 2018) <http://randd.defra.gov.uk/Document.aspx?Document=14326_Plasticstrawsstemcottonbudsandstirrers.pdf>; European Commission, 'Proposal for a Directive of the European Parliament and of the Council on the Reduction of the Impact of Certain Plastic Products on the Environment', (Communication) COM 340 Final (2018) <http://ec.europa.eu/environment/circular-economy/pdf/single-use_plastics_proposal.pdf>; David Shukman, 'Straws: UK Government to Bring in New Controls on Plastics' *BBC News* (London, 22 May 2019) <www.bbc.co.uk/news/science-environment-48358002> (controls on certain single use plastics from April 2020).

15 Peter Maddox, 'The Unintended Consequences of a War on Plastic' (*Wrap*, 19 April 2018) <www.wrap.org.uk/blog/2018/04/unintended-consequences-war-plastic>. It is also worth noting that prohibitions on such goods may have substantial negative consequences for people with disabilities: Penny Pepper, 'I Rely on Plastic Straws and Baby Wipes, I'm Disabled – I have No Choice' *The Guardian* (9 July 2018) <www.theguardian.com/commentisfree/2018/jul/09/disabled-person-plastic-straws-baby-wipes>; Vivian Ho, '"People Need Them": The Trouble with the Movement to Ban Plastic Straws' *The Guardian* (25 August 2018) <www.theguardian.com/us-news/2018/aug/25/plastic-straw-ban-california-people-with-disabilities>.

16 Anthony L Andrady and Mike A Neal, 'Applications and Societal Benefits of Plastics' (2009) 364/1526 Philosophical Transactions of the Royal Society B: Biological Sciences 1977. For illustration of the volumes of plastic use, see Ellen MacArthur Foundation, 'New Plastics Economy (13 March 2019) <https://newplasticseconomy.org/assets/doc/GC-Spring-Report.pdf>. See also Tony Naylor, 'Waitrose's Package-free Shopping is a PR Move that Will Change Little' *The Guardian* (5 June 2019) <www.theguardian.com/commentisfree/2019/jun/05/waitrose-packing-free-shopping-pr-move-change-little>.

17 Sharon George, 'Are the Days of Recycling with a Clear Conscience over?' *The Guardian* (22 October 2018) <www.theguardian.com/commentisfree/2018/oct/22/recycling-fuels-consumption-plastic>.

18 cf Matthew Taylor, 'Tax "Virgin Packaging" to Tackle Plastics Crisis, says Report' *The Guardian* (20 November 2018) <www.theguardian.com/environment/2018/nov/20/tax-virgin-packaging-tackle-plastics-crisis-report>. The report commissioned by the WWF and the Resource Association, suggests a fee on virgin packaging and a rebate system for recycling. The article concludes: 'Campaigners say the recommendations of the new report would be a step towards a so-called circular economy – where fewer raw materials are used – creating less environmental damage'.

final consumption stage.[19] The reduction of plastics waste in circular economic context would thus occur through, inter alia, increasing the incidence of plastics recycling. Whilst it must be acknowledged that plastics recycling has many technological hurdles,[20] and has seen increasing criminal activity,[21] generally encouraging such recycling would help reduce the environmental impact of waste or surplus plastics in the first place. In addition, circular economics would also require the development of mechanisms to prevent the generation of waste or surplus plastics; indeed this may be the better option. In either case (increasing recycling or preventing waste), it is necessary to consider how to deal with plastics waste at early stages in production processes, rather than at the end-use point. The focus of this article is thus on commercial transactions, with the aim of analysing how English personal property law can help address the problem of plastics waste, other than by means of simple prohibitions, price manipulation, taxation,[22] criminal regulation,[23] or other end-use-point mechanisms.

The approach suggested here is that current English personal property law, specifically that concerning retention of title clauses (ROTC), could provide a suitable mechanism to achieve the necessary levels of control to generate circular economic relationships with the effect of reducing the generation of plastics waste. The focus is on English law, because English commercial law remains one of the primary systems of commercial law in the world.[24] English law is thus likely to be of particular relevance to the clearly global nature of the plastics and recycling trades. Economy unfortunately prevents any comparative analysis here, though it should be noted that English doctrine differs considerably from that found around the common law world, where the progeny of the United States' Uniform Commercial Code Article 9 on Security Interests can be found in various different forms of personal property security Acts.[25] In particular the doctrinal lodestar of this article, the ROTC, is treated

19 DEFRA, *Our Waste, Our Resources* (n 8) 26: 'The 'lifecycle' approach complements the circular economy model. It requires us to focus not just on managing waste responsibly, but on preventing its creation in the first place. It means taking into account how decisions taken during the design stage – at the start of the lifecycle – affect how a product is used and then disposed of by the consumer. At every stage of a product's lifecycle there is scope for people to do all they can to maximise resource value and minimise waste'.

20 Roger Harrabin, 'Recycled Packaging "May End up in Landfill", Warns Watchdog' *BBC News* (23 July2018) <www.bbc.co.uk/news/business-44905576>; Matt McGrath, 'Plastic Food Pots and Trays are Often Unrecyclable, say Councils' *BBC News* (4 August 2018) <www.bbc.co.uk/news/science-environment-45058971>; Wesley Stephenson, 'All the Plastic You Can and Cannot Recycle' *BBC News* (21 September 2018) <www.bbc.co.uk/news/science-environment-45496884>; Oliver Franklin-Wallis, '"Plastic Recycling is a Myth": What Really Happens to Your Rubbish?' *The Guardian* (17 August 2019) <www.theguardian.com/environment/2019/aug/17/plastic-recycling-myth-what-really-happens-your-rubbish?>.

21 See eg Sandra Laville, 'UK Plastics Recycling Industry under Investigation for Fraud and Corruption' *The Guardian* (19 October 2018) <www.theguardian.com/environment/2018/oct/18/uk-recycling-industry-under-investigation-for-and-corruption>.

22 cf DEFRA, *Our Waste, Our Resources* (n 8) 41 (noting how the 2018 budget introduced a tax from April 2022 on plastics with less than 30 per cent recycled content).

23 Department of Environment, Food and Rural Affairs, *A Consultation on Proposals to Tackle Crime and Poor Performance in the Waste Sector & Introduce a New Fixed Penalty for the Waste Duty of Care* (January 2018) <https://consult.defra.gov.uk/waste/crime-and-poor-performance-in-the-waste-sector/>.

24 See eg Gilles Cuniberti, 'The International Market for Contracts: The Most Attractive Contract Laws' (2014) 34 Northwestern Journal of International Law and Business 455: English law is chosen most often by non-English parties in arbitration disputes at the International Chamber of Commerce, though there is no clear reason why. Furthermore, the commercial importance of London, and the number of trade organisations based there, means that often standard form contracts issued under the aegis of such trade organisations or other commercial entities, will (for good or for bad) reflect the English doctrinal position: Michael Joachim Bonell, 'The Law Governing International Commercial Contracts and the Actual Role of the Unidroit Principles' (2018) 23 Uniform Law Review 15, 19.

25 See eg Gerard McCormack, *Secured Credit under English and American Law* (CUP 2004); John de Lacy (ed), *The Reform of UK Personal Property Security Law: Comparative Perspectives* (Routledge 2010). It is acknowledged that later in this article (text following n 128) there is some focus on New Zealand doctrine. The cases analysed concerned the New Zealand law, which was essentially the same as English law, prior to the scheme adopted in the Personal Property Securities Act 1999.

considerably differently under such schemes.[26] This difference along with the generally important role of English law in commercial transactions provides a strong justification for this article's focus on English law.

It should of course be obvious that the proposals here are complementary to the variety of policy measures that could be implemented to reduce plastics waste; what is suggested herein is merely one of a number of possible mechanisms that could be utilised to deal with plastics waste in a circular economic context. Furthermore, these are tentative proposals; the specific content of the agreed conditions under an ROTC that could avoid the particular pitfalls that the current doctrine presents are not easy to determine, and remain to be substantively developed by both practitioners, commercial actors, and academics. Nevertheless, it is suggested that the proposals here would fit well within the conceptual basis presented in the Evidence Annex to the Waste Strategy, specifically in that it would be a market-based instrument which would be flexible and administratively feasible.[27] Furthermore, the ROTC approach may be useful in that the prevalence of such terms in commercial contracts suggests a level of commercial familiarity with the idea of retaining title, and it is worth noting that there is a strong tendency towards describing circular economic situations in terms that very much resemble ROTC.[28]

The next section outlines the concept of waste, as well as indicating how the control of goods is central to the meaning of waste in law, and to circular economics in general. The formulation of control in terms of ownership in circular economic literature will also be noted. Because the assessment of something as waste turns on the extent of control, it is thus necessary, to meet the circular economic ideal of eliminating waste, to provide mechanisms for the exercise of sufficient control so as to prevent waste or surplus plastics from falling into the legal definition of waste. This leads to the third section, which considers how English personal property law could provide a doctrinal regime for the long-term control of goods, using the possibilities offered by ROTC. This will show the possibility of constructing transactional frameworks that reduce the possibility of waste and allow for the recapture of surplus, in order to enhance the take-up of circular economic practices.

2 WASTE IN LAW AND IN CIRCULAR ECONOMY

Waste is a cyclical concept, involving multiple stages;[29] thus, regulation of waste can (and arguably must) be directed to the various stages of that cycle and not just at the end-point of disposal. This, along with the complicated relationship of domestic, European and international legal regimes on waste, makes the meaning of waste very difficult to understand.[30] This

26 D E Murray, 'The Unpaid Seller's Reservation of Title under the *Romalpa* Clause is Not Effective in America' [1981] LMCLQ 278.

27 DEFRA, *Our Waste, Our Resources: Evidence Annex* (n 1), Appendix 3: Policy Instrument Choice, 128-130.

28 See eg G Hieminga, *Rethinking Finance in a Circular Economy: Financial Implications of Circular Business Models* (May 2015) <http://www.ing.com/About-us/Ourstories/Features/Circular-economy-challenges-financial-business-models.htm>; explored further in S Thomas, 'Circular Economy, Title, and Harmonisation of Commercial Law' in O Akseli and J Lineralli (eds), *The Future of Commercial Law: Ways Forward for Harmonisation* (Hart Publishing (forthcoming)).

29 Iona Cheyne and Michael Purdue, 'Fitting Definition to Purpose: The Search for a Satisfactory Definition of Waste' (1995) 7 Journal of Environmental Law 149, 151: 'Waste Imanagement is therefore concerned not only with the final disposal or dumping of waste but with the whole cycle of waste creation, transport, storage, treatment and recovery in order to prevent polluting harm from coming about'.

30 David Wilkinson, 'Time to Discard the Concept of Waste?' (1999) 1 Environmental Law Review 172, 173-177; Stephan Tromans, 'EC Waste Law—A Complete Mess?' (2001) 13 Journal of Environmental Law 133, 155; Julie Adshead, 'The Waste Strategy for England 2007: Is It Deliverable?' (2008) 10 Environmental Law Review 46.

article will not provide a waste taxonomy,[31] or an exhaustive examination of the definition of waste.[32] Instead, a brief outline of some key elements of that concept within the broad context of UK and EU law is provided.[33] It is acknowledged that there are two factors that render this area highly fluid. First, there are continuing developments at the EU level concerning the implementation of circular economics, both generally and in the specific context of plastics.[34] Second, there is the obvious issue of Brexit: the immense complexity and current and continuing (September 2019) uncertainty means that it will not be addressed directly. It is worth briefly noting that circular economy, and plastics, are entirely absent from the current draft UK-EU Withdrawal agreement.[35] Within that draft agreement there is simply reference to non-retrogression in relation to inter alia waste management.[36] However, the December 2018 Waste Strategy suggests possible commonality between UK and EU strategy, with the UK Government aiming to match and where possible exceed relevant EU law on plastics waste (as well as circular economy matters).[37] As to the general EU movements on circular economy, these will not be addressed either. This is because to do so would be to go outside the specific direction of this article. Moreover, a reading of the relevant documentation produced by the EU clearly indicates that the specific aspect considered in this article – the potential to use ROTC in English personal property law (or indeed, any specific doctrine of English personal property law) as means to deal with waste – is not addressed at any point. However, as will be seen soon,[38] in the context of a general understanding of the regulatory framework on waste the approach suggested by this article is valid notwithstanding its absence from the EU documentation.

The basic regulatory framework is provided by the 2008 Waste Directive,[39] which 'clarifies but [also] resets the waste hierarchy'.[40] The waste hierarchy is a simple concept: goods should be prevented from being

31 cf Eva Pongrácz and Veikko J Pohjola, 'De-defining Waste, the Concept of Ownership and the Role of Waste Management' (2004) 40 Resources, Conservation and Recycling 141.

32 See eg Jurgen Fluck, 'The Term "Waste" in EU Law' [1994] European Environmental Law Review 79; Ilona Cheyne, 'The Definition of Waste in EC Law' (2002) 14 Journal of Environmental Law 61; David Pocklington, 'Opening Pandora's Box - the EU Review of the Definition of "Waste"' [2003] European Environmental Law Review 205; Eloise Scotford, 'Trash or Treasure: Policy Tensions in EC Waste Regulation' (2007) 19 Journal of Environmental Law 367; Robert Lee and Ellen Stokes, 'Rehabilitating the Definition of Waste: Is It Fully Recovered?' (2008) 8 Year Book of European Environmental Law 162; Richard Burnett-Hall and Brian Jones (gen eds), *Burnett-Hall on Environmental Law* (3rd edn, Sweet & Maxwell 2012) ch 14. See also Science and Technology Committee, *Waste Reduction* (HL 2007-08, 163-I), <www.gov.uk/government/publications/legal-definition-of-waste-guidance/decide-if-a-material-is-waste-or-not>.

33 See also Eloise AK Scotford and Jonathan Robinson, 'UK Environmental Legislation and Its Administration in 2013 – Achievements, Challenges and Prospects' (2013) 25 Journal of Environmental Law 383.

34 See eg European Commission, 'Review of Waste Policy and Legislation'(7 August 2019) <http://ec.europa.eu/environment/waste/target_review.htm> (noting the 'revised legislative proposals on waste to stimulate Europe's transition towards a circular economy'); European Commission, 'Implementation of the Circular Economy Action Plan' (7 August 2019) <http://ec.europa.eu/environment/circular-economy/> (noting the EU's Circular Economy Action Plan); European Commission, *A European Strategy for Plastics in a Circular Economy*, COM (2018) 28 final <eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN>; European Commission, *Proposal for a Directive of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment*, (Communication) COM 340 Final (2018) <ec.europa.eu/environment/circular-economy/pdf/single-use_plastics_proposal.pdf>.

35 Draft Agreement on the Withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community (14 November 2018).

36 ibid Annex 4, Part Two, Article 2(1). This Annex exists with 'a view to ensuring the maintenance of the level playing field conditions required for the proper functioning of [Article 6(1), setting out the single customs territory of the UK]'.

37 DEFRA, *Our Waste, Our Resources* (n 8) 18, 22.

38 See text following n 48.

39 Directive 2008/98/EC of the European Parliament and of the Council on Waste and Repealing Certain Directives (OJ L312/3 2008) (Waste Directive).

40 Eloise Scotford, 'The New Waste Directive - Trying to Do It All ... an Early Assessment' (2009) 11 Environmental Law Review 75, 75-76.

wasted, re-used, recycled, subjected to other forms of recovery (eg energy recovery through incineration) before finally being disposed of as waste. However, Scotford notes that any 'clarity' derived from the explicit setting out of priorities of waste is 'complicated' by qualifications of that prioritisation,[41] and the delegation of assessment of the waste life-cycle to Member States 'according to their own methodologies and understandings of this concept'.[42] The overreaching ambition of the Waste Directive could only be met through an overly broad definition of waste: 'any substance or object which the holder discards or intends or is required to discard',[43] and waste holders as 'the waste producer or the natural or legal person who is in possession of the waste'.[44] Broadly put, it ties the meaning of waste to the holder's monetary valuation.[45] The Directive also attempts to shift behaviour towards waste minimisation, and viewing waste as a resource rather than a burden.[46]

Four broad points can thus be made: (1) a broadly objective approach is taken to assessing whether something is waste;[47] (2) reuse of waste is neither automatically protected nor is it intrinsically necessary;[48] (3) assessing whether waste ceases to be waste is at least partly focused on a market-exchange assessment;[49] and (4) waste regulation focuses on the control of goods,[50] with the act of discarding remaining key.[51] The centrality of control, and commodification of waste, in this regulatory framework illustrates the commercialised conception of waste policy. As will be seen, circular economics very much rest on the notion of waste as a valuable commodity. In this sense there appears considerable conceptual and policy similarity between the pre-existing waste framework and circular economics, such that circular economic practices should be relatively easily developed within this regulatory framework. To achieve such developments though would require recognition of the importance of Member States' capacity to meet the Waste Directive obligations through 'their own methodologies and understandings' of the concept of the waste life-cycle.[52] This is the jumping-off point for this article.

It is suggested that one way in which we can understand the waste-life cycle is a process by which the diffusion of ownership results in a loss of control of goods such that they become waste.[53] The term 'diffusion of ownership' may appear loaded with jurisprudential niceties, but it is simply used to indicate that a loss of control can arise by the processes of sale and purchase: the transference of ownership rights from one party to another down a chain of transactions has the effect of shifting control down that form a chain in roughly the same order. This is a very crude approximation of the reality of commercial consumption of goods. Whilst it is acknowledged that English law does not automatically connect ownership with possession, the practical reality is that the two are intimately connected. Thus, by selling goods, the vendor is giving up control of the goods to the vendee. Thus, the purpose of this article is to argue that there is a potentially valuable

41 ibid 80, 85 (discussing Directive 2008/98/EC, art. 4(1), (2)).

42 ibid 81. For an earlier critique of the EU's approaches, see eg Enrique Tueft-Opi, 'Life After End of Life: The Replacement of End of Life Product Legislation by an European Integrated Product Policy in the EC' (2002) 14 Journal of Environmental Law 33.

43 Waste Directive, art 3(1).

44 ibid art 3(2).

45 Thus following the basic principles outlined by Carnwath LJ in *R (OSS Group Ltd)* v *Environment Agency* [2007] EWCA Civ 611; [2007] Bus LR 1732.

46 Scotford (n 40) 79-80.

47 *The Environment Agency* v *Short* [1999] JPL 263; [1999] PELB 18.

48 Although reuse is a priority in the waste hierarchy, factors relating to the financial and technical competence of waste disposal actors, the ease of regulatory oversight and the nature of the waste itself may mean landfilling is the preferred regulatory option: Department of Environment, Food and Rural Affairs, *A consultation on proposals to tackle crime and poor performance in the waste sector & introduce a new fixed penalty for the waste duty of care* (January 2018) <https://consult.defra.gov.uk/waste/crime-and-poor-performance-in-the-waste-sector/>. See also eg *R* v *Ezeemo* [2012] EWCA Crim 2064; [2013] 4 All ER 1016 (trade in sending electrical goods dumped in tips in the UK for refurbishment in Nigeria was held to be in breach of EU law concerning waste transfers).

49 Waste Directive, art 6 (1)(b).

50 Tromans (n 30) 136.

51 Scotford (n 40) 82; *Long* v *Brooke* [1980] Crim L Rev 109, 110.

52 ibid.

53 For a theoretical explanation, see Michael Thompson, *Rubbish Theory: The Creation and Destruction of Value* (Pluto Press [1979] 2017).

mechanism within English personal property law that enables parties to maintain control despite plastics being transferred down a transactional chain.

2.1 Circular Economics and Plastic Waste

Circular economics is a heterodox ideology, as shown by the multiple potential visions of circular economic practices.[54] It has a wide range of manufacturing and transactional models and forms, aiming at different objectives from environmental sustainability to cost minimisation and product and data ownership and control. This article is not the place to outline what circular economics is or its importance. Nevertheless, the clear growing governmental interest in circular economics,[55] means the impact of specific legal frame works and substantive doctrines on circular economic practices will likely become a key point of tension in the future development of circular economic thinking.[56]

One common refrain in circular economics concerns the capacity to eliminate waste. How this is phrased varies according to context.[57] The general circular economic ideals concerning waste have been given focus for plastics waste by means of the 2016 New Plastics Economy Initiative,[58] a project led by the Ellen MacArthur Foundation.[59] Two reports underline the

54 See Ellen MacArthur Foundation, 'Circular Economy: Concept' <www.ellenmacarthurfoundation.org/circular-economy/concept>; Walter R Stahel, 'The Circular Economy' (*Nature* 23 March 2016) <www.nature.com/news/the-circular-economy-1.19594>; Michael Braungart and William McDonough, *Cradle to Cradle: Remaking the Way We Make Things* (Vintage [2002] 2009). From a business perspective, see Peter Lacy and Jakob Rutqvist, *Waste to Wealth: The Circular Economy Advantage* (Palgrave MacMillan 2015); Julian Kirchherr, Denise Reike and Marko Hekkert, 'Conceptualizing the Circular Economy: An Analysis of 114 Definitions' (2017) 127 Resources, Conservation & Recycling 221; Callie Babbitt and others (eds), 'Sustainable Resource Management and the Circular Economy' (2018) 135 Resources, Conservation and Recycling 1 et seq.

55 See eg DEFRA, *Our Waste, Our Resources* (n 8); ibid, Ellen MacArthur Foundation: The necessarily global nature of waste and circular economy is reflected in eg The Memorandum of Understanding on Circular Economy Between the European Commission and the National Development and Reform Commission of the People's Republic of China (16 July 2018) <http://ec.europa.eu/environment/circular-economy/pdf/circular_economy_MoU_EN.pdf>. See also Ellen MacArthur Foundation, 'China-EU Agreement Paves Way for Global Adoption of Circular Economy' <www.ellenmacarthurfoundation.org/news/china-eu-agreement-paves-way-for-global-adoption-of-circular-economy>.

56 As implied by the growing legal literature on circular economy: Florin Bonciu, 'The European Economy: From a Linear to a Circular Economy' (2014) 14 Romanian Journal of European Affairs 78; Carl Dalhammar, 'The Application of "Life Cycle Thinking" in European Environmental Law: Theory and Practice' (2015) 12 Journal of European Environmental & Planning Law 97; Thomas J de Römph, 'Terminological Challenges to the Incorporation of Landfill Mining in EU Waste Law in View of the Circular Economy' (2016) 25 European Energy and Environmental Law Review 106; Katrien Steenmans, Jane Marriott and Rosalind Malcolm, 'Commodification of Waste: Legal and Theoretical Approaches to Industrial Symbiosis as part of a Circular Economy' (University of Oslo Faculty of Law Research Paper No. 2017-26, 2017) <ssrn.com/abstract=2983631>; Chris Backes, *Law for a Circular Economy* (Eleven International Publishing 2017) <www.uu.nl/sites/default/files/rgl-ucowsl-backes-law_for_a_circular_economy.pdf>; Sean Thomas, 'Law, Smart Technology, and Circular Economy: All Watched Over by Machines of Loving Grace?' (2018) 10 Law, Innovation & Technology 230; Jukka T Mähönen, 'Financing Sustainable Market Actors in Circular Economy' (26 October 2018) University of Oslo Faculty of Law Research Paper No 2018-28 <ssrn.com/abstract=3273263>; Sean Thomas, 'Law and the Circular Economy' [2019] JBL 62; Michael Burger, 'Materials Consumption and Solid Waste' in Michael B Gerrard and John Dernbach (eds), *Legal Pathways to Deep Decarbonization in the United States* (ELI Books 2018) <ssrn.com/abstract=3276245>; Thomas, 'Circular Economy, Title, and Harmonisation of Commercial Law' (n 28); Eléonore Maitre-Ekern and Carl Dalhammar, 'Towards a Hierarchy of Consumption Behaviour in the Circular Economy' (2019) 26 Maastricht Journal of European and Comparative Law 394.

57 See eg Ellen MacArthur Foundation, 'Circular Economy: Concept' <www.ellenmacarthurfoundation.org/circular-economy/concept>: 'design waste out of the system'.

58 Ellen MacArthur Foundation, 'The Initiative' <newplasticseconomy.org/about/the-initiative>.

59 Ellen MacArthur Foundation, 'Our Mission is to Accelerate the Transition to a Circular Economy' <www.ellenmacarthurfoundation.org/>.

New Plastics Economy Initiative: *Rethinking the Future of Plastics*,[60] and *Catalysing Action*.[61] Building on the evidence base provided by these reports as to the impact of plastics waste, and the potential for circular economic practices to help reduce and eliminate the problematic aspects of plastics, the Ellen MacArthur Foundation launched a Plastics Pact, whereby local organisations would help reduce and eliminate plastics waste alongside increasing the recycling and reuse of plastics.[62] Further developments in this area resulted in the October 2018 launch for the New Plastics Economy Global Commitment.[63] That document set out that 'A systemic shift tackling the root causes is required: a transition towards a circular economy for plastic, in which plastic never becomes waste'.[64] This in turn reflects the *Rethinking the Future of plastics* report, which states '[t]he overarching vision of the New Plastics Economy is that plastics never become waste; rather, they re-enter the economy as valuable technical or biological nutrients'.[65] The Commitment reflects and refines the targets set out in Plastics Pact to three main objectives:[66] elimination of unnecessary plastics; innovative designs for safe reuse, recycling, or composting plastics; and circulation of plastics 'in the economy and out of the environment'.[67]

This article focuses on the third objective – the circularity aspect. This is because it must be acknowledged, as it is within the literature just mentioned, that elimination of plastics is unlikely. Thus, developing mechanisms to embed circular economic practices in the manufacture and use of plastics is essential, not just for dealing with plastics but for dealing with plastics wastes as well. This is where legal responses, including those concerning ownership, become essential to the success of circular economy. However, in common with circular economic literature in general,[68] the legal aspects of developing and implementing circular economic practices regarding plastics waste are not expressed with clarity or certainty.[69] The Global Commitment makes no mention of ownership, or of law or legal aspects directly.[70] The *Catalysing Action* report fails to mention legal issues concerning ownership; the references to legal aspects in general are noticeable by their absence.[71] The report *Rethinking the Future of Plastics* has a section on legal responses to circular economics,[72] though what is noticeable is how that section merely identifies a variety of regulatory actions, almost entirely in the form of legislative prohibitions on types of (invariably single-use) plastics, such as carrier bags or takeaway food containers. There is a brief reference to the potential benefit from alteration of public procurement rules as a demand-side 'pull' towards circular economic plastics usage.[73] However, there is nothing on the substantive doctrine, nor on whether current doctrinal positions could have a viable role in promoting circular economic practices.

60 World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, The New Plastics Economy – Rethinking the Future of Plastics (2016) <newplasticseconomy.org/about/publications/report-2016>.

61 World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, The New Plastics Economy – Catalysing Action (2017) <newplasticseconomy.org/about/publications/report-2017>; most recently, see Ellen MacArthur Foundation, <https://newplasticseconomy.org/assets/doc/GC-Spring-Report.pdf> (13 March 2019).

62 <newplasticseconomy.org/projects/plastics-pact>. The UK charity WRAP delivered the first such implementation of this Pact: <www.wrap.org.uk/content/the-uk-plastics-pact>.

63 Ellen MacArthur Foundation, 'New Plastics Economy Global Commitment' <newplasticseconomy.org/assets/doc/global-commitment-download.pdf>.

64 ibid 1.

65 Rethinking the Future of Plastics (n 60) 18.

66 The Commitment also acknowledges that it 'will build on, and reinforce' other actions relating to plastics waste, including the EU strategy for plastics in a circular economy.

67 New Plastics Economy Global Commitment (n 63) 1.

68 See eg Mickey Howard and Ken Webster, 'Circular Business Advantage: What Organisations Need to Know' (24 October 2018) https://medium.com/circulatenews/circular-business-advantage-what-organisations-need-to-know-c7ae1954cc46 (noting, inter alia, how 'Product ownership will become a thing of the past').

69 Designing Law and Policy Towards Managing Plastics in a Circular Economy (SOAS Workshop, London, 2 June 2018) <https://www.soas.ac.uk/ledc/events/plastics-2018/>.

70 It does mention regulations in the context of food safety, but without any explanation.

71 Catalysing Action (n 61) 40 very briefly mentions laws concerning plastic packaging.

72 Rethinking the Future of Plastics (n 60) 37.

73 ibid 60-61.

December 2018 saw the publication of a new waste strategy for England, one which importantly, integrates circular economic thinking in dealing with waste.[74] It also specifically reflects on plastics waste, and provides numerous valuable policy suggestions to reduce and eliminate plastics waste.[75] At the heart of the various suggestions is recognition of the importance of preventing waste in the first place,[76] which involves not only improving design to enhance plastic recyclability,[77] but also developing 'regulatory or economic instruments if necessary and appropriate'.[78] One 'radical' aspect of the regulatory response is an enhanced concept of producer responsibility,[79] founded on the 'polluter pays' principle.[80] Where there is an application of this principle through extended producer responsibility, giving commercial parties the capacity though the utilisation of legal frameworks to control their outputs and thus avoid the generation of waste, can be seen as corollary to that principle. The negative incentive on producers to eliminate waste (i.e., if they fail to eliminate waste, then they pay) can be matched with a positive incentive. That is, there arguably need to be incentives for commercial organisations to recapture waste, including plastics, in order to recycle such products and reintegrate them within the (circular) economy and thus gain the benefits of utilising such resources.[81] Related are the concepts of reverse logistics and back-hauling of packaging: this involves companies reacquiring their products (including packaging) in order to prevent their wastage.[82] Similarly, there is the problematic issue of achieving 'end of waste' status, that is, where something that was waste is transformed so that it is no longer waste.[83]

This is of considerable importance given the current legal obligations to treat waste in particular ways in accordance with the Waste Directive. However, the specific implications for the legal doctrine concerning ownership are as unclear here as in the other reports concerning plastics and circular economics (as noted above). There appears to be a general assumption that shifting from ownership to other forms of transactions which involve retaining ownership is necessarily good.[84] Moreover, there appears to be a failure to recognise that the structure of the English doctrine on retaining ownership is not clear, and that this is particularly the case when it comes to providing circular economic transactional structures for plastics.

Most recently, in March 2019 the EU published a substantial document *A Circular Economy for Plastics*,[85] which begins by noting inter alia '[c]urrent laws and regulations are insufficient to enable cross-value-chain collaboration … policy innovations are needed to remove regulatory and legal barriers to system-wide collaboration'.[86] Amongst the policy recommendations are to '[d]evelop, harmonise and enforce regulatory and legal frameworks guided by systems thinking to connect the different actors of the plastics value chain(s)'.[87] Notwithstanding the current Brexit position (or lack thereof), the recognition of the importance of developing law, or as this article suggests utilising current doctrine, as one of a number of

74 September 2019 saw the publication of plans for a Circular Economy Bill before the Scottish Parliament: https://www.gov.scot/publications/protecting-scotlands-future-governments-programme-scotland-2019-20/pages/4/. Unfortunately, there is a lack of detail at this stage, though there has already been some criticism for the Bill's focus on waste recovery rather than reducing consumption: Richard Dixon, 'Climate Emergency Programme for Government Fails to Make the Grade' (*Friends of the Earth*, 3 September 2019) <https://foe.scot/press-release/climate-emergency-programme-for-government-fails-make-grade-scot-pfg/>.

75 DEFRA, *Our Waste, Our Resources* (n 8). See also DEFRA, *Our Waste, Our Resources: Evidence Annex* (n 1).

76 See George (n17).

77 DEFRA, *Our Waste, Our Resources* (n 8) 26.

78 ibid 17.

79 Marcus Gover, 'Resources and Waste Strategy: A Major Step Forward, With Lots to Do' (17 December 2018) <www.wrap.org.uk/blog/2018/12/resources-and-waste-strategy-major-step-forward-lots-do>.

80 See e.g. *Burnett-Hall on Environmental Law* (n 32) [2-116]-[2-225].

81 cf *Burnett-Hall on Environmental Law* (n32):2-118 'The [polluter pays] principle is thus in essence an economic instrument, intended inter alia to promote the rectification at source principle'.

82 DEFRA, *Our Waste, Our Resources* (n 8) 48-49.

83 ibid 81.

84 ibid 30; 37; 55.

85 EC (n 10).

86 ibid 10.

87 ibid 11.

possible ways to develop circular economic practices for waste plastics is clear. In particular, and in common with the general tenor of writing about the circular economy,[88] there is the suggestion that 'the biggest challenge … lies in … changing prevailing concepts such as ownership',[89] but there is a recognised gap in knowledge about how to achieve business practices which incorporate circular economic practices regarding ownership.[90] Indeed, the term 'ownership' is barely used in the report.[91]

This article thus examines the extent to which English law can provide circular economic transactional structures for plastics, specifically so that plastics waste is reduced. The English doctrine on ROTC arguably provides an appropriate framework, as it allows for the generation of commercial transactional forms which concentrate ownership in the initiator of a circular economic transaction,[92] rather than allowing for diffusion of ownership down the chain. This will give the initiator the power to control transactions, as well as the capacity to more effectively direct the use and recapture surplus plastics, thereby avoiding the generation of plastics waste. This is on the basis that the party with the legal title to an asset is the party with the capacity to enforce obligations as against third parties, and not just those with whom they have contracted. For the purposes of clarity, this argument is focused on working out ways by which parties can structure their commercial relationships to allow for voluntary recapture of waste plastics. It is not concerned with providing justifications for the imposition of obligations to recapture waste plastics.

88 See eg Technopolis Group, 'Regulatory Barriers for the Circular Economy: Lessons from Ten Case Studies (30 June 2016) <www.technopolis-group.com/wp-content/uploads/2017/03/2288-160713-Regulary-barriers-for-the-circular-economy_accepted_HIres.pdf> 52: 'The employment of leasing schemes for various products or servitisation is as another option to increase circularity. When the producer remains the owner and is responsible for maintenance their incentive is to maximise a product's lifetime and repairability. They are also incentivised to keep track of leased products in order to retrieve them for further treatment which limits illegal exports'

89 ibid 89.

90 ibid 92-93. Instead there is often rather beguiling statements such as this (at 98): 'In the product-service system concept, products and materials often remain the property of the companies. This ownership creates an incentive for designing the products so that they can be optimally reused, refurbished or recycled'.

91 Ownership is referred to in the pages cited immediately above. Property, as understood through the lens of 'personal property' is not mentioned, though in an amusing instance, the term property is used (at 131), correctly in its context as a scientific concept relating to plastics, and (this author is sure) unintentionally correctly in the context of the English doctrine: 'if the used resin collected ends up being reprocessed to be recovered in a substantially different type of application, the property requirements may be very different'. For the doctrine, see below at text following (n 128).

92 For a suggested nomenclature of circular economy, see eg Thomas, 'Law and the Circular Economy' (n 56) 62, 63 (instead of 'seller' and 'buyer', a better terminology might be 'initiator' and 'users' within a circular economic chain of transactions).

3 CONTROLLING GOODS TO AVOID WASTE

The previous section pointed out the importance of control within the regulation of waste (under the Waste Directive), as well as to circular economics. This is not the place to examine deeply what is meant by control, but 'control' in the context of waste law appears to be concerned with alteration of the physical status of goods. This will suffice for these purposes, because this is sufficient to analogise with the level of control that holders of proprietary interests in goods have. Achieving the levels of control necessary to (a) avoid goods being treated as waste and (b) effect circular economic practices will require transactional mechanisms and forms which allow for control of goods down a chain of transactions. Specifically, sellers of goods should be able to control the use of such goods, to the extent that they can recapture the goods from down-chain users if they are being used (or risk being used) in a manner inappropriate to circular economy.

What follows is an examination of the potential of ROTC to operate as a recirculating looping mechanism in the circular economic process; a means by which waste can be recaptured (to avoid it being disposed of as waste, to allow it to be reused as a material input). In particular, the historical basis of ROT illustrates

that control of the goods is a substantive part of the doctrine. That is, ROT doctrine does not solely focus on providing the ROT seller with a power to protect their economic investment in the goods concerned: there is more to ROT than mere economic protection against the buyer's insolvency. In this sense, a ROTC, much like any other security interest, enables the ROT seller to prevent the asset from being disposed of or treated in a way which would reduce or otherwise negatively impact on the secured party's rights over such asset.

Following this explanation is analysis of the issues concerning the transformation of goods in a manufacturing process; it will be argued that there is a necessary conflict between property rights and contractual agreements, but that the arguments against accounting for a party's intention are insufficient. Instead, it is suggested that there is nothing in principle preventing an ROTC from following through into manufactured goods. Following that, the next sub-section will briefly outline the *Bunkers* case, and will suggest that that jurisprudence indicates a way by which party autonomy, in terms of the retention of title and its effects, can be enhanced and effectively applied in the specific context of plastics, so as to provide a mechanism for the avoidance of waste plastics.

3.1 Retention of Title

Under English law sellers can 'reserve the right of disposal of the goods until certain conditions are fulfilled'.[93] It needs to be recognised that the meaning of the 'right to disposal' is rather obscure. It could be that draftsman Sir Mackenzie Chalmers' use of 'right of disposal', rather than 'right of property' may indicate an element of breadth to the power provided by section 19 of the Sale of Goods Act 1893. In the first edition of his text, *The Law of Sales* Chalmers said the term 'reserves the right of disposal' comes from *Mirabita* v *The Imperial Ottoman Bank*, where Cotton LJ said that the seller 'reserves to himself a power of disposing of the property'.[94] Chalmers noted that in *Mirabita*, Bramwell LJ had talked of the seller having both a property and a *jus disponendi*.[95] Chalmers explained this as dealing with situations where the seller intends to pass the property, the goods are delivered on 'such terms' i.e., with *jus disponendi*, 'as to prolong the right of stoppage *in transitu*, and in that sense a limited right of disposal may be said to be reserved'.[96] This remained the same in the second edition, following the Sale of Goods Act 1893.[97] This suggests that the right of disposal is limited to a right to stoppage in transit. This makes sense in the context of the *Mirabita* case, which involved transfers of commercial paper and documents of title. However, is there a substantive difference between that situation and the sort of situation involving ROTC faced by the courts a century or so later, including the sort of situation this article is specifically concerned with? More precisely, is there reason to think that the right of disposal may have a broader application in the present context?

Going back in time, it is clear from Benjamin that the issue of the *jus disponendi* was 'often a matter of great nicety to determine whether or not the vendor's purpose or intention was really to reserve a *jus disponendi*'.[98] This is worth briefly considering because

93 Sale of Goods Act 1979 s 19 (1). This is distinct from an ordinary contractual provision whereby goods are to be returned to seller upon a designated event, such as failure to export within a period: *DFS Australia Pty Ltd* v *Comptroller-General of Customs* [2017] FCA 547 [72].

94 (1878) 3 ExD 164 (CA) 172. HHJ Chalmers, *The Sale of Goods including the Factors Act 1889* (London, William Clowes and Sons 1890) 34; see also *The Annie Johnson* [1918] P 154, 163 (Sir Samuel Evans P): 'It is well known that these portions of the Act were founded on the judgment of Cotton LJ'; A P Bell, *Modern Law of Personal Property in England and Ireland* (Butterworths 1989) 252, fn 2: 'this is just another way of saying that property is not to pass'; cf Samuel Williston, *The Law Governing Sale of Goods at Common Law and under the Uniform Sales Act* (2nd edn, Baker, Voorhis & Co, New York 1924) vol 1, 633, fn 4, noting that the American legislation followed the Sale of Goods Act 1893, except for the somewhat loose phrase 'right of disposal' is substituted 'possession or property'. Williston goes on to provide a detailed examination of the flawed nature of *Mirabita*.

95 (1878) 3 ExD 164 (CA) 169-170.

96 Chalmers (n 94) 35.

97 ibid 44-45.

98 J P Benjamin, *A Treatise on the Law of Sale of Personal Property; with Reference to the American Decisions and to the French Code and Civil Law* (Henry Sweet, London 1868) 273.

it is clear that the right of disposal, the Sale of Goods Act 1893 s.19 provision which has followed through to the Sale of Goods Act 1979, was very much Chalmers' creation. Benjamin's approach is significant in that it would appear that there was no specific right of disposal of the sort found in s19. Instead, what we can do is look to the way the *jus disponendi* was understood, to perhaps gain a better understanding of how Bramwell LJ was using it.

Within Benjamin's discussion is an intriguing case *Craven* v *Ryder*.[99] There was an action for trover, for goods sold on credit terms. It was proven that the specific form of receipt had been adopted specifically 'for the express purpose of giving the shipper a command over the goods' until payment.[100] Gibbs CJ said that 'the holder of that receipt retains a control over the goods at least until he has exchanged the receipt for the bill of lading … the Plaintiffs might refrain from delivering the goods, unless under such circumstances as would enable them to recall the goods if they saw occasion'.[101] Benjamin said that '[t]his seems to be but another mode of describing what, in more recent cases, is termed a reservation of the *jus disponendi*'.[102] It may be suggested though that what this shows is that the term *jus disponenedi* was being utilised to cover a range of situations ever so slightly wider than stoppage in transit, to cover those cases where the vendor is attempting to control the goods. Moreover, it is important to cover those cases that are wider than stoppage in transit, by which we are necessarily meaning those cases other than those of buyer insolvency, since stoppage in transit is limited to such cases.[103] The difference is that the right here, *jus disponendi*, is one attendant to the seller's right to retain the property. This is distinct from a right attendant on the capacity to halt delivery up in the event of determining that the price will not be paid up. Put simply, one can control the shipment, or the goods themselves.[104] The *jus disponendi* was thus about controlling the goods specifically, and was very much relevant where the parties had explicitly introduced elements of control to the contractual agreement.

Whilst an ROTC is usually (perhaps even invariably) framed so that the conditional aspect is the payment of the price (and thus the ROT transaction is a form of secured credit), the reservation of the right to disposal may be able to provide more to a seller than protection as against a buyer's insolvency. The very statutory wording, and the historical background, suggests that there may be other possible uses for ROTC. That is, it may be possible to combine the retained title with a condition concerning something other than payment. Fundamentally, the ROTC provides the seller with an element of control over the goods. The ROTC cases have, unsurprisingly, been focused on the monetary aspect: how the seller's control generates protection as against the buyer's insolvency. At the same time, there has not been an overarching commercial policy reason to control the goods for other purposes; certainly, no policy as dominant as that of protection against counterparty insolvency. However, the rapid and substantial increase in commercial interest in circular economics, alongside actual commercial practices where parties are apparently retaining ownership to generate circular economic transactions, provides evidence of a new and increasingly important commercial policy reason to enable sellers to control goods. Moreover, it must be acknowledged that this is not a zero-sum policy game: ROTC can *both* protect against insolvency and provide down-chain transactional control at the same time.

That an ROTC can have such a broader purpose is not entirely obvious, but it can be discerned from various sources. ROTCs provide a proprietary protection, because the reservation of title means the seller retains

99 (1816) 6 Taunt 433; 128 ER 1103, at Benjamin, *Sale of Personal Property* (n 98) 275-276.

100 (1816) 6 Taunt 433, 433-434; 128 ER 1103, 1103.

101 (1816) 6 Taunt 433, 435; 128 ER 1103, 1103.

102 Benjamin, *Sale of Personal Property* (n 98) 276.

103 cf Iwan Davies, *Effective Retention of Title* (Fourmat Publishing 1991) 46: 'The whole purpose of the retention of title clause is that it is *not* limited in this way'.

104 cf Benjamin (n 98) 566: 'can the vendor exercise a *quasi* right of stoppage *in transitu*, - a right that might perhaps be termed a stoppage *ante-transitum*?' See also at 578: 'his Lordship was very emphatic in repudiating any supposed analogy with stoppage *in transitu* [and the unpaid vendor's lien], citing *McEwan* v *Smith* (1849) 2 H L Cases 309, 328; 9 ER 1109, 1117 per Lord Campbell.

the general property in the goods.[105] This means, as Worthington pointed out in her classic analysis, proprietary interests are 'vitally important when the defaulting party is insolvent; however, even outside that context they remain a powerful coercive tool'.[106] As Raczynska perceptively noted in her recent excellent monograph, *The Law of Tracing in Commercial Transactions*, an ROTC provides the seller with an interest in the asset itself, and not in its value.[107] It is this important distinction which provides the seller with the ability to control the asset;[108] it can repossess it should it be threatened by the buyer's actions.[109] It may also attempt to follow through into dispositions by the buyer (rather than being left with an interest in any funds such a disposition realizes), though as will be seen this is not an easy task.

There are further, more oblique, references to the capacity of an ROTC to introduce conditions other than those concerning repayment. Thus, in a footnote to a statement that the seller will protect himself against the buyer's default by making property passing conditional on payment, de Lacy puts it beguilingly simple: 'Property may also be retained subject to the buyer's performance of other conditions'.[110] Most recently, there is the following from the leading text on personal property security:

> Protecting its interests in the event of the debtor's insolvency is not the creditor's only possible motive for taking security. From the creditor's point of view, security, when allied to enforcement rights often operative without recourse to the courts, gives the creditor the opportunity to take speedy measures to abate future losses. A secured creditor, moreover, is able to control the affairs of the debtor at critical moments and is equipped with the means to monitor the affairs of the debtor.[111]

It is accepted that immediately after the just-quoted passage it is noted that 'control and monitoring needs' can be provided for by 'detailed financial covenants, coupled with rigorous events of default clauses'.[112]

105 Michael Bridge, *Personal Property Law* (4th edn, Clarendon Press 2015) 169: it is 'well settled' that ROT sellers 'retain the general property and not some unnamed security'. See e.g. *McEntire* v *Crossley* [1895] AC 457.

106 Sarah Worthington, *Proprietary Interests in Commercial Transactions* (Clarendon Press 1996) 2.

107 Magda Raczynska, *The Law of Tracing in Commercial Transactions* (OUP 2018) 144: 'Security interests and title-based interests are proprietary interests asserted in assets, not value, even though upon their enforcement, they are realized through sale and realization of the current market value'.

108 cf Worthington (n 106) 2: 'property is concerned with control over access to the benefits of resources'.

109 In this sense the ROTC is more than a mere seller's lien, which is waived by implication in credit sales. For an illustration of the importance of this capacity, see e.g. *Re Galway Concrete Ltd* [1983] ILRM 402, 406 (Keane J): 'Its objects would be wholly frustrated if the owner was not entitled to repossess the chattels in the event of a default in payment on the party of the buyer or, at the very least, in the event of a repudiation on the party of the buyer of the agreement', cited by Davies (n103) 78-79. See also John de Lacy, 'The Evolution and Regulation of Security Interests over Personal Property in English Law' in John de Lacy, *The Reform of UK Personal Property Security Law* (n 25) 5-7 (noting inter alia how it is possible, if rare, for parties to protect themselves in this way).

110 J de Lacy, 'Romalpa theory and practice under retention of title in the sale of goods' (1995) 24 Anglo-American Law Review 327, 349 fn 75. Others put it by means of implication, often leading to some uncomfortable assertions: Davies (n 103) 124: 'The emphasis on property reservation allows the owner to seize the property should the debtor fail in one of his primary obligations, especially the payment of the price. Essentially, the only commercial purpose of property retention is to ensure priority: the supplier is not retaining the asset himself but rather the right to use the asset to gain payment of the debt to him'. Here the first sentence (a repetition of that at 70) clearly allows for the possibility of an obligation other than price. The second sentence must thus be understood as a normative claim and thus can be qualified. Instead of 'the only commercial purpose', it might be better to have said the *main* commercial purpose. Other purposes, of substantial commercial value, may exist.

111 Hugh Beale and others, *The Law of Security and Title-Based Financing* (3rd edn, OUP 2018) [1.09]. Compare the qualified language in other older texts, e.g. Henry Aitken, *The Principles of the Law of Sale of Goods* (Edinburgh, E & S Livingstone 1921) 61: '[The seller] desires to retain the property until the price is paid *or some other condition has been performed* by the buyer … The object of receiving the right of disposal of the goods is *generally* to secure that the price shall be paid before the property passes' (emphasis added).

112 ibid.

However, in line with the caveat noted at the outset of this article,[113] there is no claim here that the ROTC approach is the only possibility. What is suggested is simply that the ROTC approach may be used to provide the necessary control to the supplier, such that they can attempt to prevent waste plastics from being disposed of by down-chain users so that they can present their transactions as being circular economics compliant. Nevertheless, it is suggested that the ROTC approach might have some benefits compared to, say, 'detailed financial covenants' due to the simplicity of the ROTC. Rather than having to ascertain (and negotiate) the covenants, the ROTC offers a 'ready-made' mechanism that enables the seller to maintain that level of control necessary for circular economic transactions; the ROTC provides a lower transaction-cost mechanism.

There is however a noticeable lack of clarity as to the extent of non-financial conditions that an ROTC could introduce. The ROTC case-law is, perhaps unsurprisingly, overwhelmingly concerned with financial conditions. The lack of guidance requires the development of an appropriate condition that may be used as part of an ROTC in order to achieve the type of control that this article suggests is possible. The condition could take this form: 'In order to comply with the principles of circular economy, title to all goods, including products of processes involving such goods, will be retained by the owner until the goods are transferred to an authorised third party for the expressly agreed purpose of treating the goods as a waste product for the purposes of the Waste Directive'. This example is merely illustrative, and the possible variations will depend on a wide range of factors. Different types of commercial situations will of course require additional, or different, variations on this. The preamble aspect, reflecting circular economic principles, is something of a flourish than anything else (especially in the absence of any specific legal formulations as to 'principles of circular economy'). Nevertheless, what it can provide is evidence of contractual intention, in particular, an intention to retain title for a purpose other than the common understanding of ROTC as securing against buyer insolvency per se. Doing so will be valuable in aiding courts to see how the parties are trying to avoid the pitfalls that can be created when parties attempt to reach into the financial value of products (rather than the objects themselves). Further evidence could be specified by explicit reference not only to a power to recapture, but by additional explanatory language regarding the purpose of such recapture (e.g. to prevent surplus going to waste, or indeed to take surpluses as waste, depending on the factual matrix).

Thus, we can see that ROTC can provide a mechanism (though it is not the only possibility) for the implementation of circular economic practices. The seller can retain a title to plastics, and by doing so, they retain the capacity to either direct the usage of the goods or, in the event that the use or treatment of the goods by down-chain parties is not in accordance with the conditions of the initial ROT transaction, they can recapture the goods. They have this power because they have the legal title to the goods, and as such this gives the ROT seller power to repossess the goods in the event of breach of the ROTC (in contrast to mere personal rights against the ROT buyer).[114]

Now it may well be that this title may be transferred by virtue of an exception to the basic rule *nemo dat quod non habet*;[115] the ROT buyer may qualify as a buyer in possession and thus their disponees may be able to acquire a title to the goods by virtue of the Sale of Goods Act 1979, section 25: buyer in possession exception. Two issues arise from this.[116] First, this protection for sub-purchasers may not actually be available in such cases. This is the consequence of the reasoning in *Re Highway Foods*. There it was held that

113 See text following (n 23).

114 cf Worthington (n 106) 16 noting that the buyer is in control, in the sense that title will pass if the buyer pays the price (or, for these purposes, does whatever condition is required). But, as Worthington rightly notes (at fn 50), the buyers 'control' is really a consequence of the contractual provisions. These provisions are likely to be determined by the seller: J R Bradgate, 'Reservation of Title Ten Years On' [1987] Conv 434, 444.

115 Sale of Goods Act 1979, section 21.

116 There are other issues, discussed with clarity in Raczynska, *Law of Tracing* (n107) 74-110.

because the transactions were on ROT terms, there was at best only an 'agreement to sell', and as such the Sale of Goods Act 1979, section 25 buyer in possession exception was not applicable.[117] Second, even if the *Re Highways Food* approach is incorrect,[118] then it may well be questioned whether or not the effect of the ROTC is to take the transaction outside the scope of the Sale of Goods Act 1979 altogether. This is the possible implication of the decision in *Bunkers*, and that is discussed further below.[119] This article though will put to one side the potential complications of the English *nemo dat* law for circular economics, and will consider instead the problems that are central to the ROT transaction itself. Specifically, it needs to be considered whether and to what extent the potential control that comes from retained title can actually be extended through to sub-disponees.

Until 1976, and the decision in *Aluminium Industrie Vaassen BV* v *Romalpa Aluminium*,[120] 'the notion of retention of title was in virtual abeyance'.[121] In cases following the (in)famous *Romalpa* decision,[122] a division between 'simple' and 'extended' ROTC arose. Simple ROTC involves sellers retaining ownership of goods supplied to one another. Such clauses operate as functional security interests, but they are not formal security interests (because they involve the retention of title, rather than the grant of an interest).[123] Because ROTCs 'have little practical utility if the goods have a short commercial life',[124] parties have tried different forms of extended ROTC: the basic type involves a seller attempting to retain an interest in the supplied product even after it has been through a manufacturing process by the buyer.[125] The danger with extended ROTC is that they may be recharacterized as a charge, granted by the buyer, and (invariably) void for want of registration. This distinction between simple and extended ROTC thus has an obvious impact on how best to structure circular economic commercial transactions involving plastics, especially the utilisation of waste plastics as recyclates. Consider the following:

New plastics are created by Company A. Company A has signed up to engage in CE practices, and the ROTC it utilises attempts to introduce elements of CE practices, specifically providing Company A with what it believes to be an element of control down the chain of transactions. By retaining title, it hopes to be able to prevent plastics being used inappropriately (including disposal as waste). Furthermore, it hopes to be able to re-acquire the plastics for re-use in the event that their disponees have surplus plastics. The clause is of the nature set out above: 'In order to comply with the principles of circular economy, title to all goods, including products of processes involving such goods, will be retained by Company A until the goods are transferred to an authorised third party for the expressly agreed purpose of treating the goods as a waste product for the purposes of the Waste Directive'.

Company A sells plastics on to Companies B, C and D. Company B uses plastics directly with other goods (in the manufacture of widgets); C uses plastics directly,

117cf Louise Gullifer, 'Exceptions to the *nemo dat* rule in relation to goods and the Law Commission's proposals in the Consultative Report' in John de Lacy, *The Reform of UK Personal Property Security Law* (n 25) 188, 193: these sort of cases are 'theoretically covered' by the Factors Act 1889, section 9.

118 See Sean Thomas, 'The Role of Authorization in Title Conflicts Involving Retention of Title Clauses: Some American Lessons' (2014) 43 Common Law World Review 29.

119 See text following n 215.

120 [1976] 1 WLR 676.

121 de Lacy, 'Romalpa theory' (n 110) 329.

122 *Re Bond Worth Ltd* [1980] Ch 228; *Borden (UK) Ltd v Scottish Timber Products Ltd* [1981] Ch 25; *Hendy Lennox (Industrial Engines) Ltd* v *Grahame Puttick Ltd* [1984] 1 WLR 485; *Clough Mill Ltd v Martin* [1985] 1 WLR 111 (CA); *E Pfeiffer Weinkellerei-Weineinkauf GmbH* v *Arbuthnot Factors Ltd* [1988] 1 WLR 150; *Compaq Computer Ltd v Abercorn Group Ltd* [1991] BCC 484; *Armour* v *Thyssen Edelstahlwerke AG* [1991] 2 AC 339.

123 *McEntire* v *Crossley Brothers Ltd* [1895] AC 457, 462 (Lord Halsbury LC); *Clough Mill v Martin* [1985] 1 WLR 111, 120-121 (Robert Goff LJ); *Armour v Thyssen Edelstahlwerek AG* [1991] 2 AC 339, 353 (Lord Keith), 354 (Lord Jauncey). For comparison with the US position see Gerard McCormack, *Secured Credit under English and American Law* (CUP 2004) ch 6.

124 Beale and others (n 111) [1.23].

125 cf Gerard McCormack, *Reservation of Title* (2nd edn, Sweet & Maxwell 1995) 2 (five types of ROTC: simple, current account; extended; tracing; and aggregation).

without other goods (in the manufacture of different types of plastic); D uses plastics indirectly (as moulds necessary for the production of doodads). Company E is a plastics recycler, receiving surplus and waste plastics from Companies A, B, C and D. Company E sells the recycled plastics back to the four mentioned companies, as well as to other third parties. At this stage it should of course be noted that the determination of each case will depend on the specific nature of the particular clause,[126] and the transaction as a whole.[127] The specific transactions will no doubt each have substantial documentation, including that relating to financing as well as other commercial issues. However, it remains a sufficiently simple and precise point to ask, to what extent can Company A control the use of goods it has supplied using ROTC? Conversely, to what extent is Company A able to rely on the ROTC to keep the surplus and waste plastics out of Company E's control?

The answer to these questions is depends on three aspects of ROTC law. First, there is the danger that without careful framing of the retention of title, the transaction may be characterised as a charge (and inevitably void for non-registration). Second, the transformation of the goods may be such that any title that the seller had in the goods is lost in favour of the buyer-manufacturer. Third, to what extent is it possible for parties to actually agree between themselves such that the title is retained by the seller even though the buyer processes the goods? The main focus here is on the second and third aspects. To illustrate the problems, we can look at *ICI New Zealand* v *Agnew*,[128] a decision of the New Zealand Court of Appeal, on facts which are especially relevant to the specific focus of this article,[129] i.e., the capacity of English law to provide mechanisms that enable circular economic practices involving plastics to operate so as to reduce wastage. *ICI New Zealand* v *Agnew* involved plastic pellets that were transformed into containers; a process that did not require additional materials but only the 'application of energy to the pellets, and the use of expensive machinery'.[130] The New Zealand Court of Appeal held it 'an unanswerable conclusion that pellets which were used to produce the container had lost their original identity – namely their identity as pellets. It cannot matter that they can be reconverted back to that identity, even assuming that could be a practical exercise. The question requires a common-sense answer'.[131] The (allegedly) common-sense answer was that the plastic contain was different to the pellets. Thus, any attempt to use an ROTC to provide control over the processed goods would be unsuccessful.

Unfortunately, stating that this question 'requires a common-sense answer' appeared to be the extent of the reasoning: it appears the Court was persuaded by counsel presenting them with a container, made of the pellets, which was itself full of the pellets. This appeared to be enough to convince the Court that the pellets' identity was lost; they were 'completely different in form'.[132] This seemed to be the determinative factor, as opposed to counsel's suggestion that a number of other factors should be accounted for, namely the reversibility of the process, the lack of admixture with other goods, the intention of the parties, and the 'limited extent of the change in physical appearance'.[133]

This decision thus stands headfast against any attempts to develop a circular economics approach to plastics, where such an approach relies on the retention of ownership in the seller-initiator of the circular economic transaction and that the seller-initiator can use this retained ownership right in order to control the use of the plastics down a chain of transactions, so as to prevent wastage and/or to recapture surpluses. It will be seen in the remainder of this sub-section that it is possible to argue that changes in goods

126 *Re Bond Worth Ltd* [1980] Ch 228; Beale and others (n 111) [4.22].

127 *Agnew v Commission of Inland Revenue* [2001] AC 710; *Helby v Matthews* [1895] AC 471; Beale and others (n 111) [4.21].

128 [1998] 2 NZLR 129.

129 It is worth noting that this case is not mentioned at any point in Raczynska (n 107).

130 [1998] 2 NZLR 129, 130 (Henry J).

131 ibid 135 (Henry J).

132 ibid 134-135 (Henry J).

133 ibid 134.

wrought by a manufacturing process might not lead to a loss of title. Specifically, it will be suggested that the decision in *ICI New Zealand* v *Agnew* should not be followed rigidly, thus opening a space for plastics suppliers to use ROTCs to cover the products of plastics reprocessing.

The balance between the material effects (i.e. the change to the original goods in the manufacturing process) and the contractual agreement 'is not entirely settled',[134] and the key test seems to be whether the original goods have 'lost their identity'.[135] This makes it sometimes difficult to draw the line between [cases where goods have lost their identity] and those (few) cases … where the goods have 'merely' been processed and have not lost their identity. No clear principle has yet emerged from the cases, which merely assert that the original goods have (or have not) 'lost their identity' and/or have been 'transformed' into a 'new product' … Nevertheless, it has been suggested that, contractual provisions apart, whether the supplier's title is lost or retained in the product should depend on 'economic realities' and 'issues such as whether reversing the process is economically realistic, and whether the goods have increased in value to make them a qualitatively different thing'. A cursory survey of the cases certainly suggests that if the processing increases the value of the original goods significantly, then the supplier's title is lost and this accords with an understandable reluctance to confer a 'windfall' on the supplier by holding that the more valuable products are still his.[136]

This extensive quotation is necessary to demonstrate the lack of clarity on the law.[137] There are divergent views on this matter. *Benjamin's Sale of Goods* goes slightly further in cautiously accepting the potential effect of party intention, as well as acknowledging that numerous factors may play a role in the determination.[138] Davies implicitly indicates that the specific agreement may be determinative,[139] and Worthington takes a similar view.[140] De Lacy has strongly argued that if goods supplied are subjected to a process that can be reversed without material damage, then an ROTC will be effective to allow the seller to recover the property on the buyer's default.[141] Furthermore he argued that, 'It is clear from the reasoning [in *Clough Mill*] that there was no legal principle preventing effect being given to a stipulation that title to manufactured products vested with the supplier … it remains open to the parties to expressly cater for the buyer's input into the finished product'.[142]

On the other hand, Raczynska argues that whilst there may be considerable freedom of contract, it is not an 'absolute' freedom and 'must be accommodated within

134 Citing *Clough Mill Ltd v Martin* [1985] 1 WLR 111, noted above (n 175).

135 Beale and others (n 111) [7.13].

136 ibid [7.15]. The suggestion about 'economic realities' is supported (at fn 105) by reference to Duncan Webb, 'Title and Transformation: Who Owns Manufactured Goods?' [2000] JBL 513, 540.

137 See also McCormack, *Reservation of Title* (n 125) ch 3, and 122-127.

138 M G Bridge (gen ed), *Benjamin's Sale of Goods* (10th edn Sweet & Maxwell 2017) (*Benjamin*) [5.151]: 'the question whether or not goods which are still identifiable, but have to a greater or less extent been worked on by the buyer or incorporated in other articles, remain the property of the seller would seem to depend upon what intention is to be imputed to the parties, having regard to such factors as the nature of the goods, the product, the degree and purpose of incorporation, and the manufacturing or other process applied'.

139 Davies (n 103) 32: 'There is no doubt that the approach taken by the Court of Appeal in *Clough Mill* and the House of Lords in *Armour* restores the lustre of retention of title clauses to suppliers of goods. One reason for this is that great emphasis was placed upon the agreement between the two parties as determining the issues. …Although it was not really at issue in *Clough Mill*, both Robert Goff and Oliver LJJ held at common law property in new goods made by material supplied could vest in the supplier so long as there was an agreement to this effect'.

140 Worthington (n 106) 14: it is possible, though not probable, and the necessary intention needs clear manifestation. See also, at 142, fn 128: the rules on *specification* are only relevant in the absence of contrary contractual agreement as to the location of title in manufactured products. It is also worth pointing out that Worthington also correctly noted (at 32) that windfall arguments against the seller having rights in products 'ought to be irrelevant'.

141 de Lacy, 'Romalpa theory' (n 110) 351.

142 de Lacy, 'Romalpa theory' (n 110) 355-356.

the existing legal framework which contains various limits' especially concerning property distribution rules.[143] Webb, whose work appears particularly influential,[144] goes even further in reifying rules of property over party intention. He argued that although 'courts have taken the view that there is no conceptual bar to such a contractual clause having the effect contended', 'such an approach is artificial and results in considerable inconsistencies';[145] 'inconsistencies in[…] the relationship between the law of contract and property which are unacceptable'.[146] The 'traditional analysis that any title in new goods must necessarily be acquired from the manufacturer, as that is where the title as a matter of law resides' has 'the advantage of simplicity. It requires no reformulation or addition to existing rules of law. It is consistent with and follows from the basic premises of property law'.[147]

Two responses can be made to this claim. First, it rests on the idea that property rules should not be susceptible to contractual manipulation. The problem here is that Webb's approach to this idea is rather absolutist, yet such a claim cannot be seriously held as applying without exception. Contractual agreements can and do have the effect of altering proprietary rights and interests; indeed contracts are one of the few ways by which we can voluntarily alter proprietary rights. Why should they not have such an effect in cases involving the production of goods? Furthermore, adherence to this absolute priority of property over contract has the effect of trying to do too much. It is not the purpose of this article to argue that there should not be any possibility of property rules providing the structure for transactions and that everything should simply be a riot of contracting. Instead, it is merely suggested that at the edges of the doctrine's application the strictness of Webb's approach starts to break down. This is arguably alluded to by Raczynska, who concludes her chapter on loss of proprietary interest in an asset by stating that '[n]one of the events discussed here allow the parties to prevent the loss of proprietary interest by a stipulation in contract, although in a number of events there is flexibility for parties to provide for a proprietary response after the event, for example in the case of manufacture'.[148] This is typical of the general tenor of the literature, which is an accurate reflection of the case-law; a position Webb essentially dismisses with the claim that property rules must always defeat contractual agreement. The point is simple: the courts have accepted that in principle parties can contractually agree as to the location of proprietary interests post-manufacture.[149] Webb claimed that the fact that courts have 'invariably strained to prevent such clauses from operating by placing impossibly high requirements on them, thereby preventing the parties from implementing their contractual intentions', indicates the practical unworkability of such clauses.[150] However, it is suggested that this should be turned on its head. A better reading of the cases is that courts are trying to point out what needs to be done by contracting parties: the requirements imposed are not 'impossibly high'.[151]

The second response to Webb's approach is fundamentally a policy-driven argument. Webb suggests that favouring the contractual approach would generate practical problems. Thus, he states that a manufacturer could argue that it vests its goods directly in its customers: this would mean there would not be a sale.[152] It should be recognised that this is actually a policy argument, not a practical one. The policy that Webb is arguing for is that manufacturers should not be allowed to argue that they have not

143 Raczynska (n107) 204.
144 Webb (n 136). As to its influence see Beale and others (n 111) [7.16] fn 113.
145 Webb (n 136) 514.
146 ibid 531.
147 ibid 532.
148 Raczynska (n 107) 112. See also at 179: An ROTC 'could be interpreted as a contract whereby the parties intend that the seller becomes the owner of the products manufactured … there is nothing that prevents the contributors to the joinder from agreeing to depart from the default rule … Whether the agreement departs from the default rule, and the extent to which it does, is a matter of construction of contract'.
149 cf Raczynska (n 107) 180, noting how this approach 'allows greater respect for freedom of contract'.
150 ibid 539.
151 cf Worthington (n 106) 32: it is theoretically possible.
152 ibid 536-537.

sold their goods. However, in light of the policy underlying circular economics, this needs to be rethought. That the absence of a sale is inherently within the conceptual structure of circular economic practices, which rests solidly on the idea that there will merely be contracted-use as opposed to any transfer of property, should be clear. It may well be that there is something intrinsically revolutionary about the idea that a contractual agreement can operate to vest title in a supplier rather than a manufacturer. However, radical, if not outright revolutionary, thinking will be needed to deal with plastics in circular economics. If it is the case (and it is acknowledged that the following is inherently controversial for any lawyer, including this writer) that circular economics will require a move away from an ownership-central economy to one that rests on contracted-use, a system where product-as-service is the governing reality, then something will have to give in the face of the practical commercial reality that such new forms of goods-transactions will become dominant.[153] What could and perhaps should give is the idea that ownership rights to inputs must necessarily be extinguished at each instance of a manufacturing step. There is no clear way by which suppliers of plastics will be able to control the use of the plastics if every time the plastics are modified into a different form, the original title is extinguished: this is clear from the decision in *ICI New Zealand* v *Agnew*.[154] To continue with this approach is to necessarily accept that the manufacturing process is linear, one of creation and destruction. Therefore, something different is needed.

Policy arguments can be adduced to justify, normatively, a change in our approach. Furthermore, such a change is arguably not as doctrinally impossible as Webb suggests. What follows is a closer examination of the doctrine than that usually found in the literature, in the sense that it focuses directly and specifically on the capacity to extend into products, but not for the purpose of protecting against insolvency. In simple terms, we are at this point looking to see *whether* it is possible in English law.

In re Bond Worth involved an attempt to use a ROTC to maintain an interest in yarn being used in carpet production.[155] The seller, Monsanto, had failed to provide any restriction on Bond Worth dealing with the yarn; the ROTC was essentially meaningless 'so long as Bond Worth remained apparently good for the money'.[156] Monsanto argued that they had retained 'equitable and beneficial ownership', but Slade J said that the particular terms were such that 'the proper manner of construing the retention of title clause, together with all the other relevant provisions of the contracts of sale read as a whole, is to regard them as effecting a sale in which the entire property in the Acrilan passes to Bond Worth followed by a security, eo instanti, given back by Bond Worth to the vendor, Monsanto'.[157]

In *Borden (UK) Ltd* v *Scottish Timber Products Ltd*, the claimant's title to the resin ceased when the resin was irretrievably incorporated with woodchips during the manufacture of chipboard.[158] Bridge LJ concluded that:

> [i]f a seller of goods to a manufacturer, who knows that his goods are to be used in the manufacturing process

153 There is a vast literature on the role of policy in (private) law; here only two indicative references will be made. First, Bradgate, 'Reservation of Title Ten Years On' (n 114) 443-444: 'academic quibbles should not prevent the law responding to changing commercial practices in a commercially and socially desirable way'. Second, Karl N Llewellyn, *Cases and Materials on the Law of Sales* (Callaghan 1930) 568: implicitly noting the contradiction between (i) 'fairness in court can be achieved only by taking the policy considerations of the case into consideration' and (ii) '[c]onsiderations of policy – especially any single writer's views on policy – is no substitute for the positive law'. The point here is simply that we cannot dismiss arguments of policy on the basis that they are arguments of policy, nor should we avoid the issue by dressing up arguments of policy as something else.

154 [1998] 2 NZLR 129.

155 [1980] Ch 228.

156 ibid 244.

157 ibid 256.

158 *Borden (UK) Ltd* v *Scottish Timber Products Ltd* [1981] Ch 25, 44 (Templeman LJ): 'When the resin was incorporated in the chipboard, the resin ceased to exist, the plaintiffs' title to the resin became meaningless and their security vanished'.

> before they are paid for, wishes to reserve to himself an effective security for the payment of the price, he cannot rely on a simple reservation of title clause such as that relied upon by the plaintiffs. If he wishes to acquire rights over the finished product, he can only do so by express contractual stipulation. We have seen an elaborate, and presumably effective example of such a stipulation in [*Romalpa*]. An attempt to acquire rights over the finished product by a stipulation which proved ineffective for want of registration … is to be seen in [*In re Bond Worth*].[159]

The clear implication is that 'express contractual stipulation' would suffice to extend control over processed products. Three years later came *Re Peachdart*,[160] where Vinelott J held it 'impossible to suppose that … the parties intended' for the seller to have the right to take leather that had partly or completely been produced into handbags.[161] This was partly because there was no condition in the sale agreement that records of each manufactured handbag be kept, nor was there any other evidence that the parties even contemplated this possibility.[162] Vinelott J also accounted for the alteration in the values of the raw materials, with a tipping point occurring when the leather lost its value as a raw material due to it being worked on.[163] He further held that the contract drafter had failed to delineate between a sale on ROT terms and the generation of a charge.[164]

The Court of Appeal in *Clough Mill Ltd* v *Martin* would deal with ROTC over yarn used in fabric manufacturing.[165] Robert Goff LJ was willing to follow Vinelott J's judgment in *Re Peachdart*,[166] and was of the opinion that whilst in cases where A's goods are used by B to create new goods, the 'property in the new goods will generally vest in B, at least where the goods are not reducible to the original materials'.[167] This 'generally' bears some weight, as Robert Goff LJ immediately implied: 'it is difficult to see why, if the parties agree that the property in the goods shall vest in A, that agreement should not be given effect to'.[168] What is interesting is how in the literature this position appears to have been flipped. Whilst Robert Goff LJ noted the difficulty of seeing why the agreement should not be given effect, commentators have tended to talk of the difficulty of seeing why the agreement should be effected.[169] Yet it must be accepted that a properly-drafted ROTC could provide for such an event;[170] what seems necessary is a way to account for

> the possibility that the buyer may have paid part of the price for the material, but also that he will have borne the cost of manufacture of the new goods, and may also have provided other materials for incorporation into those goods; and the condition is silent, not only about repaying such part of the price for the material as has already been paid by the buyer, but also about any allowance to be made by the plaintiff to the buyer for the cost of manufacture of the new goods, or for any other material incorporated by the buyer into the new goods.[171]

Robert Goff LJ thus found it

> impossible to believe that it was the intention of the parties that the plaintiff would thereby gain the

159 ibid 42.
160 *Re Peachdart Ltd* [1984] Ch 131.
161 ibid 142.
162 ibid.
163 ibid 142-143.
164 ibid 143.
165 *Clough Mill Ltd* v *Martin* [1985] 1 WLR 111.
166 ibid 120.
167 ibid 119, citing *Bl Comm* (17th ed 1830) vol 2, 404-405.
168 *Clough Mill Ltd* v *Martin* [1985] 1 WLR 111, 119.
169 See eg Raczynska (n 107) 179: 'Courts are very unlikely to find that, as a matter of construction of the parties' agreement, parties intended that the seller should have ownership of the product'.
170 As implied in Davies (n103) 32, 70.
171 ibid 120.

> windfall of the full value of the new product, deriving as it may well do not merely from the labour of the buyer but also from materials that were the buyer's without any duty to account to the buyer for any surplus of the proceeds of sale above the outstanding balance of the price due by the buyer to the plaintiff.[172]

Yet Oliver LJ also noted that the case itself did not actually concern the problems of manufacturing,[173] and thus Robert Goff LJ's comments can only really have been obiter. This means that the actual specifics of the content of a ROTC which effectively reaches into products are not necessarily those set out by Robert Goff LJ. Coming back to the point of principle, it was clear that while Oliver LJ appeared to accept that the production of a new thing would mean that any attempt to retain title was futile,[174] this was not an absolute rule:

> English law has developed no very sophisticated system for determining title in cases where indistinguishable goods are mixed or become combined in a newly manufactured article and, to adopt the words of Lord Moulton in *Sandeman & Sons* v *Tyzack & Branfoot Steamship Co.* [1913] A.C. 680 , 695, 'the whole matter is far from being within the domain of settled law'; and though, like Sir John Donaldson MR, I prefer to reserve my opinion, I am not sure that I see any reason in principle why the original legal title in a newly manufactured article composed of materials belonging to A and B. should not lie where A and B. have agreed that it shall lie.[175]

Later cases have adopted the same approach. *Modelboard Ltd* v *Outer Box Ltd* might appear to be of particular interest as there the contract provided that the buyer was 'licensed … to process the goods' and that the products should be marked as being made with the contracted goods, and admixtures were to be considered the seller's 'sole and exclusive property'.[176] Unfortunately though, the implications of this license were not considered – later in this article it will be considered whether the use of licenses as a means to resolve the problems arising in the ROTC context may work.[177] Coming back to the specific decision, Michael Hart QC, sitting as a deputy High Court judge, could 'see no reason why the plaintiff should not retain property in the board so far as it remained identifiable notwithstanding its having had value added to it by the plaintiff's labour and materials, if that is what the contract on its true construction provides'.[178] The earlier focus on the relevance of value added by third parties seems potentially blurred in light of the policy of upholding a commercially common sense construction of what the contracting parties agreed. Thus, in *Ian Chisholm Textiles* v *Griffiths*, where the claimant supplier of cloth argued for title in manufactured cloth products, David Neuberger QC held that:

172 ibid 120. Sir John Donaldson MR was (at 125) '[s]o far as is material in deciding this appeal … in complete agreement with the judgment of Robert Goff L.J'. He did however allude to a multi-stage test for situations like this (though notably he said 'they are not the circumstances which exist in the instant appeal'). It is only if there needs to be assessment of whether or not there is a new product (consisting of the goods concerned and other material), that we need to 'determine who owned the product'. Once there has been such a determination, we can work out whether the owner is the seller or the buyer. If it is the buyer, then as a matter of law there is a charge. However, he failed to set out how this process of determining who owned the product is to be undertaken (as Oliver LJ said, at 124, on the uncertain issue of 'determining title in cases [of mixtures and new articles], 'like Sir John Donaldson MR, I prefer to reserve my opinion'), and it is not clear from the Master of the Roll's analysis whether this is a matter of law (in the sense of it being a necessary consequence of the mixing of the goods that it is the buyer who is the owner), or dependant on party intention (as suggested above, the Master of the Rolls' agreement with Robert Goff LJ's analysis implies the latter).

173 ibid 121.

174 ibid 123.

175 ibid 124.

176 *Modelboard Ltd* v *Outer Box Ltd* [1992] BCC 945, 948 (Michael Hart QC).

177 Text following (n 228).

178 ibid 952.

> While the rights of the parties under a retention of title agreement, just as under any other agreement, must depend upon the proper construction of the agreement concerned, it seems to me that there must be a strong presumption, essentially based on commercial common sense, to the effect that, in the absence of very clear words, the parties would not have intended [that title in the manufactured product remaining with the plaintiff].[179]

Notably though he went on to state that 'I do not read [*Clough Mill* and *Re Peachdart*] as laying down as a matter of law that the construction for which the plaintiff contends is impossible … [and that if the supplier is to not only retain title to his supplied goods but to obtain title to the manufactured product] very clear words must be used'.[180] It thus seems that the contractual specifics are still of considerable, and potentially determinative, force in ascertaining the rights in such cases; just not in this case.[181] Like in the earlier cases though, David Neuberger QC found it 'a little difficult' to see how the goods other than those supplied by the claimant which formed part of the manufactured product could be transferred to the claimant, because whilst 'the extra items would not be of great value', there was 'added value' coming from the defendants 'design and workmanship and other treatment'.[182]

Two points should be noted here. First, the important extra 'value' is not in the financial value of the goods, but in the more inchoate value of the work done to the goods. Second, these cases involve combinations of supplied goods and other goods of a different nature resulting in the manufactured product. This could have an impact on how the first point is really understood. It is thus not that there is extra work done on the goods, but rather, the added value comes from the work done in combining different types of goods.[183] This can perhaps be contrasted with the situation that might arise in the context of plastics waste recyclates. In such cases, the goods concerned are much closer in their inherent nature. The effect of this can be observed in considering cases where the goods concerned were worked on, but were not combined with goods of different types. Thus a distinction could be drawn between situations where goods were simply attached, in a reversible manner, to other goods,[184] or where goods were merely physically reshaped in such a way that they 'retain their essential identity',[185] and situations where the 'original goods "lose their identity" and are used to create a new product'.[186]

A brief note at this stage can be made to *Chaigley Farms Ltd* v *Crawford, Kaye & Grayshire Ltd.*[187] There the goods were live animals, which were then slaughtered. Counsel had followed the reference to Bracton and Blackstone, via Crossley Vaines,[188] in *Hendy Lennox*,[189] and argued that the issue was whether the goods were turned into a different 'species'.[190] Thus grapes turning into wine would result in a loss of title (to the grapes), but a picked grape has not so turned into a different 'species'; consequently a slaughtered animal remains

179 *Ian Chisholm Textiles* v *Griffiths* [1994] BCC 96 (ChD) 101.
180 ibid 102.
181 ibid 104: 'In the instant case, there is simply no provision in the agreement dealing with the rights of the parties once the cloth is incorporated in an article with other goods'.
182 ibid 102-103.
183 As the quoted sentence in n 181181 implies: 'once the cloth is incorporated in an article with *other goods*' (emphasis added).
184 Such as engines with identifying marks (serial numbers): *Hendy Lennox (Industrial Engines) Ltd* v *Grahame Puttick Ltd* [1984] 1 WLR 485, 494 (Staughton J).
185 Such as cutting metal into sheets: *Armour* v *Thyssen Edelstahlwerke AG* [1991] 2 AC 339; or wood to logs: *New Zealand Forest Products Ltd* v *Pongakawa Sawmill Ltd* [1992] 3 NZLR 304.
186 Beale and others (n 111) [7.13].
187 [1996] BCC 957.
188 E L G Tyler and N Palmer, *Crossley Vaines on Personal Property* (5th edn Butterworth 1973) 430.
189 *Hendy Lennox (Industrial Engines) Ltd* v *Grahame Puttick Ltd* [1984] 1 WLR 485, 494 (Staughton J): 'According to Bracton and Blackstone when a thing is changed into a different species, as by making wine, oil, bread or malt out of the grapes, olives, wheat or barley of another, the operator becomes the new owner thereof and is only liable (in damages) to the former proprietor for the value of the materials he has so converted'.
190 [1996] BCC 957, 961-962.

of the same 'species'. However, Garland J said there was 'an inescapable difference between a live animal and a dead one, particularly a dead one minus hide or skin, offal, blood, bone, hoof horn and other parts not sold on as butchers' meat'.[191] What this case indicates though is not that there cannot be a case where there is no maintenance of the disputed goods as being of the same 'species', such that a ROTC can continue into products; rather, if there is such a situation then it will require special facts (and this case did not because the slaughter of animals did alter their 'species') and in particular a very precise contractual agreement to maintain the ROTC into the product.[192]

This loss of identity test would appear to cover the case of plastics: *ICI New Zealand* v *Agnew*.[193] However, in light of the preceding analysis, it is very difficult to square the decision in *ICI New Zealand* v *Agnew* with those cases which had held that a change in form (even an irreversible change in form[194]) would not necessarily lead to a loss of identity. Furthermore, those cases which do illustrate a loss of identity involve either an irreversible change or an admixture. To be convinced by the fact that the product concerned can contain examples of the supplied goods, where the goods concerned are by their very name as *plastic* a type of material that can be formed and, importantly, *reformed*, is almost a perverse misunderstanding of the nature of the goods, i.e. plastics. To this it may be countered that the expense or limited technical feasibility of the reversal process may be enough to justify this distinction between supplies and products, on the grounds that in cases involving a manufacturing process have emphasised the addition of value through such a process.[195] Yet such an approach fails to account for the distinction in the process of reversion both in terms of feasibility (compare the technical *difficulty* of reverting plastic products back to plastic supplies, with the technical *impossibility* of reverting meat back to cattle, or wine to grapes), and in terms of inherent qualities of the material concerned – some plastics at least are specifically made in order to be reversionable.[196]

In conclusion, parties can, if they frame their agreements with sufficient precision and clarity, extend an ROTC claim into products. The fact that there is limited evidence of successful contracting of this nature must be considered just to be a consequence of insufficient drafting clarity rather than an issue of

191 ibid 963.

192 cf *Re Weddel (NZ) Ltd* (1996) 5 NZBLC 104, 055 (New Zealand High Court), noted John de Lacy, 'Retention of Title and Claims Against Processed Goods: A Different Approach' (1997) 13(5) Tolley's Insolvency Law and Practice 163. The New Zealand High Court held that the supplier of live animals could assert title to the products of slaughter. In following *New Zealand Forest Products Ltd* v *Pongakawa Sawmill Ltd* [1992] 3 NZLR 304, Gallen J said there process of slaughter had not changed the nature of the stock, which had not lost its identity. For de Lacy, this decision shows 'a fundamental difference in approach' between English and New Zealand courts, and that 'in New Zealand any manufacturing process that does not involve the addition of extraneous material to the end product will not cause title to be transferred from seller to buyer. The labour, industry and associated costs necessary to bring about the manufacturing or other process are, apparently, to be disregarded in deciding the question of the location of title'. In this regard de Lacy suggests that 'the key to reconciling this divergence of approach is an understanding of the economic, social and geographic policy divides which have emerged over time between the two jurisdictions and are now beginning to manifest in their respective common laws'.

193 [1998] 2 NZLR 129.

194 *New Zealand Forest Products Ltd* v *Pongakawa Sawmill Ltd* [1992] 3 NZLR 304, 309 (Richardson J): 'goods worked on retain their identity must depend on the nature and extent of the work permitted to be done and actually done … Here the goods supplied were logs; they were sawn to provide sawn timber … There is no suggestion that the processing was extensive or expensive… Importantly the processing simply modified the form of the logs which as sawn timber retained its essential character. In that regard we cannot discern any significant difference between the timber in this case and the steel in *Armour v Thyssen*'.

195 See eg *Modelboard Ltd* v *Outer Box Ltd* [1992] BCC 945, 952, noted at n 178.

196 The fact that some plastics cannot be reformed is neither here nor there as to the general point. As to the potential for plastics recycling under current and potential future technical feasibility, see generally Rethinking the Future of Plastics (n 60).

principle.[197] The problem in *ICI New Zealand* v *Agnew*, for example, is that the seller's terms were of general application for the sale of all types of goods (imprecision as to the specific assets).[198] On the other hand, claims to 'equitable and beneficial ownership', such as in *In re Bond Worth*, are insufficient, because the extent of such a claim is unclear and imprecise (as to the nature of the claim). It is also strongly arguable that whilst giving any authority to sub-sell the goods will itself explode any competing term attempting to retain ownership past that point, this is also just the impact of imprecise contracting (imprecise due to contradiction). Thus, it can be suggested that there is no inherent difficulty with the possibility of a seller extending into manufactured products, especially where there are no other goods involved in the manufacture. The test depends on the content of the agreement between seller and buyer.

Having identified at least some of the seemingly more secure boundaries limiting the extent of an ROTC, it is now possible to ascertain what an acceptable ROTC which extends into products might look like. Earlier it was noted that an ROTC will need to prevent dispositions unless of a specific authorised nature, but that formulating anything more specific will depend on the particular factual matrix of the transaction.[199] This makes it essential to recognise that the best example here will necessarily be rather vaguer than those which practical application might generate.

Using the example ROTC from *ICI New Zealand* v *Agnew*, we can see that ownership would remain with the seller if the goods retained their identity (clause 10.1). If there was a change (though it has been argued above that this was not that case there), then the clause pertaining to such events (clause 10.2) rested on the financial relationship between the parties. If as suggested above, there is nothing preventing an ROTC from being created without reference to the financial aspect, then it is possible to sidestep the difficulties raised by attempting to ascertain the pro-rata (or otherwise) relationship between the buyer's debt and the processed goods. There are other factors though that Henry J identified as demonstrating that clause 10.2 actually created a charge. It is suggested that changes to these factors, through explicit contractual language, would create an ROTC that would enable control of the goods. Henry J stated that, in addition to the (now sidestepped issue of indebtedness), '[s]eparate, and thereafter continuing, identification would be required', but for him, 'such an exercise was obviously never intended and would also be quite unworkable'.[200] Moreover, as a practical aspect, enhanced tracking of goods is essential to achieving the overarching aims of circular economics,[201] even if it does remain somewhat technologically challenging.[202] Nevertheless, it is possible that progress will be made,[203] and combined these changes in the broader commercial context suggest that parties explicitly engaged in circular economic practices would explicitly intend for separate and continuing

197 See eg *ICI New Zealand* v *Agnew* [1998] 2 NZLR 129, 135: 'we accept as a matter of principle that in some circumstances contracting parties can effectively agree that legal title to a manufactured article can vest in one of them when the article comes into existence'.

198 [1998] 2 NZLR 129, 134 (Henry J). Cf Beale and others (n 111) [7.17] fn 122: 'the judge regarded the issue as one of construction of the contract, leaving open the possibility that it is possible for a supplier to acquire title to the product otherwise than by way of charge'. The phraseology used possibly shows an unconscious denial of the possibility that title to products could be detained. It should be clear that the supplier is *retaining* title, not *acquiring* title: this subtle and revealing shift has the effect of incorrectly flipping the argument, in a way that clearly does unacceptable violence to the agreement of the parties concerned; unacceptable because it is a clear contradiction not only to the agreement in and of itself but also because it substitutes the suppliers actual argument (for retention of that which was originally theirs) to something quite different (for acquisition of something that was not originally theirs).

199 See text following (n 113).

200 [1998] 2 NZLR 129, 135.

201 See eg EC (n 10) 11: policy recommendation to set up a 'coordination mechanism, combining technical, commercial and behavioural expertise, for tracking material flows and renewable feedstock inventories, and for strategic long-term investments in plastics production,
collection, sorting and recycling infrastructure across Europe'.

202 EC (n 10) 104-105.

203 See eg EC (n 10) 109, recommending funding to develop tracking technologies.

identification of goods within a circular economic transactional structure.

Furthermore, Henry J stated that the ROTC had 'no prohibition against incorporating other materials into a manufacturing process'.[204] Thus a circular economic-compliant ROTC would have such a prohibition. Processes which utilise other goods will need to be accounted for though. It is not entirely clear what the best way forward may be in such situations. It is possible for parties to agree to a joint ownership though,[205] so there would be nothing in principle against an ROTC that explicitly outlines a potential joint ownership situation in such an event. It may however not be possible to avoid a third party refusing to enter such an agreement, and it must be considered that that would be outside the boundaries of a circular economic transaction; whilst going so far a ROTC cannot operate to enforce a particular commercial policy on third parties contrary to their intention. Indeed this serves to emphasise the aim of this article, which is merely to demonstrate how parties that wish to enter into a circular economic-compliant transaction may be able to construct an appropriate agreement (i.e. one which will not be recharacterized as a charge, and one which provides the appropriate capacity for a party to control goods down a chain of transactions).

It has been demonstrated that ROTC can provide a level of control which may be useful for plastics manufacturers (and indeed other commercial actors), to prevent goods being used in a manner incompatible with circular economics. This level of control could even extend into the products of processing. The nature of plastics recycling is such that the danger of mixing different types of goods, in terms of preventing ownership from being extended, becomes less relevant. Furthermore, there is the possibility of developing ROTC that do not concern the financial aspects of the transactions. That is, it is possible to sell goods on ROT terms, where such terms concern other conditions. This would be a small measure to enhance the capacity of parties to engage in circular economics. As was noted earlier, the recent Waste Strategy suggested, though without any substantive detail, possible use of 'regulatory or economic instruments if necessary and appropriate' to deal with the problems of waste generation and recycling.[206] Recognising that English ROTC doctrine can possibly be used, as such an 'instrument', to achieve the policy aims of circular economics, requires acknowledgment that the law can go beyond the mere aim of dealing with (the threat of) insolvency. Should commercial actors wish to extend control, to prevent waste and to enable more effective recapture for the purposes of recycling, they have the capacity if they are willing to decouple the financial aspects from the property-control aspects of the transaction in an explicit manner. At this point it becomes necessary to consider the potential implications of the recent *Bunkers* decision.

3.1.1 Bunkers

In 2016, the Supreme Court engaged with the very foundations of understanding of ROTC, in *PST Energy 7 Shipping LLC* v *O W Bunker Malta Limited* (commonly known as the *Bunkers* case).[207] Lord Mance, giving the judgment of the Court, held that the effect of an ROTC combined with 'a feature quite different from a contract of sale of goods - the liberty to consume all or any part of the bunkers supplied without acquiring property in them or having paid for them',[208] took the transaction concerned outside the Sale of Goods Act 1979 (SGA) regime. Instead we now have a 'third way'; a sale that is not a sale for the purposes of the SGA. For want of a more taxonomically elegant conceptualisation, this novel form of transaction has garnered the moniker of a *sui generis* sale.[209]

204 [1998] 2 NZLR 129, 135.

205 See eg *Coleman* v *Harvey* [1989] 1 NZLR 723, where the New Zealand Court of Appeal held that a mixture of silver was to be co-owned. This case was not cited in *ICI New Zealand* v *Agnew*.

206 See above text accompanying (n 78).

207 [2016] UKSC 23. It is also sometimes called *Res Cogitans*, after the ship involved.

208 *Bunkers* [2016] AC 1034 [34].

209 cf Raczynska (n 107) 15: 'they may be *sui generis* contracts with retention-of-title for the supply of goods with licence (authority) to sub-sell or to manufacture or, in other words, a licence (authority) to destroy the seller's proprietary interest'.

Bunkers has received numerous critical responses. Gullifer has questioned whether or not the whole structure of sales and retention of title needs to be rebuilt.[210] For her, *Bunkers* has the effect of effectively neutering SGA s 49,[211] showing 'the lack of 'fit' between the SGA and the use of ROT clauses'.[212] Saidov described *Bunkers* as potentially a 'wrong turning' which may 'reduce the scope and significance of the sale of goods law'.[213] Low and Loi are even more biting in their criticism: 'the Supreme Court has plunged English law and commerce into a state of Carrollian irrationality'.[214]

Certainly, a number of issues remain unclear following *Bunkers*. Most obviously, there are doubts about the nature of the *sui generis* sale: Lord Mance suggested that such contracts 'would contain similar implied terms as to description, quality, etc to those implied in any conventional sale',[215] but which statutory terms would necessarily be implied into such transactions remains unclear.[216] Little can really be said here about specific implications for plastics waste transactions. Whilst questions about the appropriateness of the terms concerning description, quality and fitness for purpose (for instance) are live and would be highly relevant to plastics waste transactions, they would also be relevant to any *sui generis* sale not just those concerning plastics waste.

Will *Bunkers* apply in all cases where goods are supplied for the purposes of consumption? This question is not entirely clear (unsurprisingly).[217] However, soon after *Bunkers* the Court of Appeal, in *Wood* v *TUI Travel Plc*,[218] gave some sort of indication as to the potential judicial response. In *Wood*, there was a claim for compensation on the grounds that the claimant suffered food poisoning following eating at a self-service buffet. An issue arose as to who bore the risk of food, which in turn led to discussion of the point at which title in the food passed. Burnett LJ held that property in food passes when it is served. The alternative approach, that like *Bunkers* the property in the food never passed to the claimant holidaymakers but remained with the hotel at all times until the object was destroyed by being eaten, was dismissed as overly metaphysical.[219] This suggests perhaps that *Bunkers* may not be of widespread application. Nevertheless, the necessarily obiter nature of the discussion in *Wood* means that that point was not fully considered. There may be scope for further consideration here, as to the nature of 'consumption'. In *Bunkers* Lord Mance referred to the liberty to *consume*. It is a potentially arguable point as to whether this specifically means consumption, in the form of a destructive using up. If this narrow interpretation is correct, then it is hard to really see the difference between *Bunkers* and *Wood*, as both clearly involved the consumption-to-destruction of a product in the form of a fuel (bunkers as fuel for the *Res Cogitans*; buffet food as 'fuel' for the holidaymakers). Yet it is also worth noting that some commentary is not so strict. Consider for instance Beale

210 Louise Gullifer, '"Sales" on Retention of Title Terms: Is the English Law Analysis Broken?' (2017) 133 LQR 244.

211 ibid 256: 'left with very little application'. The relationship between the SGA and ROTC was considered in *Caterpillar (NI) Ltd (formerly FG Wilson (Engineering) Ltd)* v *John Holt & Co (Liverpool) Ltd* [2013] EWCA Civ 1232; [2014] 1 WLR 2365. For an excoriating critique, see Louise Gullifer, 'The Interpretation of Retention of Title Clauses: Some Difficulties' [2014] LMCLQ 564. For analysis of the potential way forward for SGA s49 in light of *Bunkers*: Djakhongir Saidov, 'Sales Law Post-Res Cogitans' [2019] JBL 1, 8-19.

212 Gullifer, '"Sales" on Retention of Title Terms' (n 210) 256.

213 Saidov (n 211) 1.

214 Kelvin F K Low and Kelry C F Loi, 'Bunkers in Wonderland: A Tale of How the Growth of *Romalpa* Clauses Shrank the English Law of Sales' [2018] JBL 229, 232 (referencing Lewis Carroll, *Alice in Wonderland*).

215 *Bunkers* [2016] AC 1034 [31]. At [34]: being sui generis 'does not mean that its terms, as regards undertakings as to description and quality, would not be modelled on those applying in the sale of goods'.

216 See eg Henry Moore, 'Case Comment: Unconventional "Sales"' (2016) 75 CLJ 465, 467: the lack of guidance is 'regrettable'; Low and Loi (n 214) 251: 'it would be foolhardy to attempt to predict with any confidence which terms will be implied'.

217 See Saidov (n 211) 7-8.

218 *Wood and another* v *TUI Travel plc (trading as First Choice)* [2017] EWCA Civ 11; [2018] 2 WLR 1051.

219 cf Low and Loi (n 214) 252-253: the 'much derided nanosecond … transfer of property theory' would resolve the difficulties in this area. Saidov (n 211) takes a similar view.

and others, where it is said that 'such supply contracts are likely (if on-sale or use of the goods before title passes is envisaged) to be classified as *sui generis supply* and not (conditional) *sale* contracts'.[220] Clearly 'use' is wider than 'consumption', even where use and on-sale are distinguished. This is important, because in the context of a circular economic plastics industry the focus (as illustrated by the *ICI New Zealand* v *Agnew* case) is clearly going to be at least as much on a form of *use* of plastics as it is on a *consumption-to-destruction* of plastics.

Raczynska usefully hints at both the difficulties and opportunities which *Bunkers* provides: 'it would initially seem that such a supplier could seek to assert a proprietary interest in the new asset [defined as a manufactured product or sale proceeds] in the same way'.[221] It is suggested that there are opportunities following *Bunkers* for parties to utilise the additional freedom they appear to be given, to manipulate the contractual terms in order to more effectively delineate proprietary rights and obligations. In doing so this may still allow for a conceptualisation of the *sui generis* sale as one which sits within the broad ambit of the sales doctrine operating under the SGA framework. Specifically, the argument that *Bunkers* provides greater party freedom is commensurate with the basic principle enunciated in *Cochrane* v *Moor*,[222] and enthroned in the Sale of Goods Act 1979, section 17: parties can pass property *when they intend*, as opposed to property passing on delivery. For Gullifer, this 'exemplif[ies] freedom of contract …[and thus a] seller who wants protection [following delivery] has to bargain for it'.[223] If they do so bargain, then sellers can obtain 'a powerful method of proprietary protection against counterparty credit risk by manipulating the passing of property after delivery'.[224] The buyer

> gets everything it wants under the contract except bare title to the goods: it gets possession and, in the case of inventory, the right to sell the goods, often the right to use the goods in manufacturing or other processes and sometimes the right to consume the goods. The seller will usually provide for the right to repossess the goods on non-payment, which, crucially, will survive the buyer's insolvency because of the seller's proprietary interest in the goods.[225]

Unpacking this statement is key to understanding the implications of *Bunkers*. Gullifer suggests that the sorts of contractual manipulation implied above would be insufficient to meet desires of sellers and buyers in financing contexts, pre and post-insolvency.[226] However, analysis of ROTC through an insolvency lens does not really help in situations where parties do not go insolvent. In other words, does (and if so, to what extent) an ROTC have value outside of post-insolvency asset distribution questions?[227] Certainly it is the case that an ROTC can be used to impose 'whatever conditions' the seller wishes,[228] and it has been examined above how ROTC can provide

220 Beale and others (n 111) [7.02] fn 4.

221 Raczynska (n 107) 15.

222 *Cochrane* v *Moor* (1890) 25 QBD 57, 71-73 (Fry LJ).

223 Gullifer, '"Sales" on Retention of Title Terms' (n 210) 246. Cf Ji Lian Yap, 'Predictability, Certainty, and Party Autonomy in the Sale and Supply of Goods' (2017) 46 CLWR 269, arguing that *Bunkers* reduces party autonomy, as the courts failed to account for the fact that the parties considered the transaction to be one of sale, and the wide ranging potential implications reduce the levels of predictability and certainty for commercial parties. Though it should be noted that Yap also suggests (at 280) suggests that if parties wish to stay within the SGA then they would need to provide for this in the contract, 'an example of the parties obtaining a measure of certainty by means of contractual drafting, which is in itself an exercise of party autonomy'. This illustrates the potential contradictions in this area.

224 Gullifer, '"Sales" on Retention of Title Terms' (n 210) 246.

225 ibid.

226 ibid 250.

227ibid 249-250: the developments by contractual interpretation have distorted the (insolvency-focused) 'system of proprietary protection of creditors', and instead of 'an overarching view being taken of the balance that should be reached between creditors, and the underlying policies driving this balance, the development of the law is at the mercy of the ingenuity of those drafting contracts (who seek to get the best of all worlds) and the vagaries of which cases come before the courts and in what circumstances'.

228 *Benjamin* [5.133] citing *Wait* v *Baker* (1848) 2 Exch 1, 7-9; 154 ER 380, 383-384.

proprietary protection that goes beyond mere protection against insolvency.[229]

In the context of this article's argument, we can possibly reformulate the question thusly: what might the impact of this doctrinal shift be in the context of circular economic approaches to plastics waste? What is the extent to which the parties may be able to agree on terms which affect the extent to which the buyer is able to use or consume the goods? Recalling Gullifer's explanation,[230] the buyer 'often' has the right to use and 'sometimes the right to consume': the possibility alluded to is clearly whether a ROTC could provide for limitations on such rights.

Parties aiming for circular economic practices could create more appropriate transactional frameworks utilising ROTC in order to control plastics. Although it was suggested that parties might be able to utilise an ROTC to provide for a level of post-sale control, and that in principle this is possible, it needs to be recognised that such actions run a considerable risk that such agreements will actually be (re)characterized as a charge. Rather than risking the danger of recharacterization through an imprecise drafting of an ROTC, parties may wish to focus on an even more fundamental aspect: the contract as one of *sale*. More specifically, achieving the necessary levels of post-'sale' control for effective circular economies requires the vendor to utilise the power it has in the first place to construct the nature of the transaction. *Bunkers* offers a new route: a *Bunkers*-style ROTC, that is, one which demonstrates persuasively that the transaction concerned is not actually a sale.[231] Thus by contractual agreement, parties can reformulate the transaction as something other than an SGA sale. The institutional structure of sale rests on a very solid notion of property: a sale is defined as a transfer of the property in goods for a price.[232] The centrality of property is exemplified by *Rowland* v *Divall*, where the failure to pass property was sufficient for there to be a total failure of consideration: 'The whole object of a sale is to transfer property from one person to another'.[233] Yet as Gullifer rightly suggests *Bunkers* demonstrates the incompatibility of the retention of title 'structure' and the 19th century sales jurisprudence encapsulated in the SGA. The problem beforehand concerned the insufficient clarity of contractual terms to alter the basic proprietary operations in terms of combining goods. The way out of the problem is by redirecting the strength that does come from party agreement, towards the nature of the agreement itself, and agreeing that the transaction is not a sale. This of course would be a step somewhat further than that taken by Lord Mance in *Bunkers*, who merely took the contract out of the SGA regime. But the logical end point of this emphasis on the power of the parties to characterize their transaction is that contracts for the supply of products that are by their nature consumed can be framed as licenses. And as Lord Mance put it, there was a 'liberty to consume all or any part of the bunkers supplied without acquiring property in them or having paid for them'.[234] It is thus necessary to view the transaction as a licence.[235]

By coming outside of the conceptual structure of a sale (whether SGA or *sui generis*), the use of licences also negates the use of ROTC. This may be beneficial, in that parties will no longer have to run the risk of having their transaction (re)characterized as a charge with the attending registration obligations. In the event that a transaction is a license to use, then the rights that a licensee obtains would be limited to the extent granted by the licensor.[236] Thus in *Bunkers*, the supplier

229 Text following (n 93).

230 Text to (n 225).

231 This is in accordance with Saidov, who suggests that there needs to be a combination of an ROTC, credit terms, and a right to consumption for the transaction to be a *sui generis* sale; absence of one of those elements would make it a sale: Saidov (n 211) 7.

232 SGA s 2(1). This arguably goes back to Blackburn's path-breaking text on sale, which focused on the proprietary aspect: Colin Blackburn, *A Treatise on the Effect of the Contract of sale, on the Legal Rights of Property and Possession in Goods, Wares, and Merchandize* (London 1845) xiii. The classic critique, still valid for the English doctrine, is K N Llewellyn, 'Through Title to Contract and a Bit Beyond' (1938) 15 NYU Law Q Rev 159.

233 [1923] 2 KB 500, 506-507.

234 *Bunkers* [2016] AC 1034 [34].

235 See above (n 209).

236 cf *Modelboard Ltd* v *Outer Box Ltd* [1992] BCC 945, above (n 176).

provided the bunker oil for the purpose of it being consumed so to propel the ship. This clearly was not a disposition enabling the user of the oil to do some other commercial action, such as sub-selling the oil; indeed such an action was specifically prohibited in the *Bunkers* transaction.[237]

In the instance of plastics waste recycling, if the supplier were merely to licence the use of plastics for consumption in a manufacturing process, rather than selling them, then clearly the buyer/licensee would be limited in their capacity to dispose of any surplus or waste. Such surplus or waste would necessarily remain the property – one could say remains owned by – the supplier. What then of the plastic that is used by the buyer/licensee? It cannot be said that they have acquired any property in the supplied plastics, because the transactional form prevents such property transferring. If the ideology underlying the circular economy is adhered to, then the ideal result even following a manufacturing process is that the supplier remains the owner of the produced goods.

What can be seen then is the possibility of using English personal property law as a mechanism to enhance the achievement of circular economic practices. The power to control goods, through the ability to recapture based on the retention of ownership, can be extended by means of conditions within an ROTC, provided those conditions are sufficiently clear (and decoupled from the financial aspects of the transaction). This is however a narrow possibility, and whilst the courts have remained open to the option in principle, there may also be scope for suggesting an alternative, and more radical option: the license approach suggested by *Bunkers*. The specific content of this license would of course turn on the particular circumstances of the transaction. Essential to this assessment will be ascertaining, again as with the ROTC approach, the specific contractual intention of the different parties. But key to assessing the value of this approach is distinguishing between how *Bunkers* shows the impact of consuming (to destruction) the goods, and how it also demonstrates that parties can generate transactions that can go outside the Sale of Goods Act 1979. Were commercial parties to take up this option, then there would be room to generate and demonstrate the sorts of transactional relationships necessary to enable parties to control goods down a chain of transactions, according to principles of circular economy.

However, a clear note of caution is needed here. Certainly there is clear value in the increased use of licences as a means to enable circular economic practices involving smart technology.[238] Licences provide a quick and easy mechanism to enable the structuring of the sort of transactions envisaged by circular economy advocates, where there is no transference of ownership. Nevertheless, the licence approach is necessarily limited. It is not easy to see whether it will be of special benefit in the context of plastics recycling. Its most likely value is merely as part of combined new approach to commercial transactions, which would involve the use of multiple different systemic elements already situated within the doctrinal framework, just in a different manner to that previously understood.

4 CONCLUSION

The increasing general prevalence of circular economic practices, and the growing potential of such practices as means of dealing with plastics waste, provides justification for examining how doctrinal mechanisms could be structured to aid the development of such practices. However, there remain potential legal complications regarding how surplus and waste plastics can be effectively recaptured back into circular

237 *Bunkers* [2016] AC 1034 [14]: clause H2 of the transaction said buyer 'shall not be entitled to use the bunkers other than for the propulsion of the vessel, nor mix, blend, sell, encumber, pledge, alienate, or surrender the bunkers to any third party or other vessel'.

238 Sean Thomas, 'Law, Smart Technology, and Circular Economy: All Watched Over By Machines of Loving Grace?' (2018) 10 Law, Innovation & Technology 230.

economic loops. Such problems have not been specifically identified in the circular economics literature concerning plastics (nor indeed in the broader circular economic literature). The current regulatory framework on waste rests on the importance of control, and of the treating of waste as a resource. Both of these aspects are central to circular economic practices, and moreover, can be addressed through the doctrinal framework for ROTC offered by English law.

The English law on ROTC is currently in a rather confused state regarding the capacity of parties to generate contractual agreements that enable suppliers to reach into products. Whilst there is a strong argument in favour of the supplier's interest disappearing, and a new title generating in favour of the party undertaking the manufacturing or similar such process, such an approach is not entirely unchallengeable. Certainly on policy grounds, it could be strongly argued that parties in the specific context of plastics recycling should be allowed to form transactions which allow for the supplier to maintain control over any surplus or waste resultant from processes undertaken over his supplied goods, thus more easily enabling the development of circular economic practices. Moreover, it has been demonstrated that there are reasons to accept that what the courts have been doing is not prohibiting the possibility of parties agreeing that the seller will have control of products; rather they have merely been noting that such agreements need to be clearly made and that the cases before the courts have not managed to do this. Arguably the importance of such control for circular economic transactions will provide a strong commercial justification for lawyerly efforts to construct appropriate transactional forms.

In the event though that working within the ROT doctrinal framework is not possible, it may be that the *Bunkers* decision offers an alternative. *Bunkers* shows the possibility of *sui generis* transactions which may be more flexible, allowing parties greater freedom in constructing contracts. It was suggested that the necessary consequence of this approach of non-SGA sales, is the increased possibility of the development of licence-for-use as a viable transactional form. The removal of property as a central transmittable core of a 'sales' transaction provides the necessary foundations for circular economic transactions which involve the initiator retaining ownership in the fullest sense, for the purposes not of protecting themselves against their counterparty's insolvency, but of providing themselves with a level of control over the way the goods are used: minimising surplus and avoiding waste.

In conclusion, circular economic transactions will need legal mechanisms that enable 'sellers' to control the use and disposition of goods down a chain of transactions. One possible way of enabling such control is to use the ROTC mechanism. This is of course not the only possibility, but it is one which will fit within the general tenor of commercial practices and especially those in circular economic thinking which already rests heavily on notions of retaining ownership. It is arguably possible that the current doctrine can allow for sellers to own the products of a manufacturing process, provided appropriate contractual formulations of sufficient clarity to demonstrate party intent can be constructed. In addition, it is also possible using the recent *Bunkers* case to take such transactions outside of the classic sales framework. Thus, in the alternative to an ROTC, it may be appropriate to simply licence goods. Either way, English personal property law provides mechanism that can be used to generate workable circular economic transactions which enable plastics wastes to be controlled down a chain of transactions.

ARTICLE - SPECIAL ISSUE ON DESIGNING LAW AND POLICY TOWARDS MANAGING PLASTICS IN A CIRCULAR ECONOMY

LIFE CYCLE THINKING AS A LEGAL TOOL: A *CODEX RERUM*

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TABLE OF CONTENTS

1 INTRODUCTION

All creatures including birds, animals and humans are at risk from plastic waste in the environment and the challenge of preventing it entering rivers, oceans, the atmosphere and land is urgent requiring our full attention.[1] Yet, at the same time, plastics are a valuable material for preserving food, and they are used in textiles, transportation, construction and personal care products. Indeed, a world without plastics is unimaginable. The challenge then, is to deal with the escape of waste plastics in a way which enhances the circular economy – a closed-loop system where end-of-service-life objects become a resource. For most plastics like packaging, closed-loop systems already exist which can be improved through increasing collection and reuse/recycling. However, there are also uncontrolled losses of plastic materials that happen as "fugitive" emissions like tyre-wear or when laundering garments made from plastic. The problem of plastics waste is linked to the issue of mass consumption in the industrialised world, which has led to increasing production, the proliferation of goods, and the generation of waste. In highly industrialised societies, products are often treated as throwaway or 'single-use' items which not only increase the waste burden including fugitive emissions during their use phase, but also use raw materials in their manufacture thereby depleting the virgin resources of the planet. In the developing world, these problems exist too but are often exacerbated by the import and accumulation of plastic waste from the global north despite recent bans on such trade.[2]

Following the publication of figures for the production of plastics waste, there has been a plethora of policies produced at the UK and European Union levels. These include the UK Government's 25 Year Environment Plan, which sets a target of working "towards eliminating all avoidable plastic waste by end of 2042".[3] Bans, such as that on the manufacture and sale of cosmetics containing micro-plastic beads,[4] and financial instruments[5] are also part of the UK approach. The UK Government's Waste and Resources Strategy[6] includes two key ambitions: to work towards all plastic packaging placed on the market being recyclable, reusable or compostable by 2025; and to eliminate avoidable plastic waste over the lifetime of the 25 Year Environment Plan. Alongside these, a holistic approach, which transforms the perception of plastic waste from "*mere garbage*" into something which "*should be regarded as a resource*",[7] is part of the drive towards a circular economy approach at the EU level. Sustainability leadership is needed to facilitate the establishment of a 'framework of actions to ensure a holistic circular economy approach with proportionate and complementary policies which combine better regulation; market-based instruments; research and innovation; incentives; measures of performance; and information exchange.'[8] Further activity at EU level includes a policy on the minimisation of plastics waste and the development of a circular economy. In December 2015, the European Commission adopted

1 Kara Lavender Law, 'Plastics in the Marine Environment' (2017) 9 Annual Review of Marine Science 205–229; Roland Geyer, Jenna R Jambeck and Kara Lavender Law, 'Production, Use, and Fate of All Plastics Ever Made' (2017) 3/7 Science Advances 1-5; Ellen MacArthur Foundation, *The New Plastics Economy: Rethinking the Future of Plastics & Catalysing Action* (Ellen MacArthur Foundation 2017).

2 See for example, 'India Bans Imports of Waste Plastic to Tackle Environmental Crisis' *The Independent*, 7 March 2019 available at <https://www.independent.co.uk/environment/india-plastic-waste-ban-recycling-uk-china-a8811696.html>.

3 HM Government, A Green Future: Our 25 Year Plan to Improve the Environment (UK Government 2018) 83.

4 The Environmental Protection (Microbeads) (England) Regulations 2017.

5 UK Treasury, 'Tackling the plastic problem. Using the tax system or charges to address single-use plastic waste' (UK Government 2018) available at <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/690293/PU2154_Call_for_evidence_plastics_web.pdf>.

6 HM Government, Our Waste, Our Resources: A Strategy for England (UK Government 2018) 17.

7 European Parliament resolution of 14 January 2014 on a European strategy on plastic waste in the environment (2013/2113(INI)) 2016/C 482/09.

8 Department for Environment, Food and Rural Affairs, European Economy Circular Economy Package - UK response to European Commission public consultations on the circular economy and on the functioning of waste markets (DEFRA 2018).

an EU Action Plan for a circular economy.[9] In that plan it identified plastics as a key priority and committed itself to 'prepare a strategy addressing the challenges posed by plastics throughout the value chain and taking into account their entire lifecycle'. In 2017, the Commission confirmed it would focus on plastics production and use and work towards the goal of ensuring that all plastic packaging is recyclable by 2030.[10] This culminated in the 2018 Communication setting out the policy on the treatment of plastics in a circular economy.[11]

These policies show good will and good intent on the part of governments towards seeking a solution to the problem of plastic products and the waste generated from them. It is undeniably essential to control more effectively the environmental impacts of production and consumption,[12] and it is argued here that the way to do so is through regulatory measures which adopt a radical new approach by addressing the product in a holistic fashion rather than focussing from a legal perspective on specific points during its lifetime or introducing ad hoc prohibitions. Here, the regulatory focus will be on the product and it will impact during the design phase. Lifecycle thinking in the form of a Product Impact Assessment will be applied to the product at the design stage influencing its final form and this assessment, while intended to be wider in scope than questions about the use of plastics in the product, will incorporate questions about the use of plastics in the product.[13] This new approach will provide the opportunity for the type of plastic to be addressed alongside issues around fugitive emissions during use and then disposal of the plastic components at the end of life whether of the individual component (business-to-business) or the product (business-to-consumer) itself. Currently, sectoral laws provide, for example, for the management of waste,[14] and the control of pollution to air and water[15] caused by manufacturing industry but fail to take a holistic approach to the environmental impact of products throughout their lifecycle and beyond. The laws, which seek to focus on the end of the lifecycle, fail to be effective in bringing the product and its embedded energy back into the commercial cycle and do not address at all the waste burden of plastic products during their use phase. End of life legislation[16] can trigger design changes but are not focussed on achieving this outcome – rather they focus on recovery operations. Indeed, the weakness of sectoral laws is that they are mischief-led – they focus on the particular problem whether that be, for example, a polluted river, poor air quality or climate change and address that problem to the exclusion of others. A life cycle approach

9 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', COM (2015) 614 final.

10 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'Commission Work Programme 2018 – An agenda for a more united, stronger and more democratic Europe', COM (2017) 650 final.

11 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 'A European Strategy for Plastics in a Circular Economy', COM (2018) 28 final.

12 UN Sustainable Development Goal 12 sets targets in relation to sustainable consumption and production patterns. See <https://sustainabledevelopment.un.org/sdg12>.

13 It is intended that, as with the REACH legislation - Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Product Impact Assessment will apply to new products at first but will eventually extend after a transition phase, to existing products which are still marketed.

14 Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste [Waste Framework Directive].

15 Directive 2010/75/EU of the European Parliament and the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) [Industrial Emissions Directive or IED]; Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for the Community action in the field of water policy [Water Framework Directive].

16 For example, Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 (as amended by Decisions 2002/525/EC, 2005/437/EC and 2005/438/EC) on end-of-life vehicles; Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electronic and electrical equipment; and European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging waste.

applied as a regulatory tool to a product would look across the spectrum of impacts from resource use to end of life and thus require design changes to a product to balance and mitigate those impacts. This approach will drive circularity in that it will incorporate not only environmental impacts but also such features as longevity and durability.[17] It has long been recognised that an integrated approach to environmental control is essential and this has emerged in terms of production processes from as long ago as the 1990s. The original UK concept of integrated pollution control,[18] which was subsequently adopted and expanded at EU level into integrated pollution and prevention control,[19] focussed on production and its impacts. It is not suggested here that this proposal for a product law (a *codex rerum*) will replace those integrated controls although it is likely to reduce some of the impacts during the winning of materials and the manufacture of the product. Rather this proposal will introduce a layer of regulatory control, which focusses on the product and fills the gaps, which the industrial process and production legislation leave out – notably the use phase of a product but also the integration of all phases across its life cycle.

Informing appropriate laws and policies to tackle the better management of plastics waste requires multi-disciplinary insights – we need an understanding of legal mechanisms and socio-economic considerations, as well as the physical properties of plastics and wastes underpinned by a life cycle approach so that those laws can be well designed to prevent harm. Evaluating the impact of a product involves engineering and science in relation to the type of materials such as plastics used in its manufacture. Intelligence regarding the way in which consumers use a product is also required involving behavioural science. And the psychology of consumerism needs also to be recognised in the design of a product if manufacturing industry is to be engaged with this new approach. This multidisciplinary background is recognised in this article which focuses on the proposal for a regulatory approach to the mitigation of the environmental impacts of a product.

Outline of Argument

This article addresses the specific question of a regulatory procedure which could be adopted to promote the development of a circular economy in plastics by controlling the product, whether that incorporates plastics as one of its components or which is made entirely from plastic. In Part 2 it addresses the development of integrated product policy – an approach which focuses regulatory controls on the product – and the development of the concept of producer responsibility. The implementation of this policy into the ecodesign laws is considered alongside its limitations. Part 3 considers life cycle approaches and the way in which life cycle assessment is needed to underpin an environmental product policy as part of a new model law relating to products (described here as a law of things or *codex rerum).* A procedural approach described as a Product Impact Assessment is sketched. Part 4 discusses different styles of regulation and advocates a licensing regime for the *codex rerum*. Part 5 examines the use of voluntary agreements incorporated into agreed standards as part of the process of a Product Impact Assessment and this discussion is further developed in part 6 which considers the Ecodesign regime and the extent to which that can inform the new law for things or *codex rerum*. Part 7 applies the proposed model to plastics. Part 8 concludes by arguing that a new model law dealing horizontally with products (the *codex rerum*) is required to shift the nature of the market from one based on a linear production model centred on 'GDP growth' to a system where resources move round a loop with the aim of generating zero waste[20] in the process. This will address the use of plastics as one material in products.

17 Klaus Tonner and Rosalind Malcolm, 'How an EU Lifespan Guarantee Model could be Implemented Across the European Union' (JURI Committee of the European Parliament 2017).

18 The Environmental Protection Act 1990, Part I. For the importance and radical nature of this legislative approach at the time, see Michael Purdue, 'Integrated Pollution Control in the Environmental Protection Act 1990: A Coming of Age of Environmental Law?' (1991) 54/4 Modern Law Review 534-551.

19 Directive 2008/1/EC1 of the European Parliament and the Council of 15 January 2008 concerning integrated pollution prevention and control.

20 Zero waste (and zero waste economy) is used throughout this article as short-hand for a circular economy which seeks to minimise waste to the lowest possible level consistent with the laws of thermodynamics.

2
INTEGRATED PRODUCT POLICY

Mass consumption with its proliferation of waste has brought to the forefront ideas of achieving sustainable production and consumption and, as Davidson argues, the question of 'how we should arrange our systems of production and consumption to ensure the sustainability of the Earth under conditions of conspicuous and pressing environmentally limiting conditions'[21] is now a key question. As part of this thinking, a new approach is emerging which seeks to address the regulation of the environmental impacts of products.[22] As Orwat and Karl suggest, 'Although environmental policy has traditionally focused mainly on production and the supply side, it is now beginning to address issues related to products and the demand side.'[23] In regulatory terms this approach has been seen in European proposals for an Integrated Product Policy which had been flagged in the 6th Action Programme for the Environment, "Environment 2010: Our Future, Our Choice".[24] This proposed, as one of five approaches to achieving environmental improvement, that business and consumers should play a greater role in achieving more environmentally sound products and consumption and advocated the development of product-related environmental policies, which would promote the development of a market for greener products. Product related laws became part of EU policy and the potential for development of these laws to provide an effective regime for controlling the impact of products on the environment is now fast developing.[25]

Regulation represents a traditional approach to the achievement of environmental protection and, providing it is clear, is usually approved by industry. The new approach, however, originally to be found in the 6th Action Programme, reflected in the European Union's development of an Integrated Product Policy and further developed in the 7th Programme,[26] marked a change from this traditional approach. In general, existing environmental laws and policies work in two ways: either on sectoral lines according to the environmental medium (e.g. water, air, waste) in question; or, on vertical lines impacting at strategic points during the lifecycle of products. Integrated Product Policy took a horizontal approach based on life cycle thinking and, in this, represented a new paradigm for regulation.[27] But Integrated Product Policy did not progress sufficiently the potential for keeping products and their embedded energy in the economy – it was horizontal across the flat life span of the product rather than being circular so as to drive a continual flow of materials. There is a need to change the regulatory approach to drive an end result which retains products as stock within a circular economy, thus minimising both their impact on the environment and the depletion of virgin resources.

21 John Davidson, 'Sustainable Development: Business as Usual or a New Way of Living?' (2000) 22/1 Environmental Ethics 45-71; Robert G Lee, 'Look at Mother Nature on the Run in the 21st Century: Responsibility, Research and Innovation' (2012) 1 Transnational Environmental Law 105-117.

22 Eléonore Maitre-Ekern, Carl Dalhammar and Hans Christian Bugge (eds) *Preventing Environmental Damage from Products - An Analysis of the Policy and Regulatory Framework in Europe* (Cambridge University Press 2018).

23 Carsten Orwat and Helmut Karl, 'European Environment: Integrated Product Policy and the Environment' (1999) 9/5 Special Issue of Environmental Policy and Governance 171-173, at 171.

24 Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on the sixth environment action programme of the European Community 'Environment 2010: Our future, Our choice' – The Sixth Environment Action Programme, COM (2001) 31 final.

25 Rosalind Malcolm, 'Integrated Product Policy: Products and their Impact on Energy' (2011) 3/1 International Journal of Law in the Built Environment 48-64; Dirk Scheer and Rubik Frieder (eds), *Governance of Integrated Product Policy: In Search of Sustainable Production and Consumption* (Greenleaf Publishing 2006); Frans Oosterhuis, Rubik Frieder and Gerd Scholl, *Product Policy in Europe: New Environmental Perspectives* (Kluwer Academic Publishers 1996).

26 Decision No. 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' 2012/0337 (COD). The 7th Environmental Action Programme no longer references Integrated Product Policy. Instead it includes reference to the Ecodesign regime as part of the focus on production and consumption patterns and the improvement of product environmental efficiency.

27 Rosalind Malcolm, 'Environmental Product Policy: A New Regulatory Paradigm for a Consumer Society' [2005] European Environmental Law Review 134-144.

This raises some questions: what regulatory frameworks are necessary to control the impact of products on the environment on a whole life basis? How can laws, policies, and administration be altered, directed and strengthened to effectively regulate the development of greener plastic products? How can such laws make a major contribution to sustainable development within an economy which circulates goods and materials thus avoiding the use of virgin resources and the generation of plastics waste both during the use phase of the product and at end of life?

Integrated Product Policy works at two levels: one is concerned with reducing the environmental impact of a product; the other seeks to attribute the costs of such impacts appropriately. In other words, it rests primarily on two principles: preventive and polluter pays. Both principles can be found in the earliest examples of EU environmental policy,[28] and now are enshrined in the Lisbon Treaty.[29] The preventive principle is at the heart of Integrated Product Policy: once environmental impacts are identified along the life cycle, then steps may be taken which are designed to reduce or eliminate them. The polluter pays principle is also fundamental to an understanding of Integrated Product Policy. The precautionary principle seeks to avoid impacts even where there is scientific uncertainty but has yet to feature explicitly in the application of Integrated Product Policy.[30]

The objective of Integrated Product Policy is to achieve a 'greening' of products. It is a policy which is designed to function within a market economy where it is essential that consumption and production patterns are sustained in an economic sense. It is not aimed at achieving a reduction in the consumption of products – such a result would be politically and economically unacceptable. Its object is to achieve 'better' products, i.e. those which are environmentally sustainable. Indeed, it was offered to industry as a policy which would enhance competitiveness: "In a competitive business world, environmental performance can be a factor giving companies or their products a competitive edge. Integrated Product Policy can help such companies by giving them more visibility".[31]

The impetus for a 'greener' product must occur primarily at the design stage in order to prevent products which are environmentally damaging entering the market and the use stage will also need to be addressed during the Product Impact Assessment to ensure that consumers use products in the least environmentally damaging fashion, for example, in a way which avoids the fugitive emissions which can result from the use of plastics. This can be built into the design stage but can also rely on good labelling with clear information for the consumer. But leaving such choices to the consumer is not the safest way to assure environmental gains, and the design stage should be utilised to ensure that the consumer is left with no or little choice to use the product other than in an environmentally sound manner. The design stage must take account of each life cycle phase in an integrated fashion to ensure that any impacts identified are not simply moved along the life cycle. It must include consideration of the disposal stage to achieve the best possible outcome in terms of remanufacturing, recycling or other forms of re-use. A clear advantage of a formal standard-setting approach as part of an Integrated Product Policy is that, whereas at the moment a 'greener product' has to compete against other 'less green' products, leaving the choice to the consumer who may exercise that on the basis of preference, price, fashion or some other variable,[32] Integrated Product Policy will eliminate the 'less green'

28 First Environmental Action Programme, [1973] OJ C112/1.

29 Treaty on the Functioning of the European Union, Title XX 'Environment'.

30 See *Rio Declaration on Environment and Development*, United Nations Conference on Environment and Development 1992 (UNCED), Principle 15. It reads: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". See also Elizabeth Fisher, Judith S Jones and René von Schomberg (eds), *Implementing the Precautionary Principle: Perspectives and Prospects* (Edward Elgar 2006); Ronnie Harding and Elizabeth Fisher, *Perspectives on the Precautionary Principle* (Federation Press 1991); Tim O'Riordan and James Cameron (eds), *Interpreting the Precautionary Principle* (Earthscan Publications 1994).

31 Margot Wallström (Environment Commissioner), 'Integrated Product Policy; Commission outlines its strategy to stimulate greener products', EU Institutions Press Release DN IP/03/858, 18 June 2003.

32 Tim Jackson, 'Motivating Sustainable Consumption – A Review of Evidence on Consumer Behaviour and Behavioural Change', Report to the Sustainable Development Research Network (ESRC Sustainable Technologies Programme, January 2005).

product dictating choice at the point of the buying decision.[33] Producer responsibility is a key element of Integrated Product Policy. Primarily initiated in Sweden and under development since the 1990s across Europe and the USA, producer responsibility (sometimes described as 'extended producer responsibility') is part of an approach towards the achievement of sustainable development within a sustainable consumption framework. Preceding the development of the Integrated Product Policy, it was the first step in the EU in this direction. It has been described as:

> An environmental protection strategy to reach an environmental objective of a decreased total environmental impact of a product by making the manufacturer of the product responsible for the entire life-cycle of the product and especially the take-back, recycling and final disposal of the product.[34]

The polluter pays principle is sharply in focus in this approach and operates as a theoretical principle underpinning both this policy area and the regulatory framework for the *codex rerum* by transferring the external costs, which are normally borne by society to the manufacturer. In this way, a paradigm shift occurs from regulatory emphasis on the process to the product. It is informed by the public interest theory of regulation, which seeks to correct market failures such as the cost of the waste burden on both industry and society. There are conflicts of views arising here as the manufacturer sees the consumer as part of the problem since it is during the use phase that environmental impacts can also arise as well as during production and disposal. This raises the question of 'who is the polluter?' Producer responsibility in its developed form fails to deal with this question and does cause confusion around the principle if it is to be used as the core underlying basis for legislation. But a holistic view which informs the development of the *codex rerum* is that it is the product which is the source of the problem – not the consumer. If the product did not exist, then the consumer could not pollute the environment by using it. So, if manufacturers make products, then the burden should be shifted to them to design those products which do not pollute during their consumption and all other phases. The dynamic approach of producer responsibility is that producers have the financial responsibility for the end of life environmental costs of their products and will therefore be forced to design them in ways, which minimise these financial costs. If industry must pay collectively for the environmental impact of waste products, then it will put its mind to designing products with fewer impacts.

In the last decade, the increasing concern about plastics waste has reached a crescendo,[35] but the concern about waste in general dates back much earlier. In the 1990s, the EU began to express concern about the large amounts of waste being generated noting that the volume of waste was continuing to increase despite attempts to minimise it. Dutch environmental policy implemented an approach, which included the costs of disposal at the end of life into the price of new products – an experimental approach, which recognised that the polluter pays principle reflected both pollution by the manufacturer and the consumer. Other countries such as Japan, Taiwan, Korea, Brazil and Peru also witnessed attempts to introduce systems of producer responsibility.[36] In the US, California has led the way on the development of recycling laws.

End of life legislation (or take-back legislation) is an example of producer responsibility and there is a batch of laws around this point in the life cycle of a product. Producer responsibility in its early form is demonstrated in the 'take-back' legislation in directives

33 Principles surrounding the science of econometrics are relevant to an economic modelling of the supply and demand characteristics of products based on these criteria but are not within the scope of this article.

34 Chris van Rossem, Naoko Tojo and Thomas Lindhqvist, 'Extended Producer Responsibility: An Examination of its Impact on Innovation and Greening Products', The International Institute for Industrial Environmental Economics – Internationella Miljoinstitutet, Report commissioned by Greenpeace International, Friends of the Earth Europe and the European Environmental Bureau (Vedant Goyal 2006). See also Carl Dalhammar, 'Extended Producer Responsibility' in Ludwig Krämer and Emanuela Orlando (eds), *Principles of Environmental Law*, Elgar Encyclopedia of Environmental Law Series (Edward Elgar 2018).

35 See, for example, BBC *Blue Planet II*, Series 1.7.

36 Yasuhiko Ogushi and Milind Kandlikar 'Assessing Extended Producer Responsibility Laws in Japan' (2007) 41/13 Environmental Science & Technology 4502-8.

such as for packaging, waste from electrical and electronic equipment, and vehicles, included labelling obligations as well as obligations to take responsibility for physical take-back and financial responsibility. Various expressed objectives of producer responsibility list items such as waste reduction; increased recycling as a method of waste disposal; improved resource use through eco-design; technological innovation; and, the generation of financial resources, which could be committed to recovery.[37] While these obligations did address the critical end of life problems of products, what they did omit, however, was the whole life approach to assessing the environmental impact of products and forcing design improvements to retain the product and its embedded energy within a circular economy and eliminate waste to a point consistent with the laws of thermodynamics.

Sometimes the terminology of 'producer responsibility' can be problematic. As it has been used in the EU, it has largely come to refer to take-back legislation – a term used for the obligations to recover products at the end of their life whether physically or by providing an economic framework. The reason for this is that end of life, and waste in general, is perceived as being the most potentially damaging stage in a product's life. For this reason too, waste legislation generally requires management responsibilities for all those handling waste and creates a framework of offences both in relation to the requirement for licensing and for general environmental offences.[38] By contrast, 'extended producer responsibility' can be used to refer to the whole life cycle of the product and all those involved in that cycle – not just the producer. This is problematic in that it downgrades the influence the producer has over the product and its impacts. It is to be distinguished from Integrated Product Policy, which clearly places responsibility on the producer.[39]

Producer responsibility as enacted in the EU clearly focuses on the final stage of the product while some of the objectives indicate a creeping integration of product policy across the life cycle with responsibility bearing on the individual producer. The *codex rerum* addresses not just the environmental impacts across the whole lifecycle but also takes the product round a loop within a circular economy and unequivocally puts the responsibility on the manufacturer of the product to retain the product and its embedded energy within that industrial system.

So, Integrated Product Policy as set out in two Communications from the European Commission,[40] presents an entirely new approach to the regulation of environmental impacts. It represents a radical and innovative way of controlling environmental pollution by looking at the impacts, which individual products will have on the environment along their full supply chain throughout their lifetime. At its heart is a life cycle approach, which requires an evaluation of the impacts a product will have at each stage.[41] Its preventive approach applies an assessment of environmental impacts to the product at each stage; i.e. from cradle to grave. The long supply chain involves the winning of the raw materials for the product; their processing; the manufacture of the product itself; its usage; and, finally its disposal, with at each point, consequent impacts on the environment. Further, in between each stage are sub-stages; for example, transportation or storage or repair. Each of these stages, under Integrated Product Policy, should be included in a life cycle assessment.

It is necessary to explain life cycle thinking given its importance to Integrated Product Policy and broader environmental product policies including the *codex rerum*.

37 Reid Lifset, 'Take it Back: Extended Producer Responsibility as a Form of Incentive-Based Policy' (1993) 21/4 Journal of Resource Management and Technology 163-175; Knut F Kroepelien, 'Extended Producer Responsibility — New Legal Structures for Improved Ecological Self-Organization in Europe' (2000) 9/2 Review of European Community & International Environmental Law 165-77.

38 See, for example, The Environmental Protection Act 1990, Part II.

39 Lifset (n 37).

40 'Green Paper of 7 February 2001 on integrated product policy' (presented by the Commission), COM (2001) 68 final; Communication from the Commission to the Council and the European Parliament, 'Integrated Product Policy: Building on Environmental Life-Cycle Thinking', COM (2003) 302 final.

41 Henrikke Baumann and Anne-Marie Tillman, *Hitch Hiker's Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Application* (Studentlitteratur AB 2004).

3
LIFE CYCLE APPROACHES

The notion of a holistic environmental product policy refers to a fully integrated approach which addresses all aspects of the impact of a product.[42] Life cycle thinking is integral to this approach and is at the core of Integrated Product Policy as well as the *codex rerum*. The holistic approach refers to the identification of all environmental impacts throughout the lifetime of a product – that is cradle to grave, or more appropriately when driving towards a circular economy – cradle to cradle. Life cycle thinking addresses the whole life implications of activities, without necessarily pursuing the formal quantitative approach of a life cycle assessment study (see below), and has become a mainstay of policy in this field.[43] The holistic approach to the assessment of a product and its impact on the environment means that all the point controls, which are normally separately regulated, are integrated into the design stage of the product. So, impacts arising from the sourcing of the resources necessary for the production of the product; during its usage in the hands of those down the supply chain; and its disposal, are considered and acted upon even before the product is launched onto the market. This holistic life cycle thinking approach applied as part of the proposed Product Impact Assessment draws upon the learning acquired from environmental impact assessment (EIA) and strategic environmental assessment (SEA),[44] and is intended to be based on the preventive principle. Both the EIA and SEA Directives are based on the principle that all environmental impacts of projects, plans and policies should be assessed prior to implementation and public consultation plays a key element in these procedures.

Life cycle assessment is a quantitative manifestation of life cycle thinking. It is a tool which can be used in various ways such as for comparison between products or for single assessments. Life cycle thinking can be addressed in different forms through the analytical and quantitative tool of life cycle assessment. An international standard provides guidelines.[45] Life cycle assessment enables identification and, ideally, quantification of the environmental benefits of keeping the product and its embedded energy in circulation without using new resources thus minimising the generation of waste. It is complicated but this is bound to be the case as there are several stages and accompanying impacts which a product will have during its lifetime. "Aggregation", i.e. the extent to which distinct environmental impacts can be combined or traded off, is a specific problem in life cycle assessment.

The comparative approach of life cycle assessment is most likely to be used in retrospective situations where products are being compared for some reason such as, for example, a buying decision in a public procurement context. A single life cycle assessment can be used as a proactive and prospective tool to identify which are the greatest environmental impacts in a product's life cycle.[46] It is within the prospective context where its use is advocated as part of the proposed *codex rerum* where it is targeted at the design phase of a product as a pre-condition to its entry into the market. The use of life cycle assessment tools would be aimed at

42 This article is only concerned to argue the case for the application to products but it is conceived that this approach could ultimately apply also to services.

43 Guido Sonnemann et al, 'Life Cycle Thinking and the Use of LCA in Policies around the World' in Michael Z Hauschild, Ralph K Rosenbaum and Stig Irving Olsen (eds), *Life Cycle Assessment: Theory and Practice* (Springer 2018) 429; Walter Kloepffer, 'Life Cycle Sustainability Assessment of Products' (2008) 13 International Journal of Life Cycle Assessment 89-95.

44 Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment ['Environmental Impact Assessment' or EIA Directive], or for public plans or programmes on the basis of Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment ['Strategic Environmental Assessment' or SEA Directive].

45 ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework. See also ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines; ISO/TR 14047:2003 Environmental management - Life cycle impact assessment - Examples of application of ISO 14042; ISO/TS 14048:2002 - Environmental management - Life cycle assessment - Data documentation format.

46 Usually, the terms used are 'accounting LCA' and 'consequential LCA' (or change-oriented LCA). See, for example, chapter 3 in Baumann and Tillman (n 41).

ensuring that no product enters the market unless it has been satisfactorily demonstrated that its environmental impacts have been minimised and any other benchmarking criteria enabling circularity throughout its lifetime(s) have been satisfied. In the context of plastic products, this requirement means that such products will not generate waste in any of the forms in which that can occur in respect of waste throughout their lifetime. It may also reflect innovations such as new and developing types of plastics, which degrade more effectively.[47] Further requirements are that such plastic products use no new resources and the product (and its embedded energy) is capable of being returned to beneficial use as part of a circular economy. This process of evaluation under the *codex rerum* is described here as the 'Product Impact Assessment'.

Under the Product Impact Assessment, as part of the analysis, a calculation would be made which includes the generation of waste and emissions throughout the life of the product. This calculation is likely to include the resources used across the supply chain.[48] But the goals behind a Product Impact Assessment can be various and should include such matters as: resource efficiency, waste minimization and circularity, durability and longevity, reusability and recyclability as well as generalised reduced environmental impact. These features are determined during the goal and scope phase when conducting a Life Cycle Assessment. During a Product Impact Assessment, the necessary goals and scope of the process in relation to any particular product could be determined by the Technical Committee which would be set up at the outset to undertake the technical aspects leading to the assessment. But whatever the goals of the Product Impact Assessment are determined to be, the approach exemplifies the application of the preventive principle since the process must be completed at the design stage. One example of this is a seven-stage approach advocated by the Danish Environmental Protection Agency, which actually proposes applying this to either a product already on the market or one still at the design stage. The steps start with (1) a description of the product's use and functionality and (2) the creation of an overview of its environmental impacts across its (linear) product life cycle. An environmental profile is then created as part of step 3 with the impacts identified in step 2 sorted into categories and types. Step 4 involves sketching the stakeholder network so as to identify which of them influence environmental impacts and how possible improvements can be achieved at different points throughout the product's lifetime. Step 5 is an estimated quantification of environmental impacts (in this model designed for internal consumption and guidance rather than in accordance with formal methodological techniques such as the ISO standards). The final two tasks involve (6) creating solutions for the product and its life cycle which can lead to environmental improvements and finally (7) developing an environmental strategy which is an action plan for the environmental efforts of the company.[49] As an example of a model for the method for applying Product Impact Assessment, this is informative and demonstrates a practical way in which it can be implemented. The point at which the *codex rerum* departs from this approach is that Product Impact Assessment will be part of a regulatory framework and, as argued in the next part of this article, will be a mandatory requirement before a product can enter the market.

4 HOW TO REGULATE UNDER THE CODEX RERUM?

There is a range of regulatory styles and within the context of the *codex rerum* a command and control style within a permissive licensing regime is

47 For a discussion of the different types of plastics and their uses, see Roland Clift et al, 'Managing Plastics: Uses, Losses and Disposal' in this issue of LEAD Journal.

48 Baumann and Tillman (n 41); Roland Clift et al, 'Inventory Enhancement: A Summary of the Results of the Working Group on Inventory Enhancement' (1999) 10/3 SETAC-Europe News 14-20.

49 Tim C McAloone and Niki Bey, Environmental Improvement through Product Development: A Guide (Danish Environmental Protection Agency 2009).

advocated.[50] A key basis for such regulation would be the requirement for a Product Impact Assessment to be undertaken for all products and for compliance with that Product Impact Assessment to occur before market launch and throughout the ongoing marketing of the product. In other words, it is a mandatory process which bites at inception and continues for as long as the product is offered for sale – no Product Impact Assessment, no market; no continuing compliance with the Product Impact Assessment, no sales. So, regulation would be used to enforce certain essential characteristics and to keep a product off the market if it failed to comply. The design aspects of the product would be addressed, as in the Ecodesign regime and in voluntary Environmental Product Declarations,[51] using innovative technological approaches and this stage would be managed by Technical Committees. The essential requirements established under the Product Impact Assessment must be met before the product could be marketed – and they must continue to be met. In effect, the process results in a grant of a licence subject to conditions to market the product. Such a process to be mandatory and fit under the command and control style of regulation must be accompanied by an effective and respected enforcement framework. Thus, where a product has been licensed under the *codex rerum,* then breach of the license would be controlled through either administrative processes, comprising service of an administrative notice specifying the breach and requiring compliance within a set period of time, or criminal prosecution. As with current licensing enforcement procedures, where the terms of such a licence are breached then enforcement by a designated enforcement agency would follow. So, monitoring of the market is a necessary corollary to licensing and enforcement. Finally, it is proposed that there should be a transitional period for the implementation of the *codex rerum* with new products covered first and existing products drawn into it in stages.

5 VOLUNTARY AGREEMENTS AND STANDARDISATION

Many products have in fact been standardised – a 'secret' development in product policy.[52] In the European context this has worked as part of a process of identification of common interests in achieving technical solutions. In a single market context this ensures that products are accessible to all the national markets so national standards are increasingly being replaced by European standards to achieve uniform applicability. It is often the case that to ensure a product can enter international markets it also conforms to international standards. The European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC) and the European Telecommunication Standardisation Institute (ETSI) are recognised as the bodies for the development of European standards.[53] CEN has a Strategic Advisory Board for the Environment and the CENELEC has a Working Group of the Technical Board "Environmental Standardisation". Both bodies also have environmental databases and guides for the incorporation of environmental impacts into the standardisation process.

50 Neil Gunningham 'Environment Law, Regulation and Governance: Shifting Architectures' (2009) 21/2 Journal of Environmental Law 179-212; C Sabel and J Zeitlin, 'Learning from Difference: The New Architecture of Experimentalist Governance in the EU' (2008) 14/3 European Law Journal 271-327; Joanne Scott and Jane Holder, 'Law and Environmental Governance in the European Union' in Grainne De Burca and Joanne Scott (eds), *Law and New Governance in the EU and the US* (Hart Publishing 2006) 211; Nicholas A Ashford 'Government and Environmental Innovation in Europe and North America' in Mathias Weber and Jens Hemmelskamp (eds) *Towards Environmental Innovation Systems* (Springer 2005) 159.

51 See Part 5 of this article.

52 Opinion of the European Economic and Social Committee on the 'Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee on the Integration of Environmental Aspects into European Standardisation', COM (2004) 130 final. See also Communication from the Commission to the Council, the European Parliament and the European, Economic and Social Committee, 'Integration of Environmental Aspects into European Standardisation' SEC (2004) 206.

53 Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

Standards are an important element in any product policy since they establish the basic criteria on which product development can be based. They may establish all aspects of a product from the way it is made to the way it is disposed of and, of particular interest to an environmental product policy, they may define what materials it can use and other matters which may have an impact on the environment. The process of standard setting is critical for the development of an environmental product policy and is important in contributing to sustainable development policies.[54] Current standards in use are either mandatory and are set out in regulation, or voluntary and agreed by trade associations, companies or under the aegis of standardisation bodies. The Ecodesign Directive[55] is an illustration of this standards-based approach used in a regulatory context. Environmental Product Declarations are also examples of voluntary standard setting and, as a concept, are strongly linked to the proposed Product Impact Assessment. Environmental Product Declarations are approved through an independent process. They are registered and give information about the life-cycle environmental impact of products. ISO 14025 is the comparable standard for Environmental Product Declarations ('type III environmental declarations') making the process formalised and transparent. But, Environmental Product Declarations remain voluntary so have little impact on transforming the market even though they may appear in public procurement schemes. They are also largely confined to business-to business contexts (rather than business-to-consumer). So, where Environmental Product Declarations part company with Product Impact Assessments is that the former are voluntary and the latter mandatory.

In general, European standards are voluntary agreements developed through a system of consensual workshops organised by the European standardisation bodies. They are distinct from legislation which incorporate standards or parameters. Standardisation offers a different approach from legislation and can be an alternative or complementary. A legal framework as demonstrated by the Ecodesign regime[56] can incorporate a series of voluntarily agreed standards thereby keeping legislation oriented towards performance and under a process of swift and straightforward review to keep abreast of technical developments. Usually a five year review period is in place for reviewing standards and this can involve a review of the environmental impacts of a product.

There are a growing number of European standards, for example, with CEN having in the region of 7000 European standards and they cover a range of issues such as product design, energy efficiency, end-of-life and other processes. Measuring environmental impacts is a growing area of CEN and other standards. The New Approach directives introduced in 1985,[57] and the New Legislative Framework introduced in 2008[58] have also seen the growth of standards adopted on a voluntary basis which can then be used as evidence of compliance with the legislative requirements. Product standards represent a very significant part of European standards covering areas such as safety and compatibility with other components. The potential for developing environmental standards is great with the possibility presented of reducing environmental impacts, reducing energy use and so on. Life cycle approaches are also coming to the forefront where standards are integrating environmental aspects into the design stage and are underpinning Ecodesign approaches.

54 Communication from the Commission, 'A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development', COM (2001) 264 final.

55 Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of eco-design requirements for energy-related products.

56 The Ecodesign Directive is a framework directive. Under Article 16(1), Working Plans form part of the process by rolling out the standardisation requirements to more product groups. Following the Communication from the Commission to the Council and the European Parliament, 'Establishment of the working plan for 2009 – 2011 under the Ecodesign Directive', (COM (2008) 0660), two further Working Plans have been developed: Commission Staff Working Document, Establishment of the Working Plan under the Ecodesign Directive, '2012-2014 Working Plan' SW9(2012) 434 final) and the third Working Plan 2016-2019 (COM (2016) 773) issued on 30 November 2016.

57 European Committee for Standardisation, 'New Approach and Other Directives', available at <https://www.cen.eu/work/supportlegislation/directives/pages/default.aspx> accessed 5 July 2019.

58 European Commission, 'New Legislative Framework', available at <https://ec.europa.eu/growth/single-market/goods/new-legislative-framework_en> accessed 5 July 2019.

The advantage of using the European approach is that expertise on environmental impacts can be easily incorporated as part of the process which has become highly specialised, systemised and expert. For example, CEN has standardised a test method for potassium content which can be used for sludge, biowaste or soil. This not only works as a test which is acceptable across a number of industries but also aids market development by removing uncertainty – industry may rely on results based on this standardised testing approach. They have a basis for differentiating between products or services which are or are not based on such standardised processes. Environmental technologies in the field of energy use, for example, can also be differentiated based on standardised approaches to their testing and measurement.[59] As a verification tool, standardization can be immensely useful to industry and can achieve significant environmental benefits without much outlay where the standardised methods have been developed with the objective of minimising environmental impacts.

In addition to technical and scientific expertise, the standardisation process has the facility to incorporate other users of the products so consumer interests can be represented as well as political and other interest groups.[60] The European Environmental Citizens Organisation for Standardisation (ECOS) has been set up which is a consortium of environmental organisations. It is mandated to build membership of NGOs involved in the standardisation process and to establish a network and technical work programme and undertake training of experts to build expertise in environmental impacts of standardisation. This broad range of interests helps to ensure public acceptability of the standard and the product or service, which incorporates it. However, it is important that lack of resources, both in terms of time and finance does not limit such involvement – the standardisation process is expensive.[61]

The development of standards, which incorporate environmental concerns, does depend on the availability of expertise and awareness of these matters. The complementary use of standards and legislation is therefore the most effective process for developing such environmentally aware standards. The legislation imposes the requirement to establish a standard requiring certain environmental parameters to be agreed and the standard, agreed through the voluntary process chaperoned by the standardisation body fills in the detail. This provides an interesting mix between regulatory and voluntary approaches and can be seen at work in the Ecodesign regime, which is considered further in section 6.

6 THE EU LEGISLATIVE FRAMEWORK FOR THE ECODESIGN OF PRODUCTS

The Integrated Product Policy Green and White Papers and the subsequent studies and research were eventually followed by the implementation in 2005 of the first framework directive[62] - Directive 2005/32/EC on the eco-design of Energy-using Products. This directive was a first step in the implementation of Integrated Product Policy and sought to improve the environmental impacts of energy-using products by adopting a lifecycle approach at the inception stage of a product. Part of the single market approach, it adopted criteria for energy-using products applicable at member state level. A promising start to the adoption of an Integrated Product Policy, it was replaced in 2009 by the Ecodesign Directive,[63] which extended the remit of the original directive beyond energy-using products to 'any goods having an impact on energy consumption during use'. The Ecodesign Directive is now part of a catalogue of legal instruments

59 Communication from the Commission to the Council and the European Parliament, 'Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union', COM (2004) 38 final.

60 'Service Contract for the Integration of Environmental Requirements in the European Standardisation Process', OJ 2002/S 173-137828.

61 Report of 13 May 1998 from the Commission to the Council and the European Parliament, 'Efficiency and Accountability in European Standardisation under the New Approach', COM (1998) 291 final, 11.

62 Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of eco-design requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council.

63 Directive 2009/125/EC (n 55).

covering ecolabelling,[64] energy performance of buildings,[65] waste,[66] and environmental management and auditing.[67] These deal with whole life rather than end of life such as the extended producer laws on packaging,[68] waste from electrical and electronic equipment, end of life vehicles,[69] batteries,[70] and restriction on hazardous substances.[71]

7 APPLYING THE *CODEX RERUM* TO PLASTICS

The focus and context of this article is the particular and difficult problem of pollution of the environment by plastics waste whether as a result of fugitive emissions or at the end of life. In themselves, plastic products tend not to be an environmental problem – their resource base is not an exploitative use of rare raw materials and their production is not more or less environmentally damaging than any other process. The problem is, as described in the introduction, one relating to their discarding whether at end of life or during usage as fugitive emissions. It is unlikely, given their growth since initial development, that it will be possible to remove plastics from the economy despite the various bans that can be identified across the world.[72] The ultimate objective must be to prevent plastics leaking into the environment as waste. This is where Product Impact Assessment becomes a useful tool applying to all products including plastics. Applying a life cycle approach to a product will involve an examination of its use of plastics – whether plastics are the material used for a component or the whole product. Product Impact Assessment will operate on the final product but it will encompass its constituent parts. So, it might identify that certain components which are likely to leak as fugitive emissions should be replaced by other less environmentally damaging parts made, for instance, from different materials or from different types of plastics. Recognising different types of plastics during this regulatory phase is key to Product Impact Assessment control and that, as with many regulatory interventions, may lead to the promotion of innovative approaches as well as to new types of plastics. Further, the life cycle approach embedded in Product Impact Assessment will require end-of-life solutions to be explicit in the design of products so reuse and recyclability will be dominant drivers in Product Impact Assessment approvals. Moves to ban single-use plastics are now being seen worldwide so it is less likely that Product Impact Assessment will be needed to achieve control of such items (although their replacement by other single-use items made from other materials may long remain an area necessary for Product Impact Assessment in order to achieve a transformation from linear to circular economy models beyond the immediate plastic problem).

As described above, Product Impact Assessment would apply initially to new products with existing

64 Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products; and Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel. See on the topic of ecolabelling, Mauro Cordella et al, 'Improving Material Efficiency in the Life Cycle of Products: A Review of EU Ecolabel Criteria' [2019] The International Journal of Life Cycle Assessment 1-15.

65 Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

66 The Waste Framework Directive (n 14).

67 Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC.

68 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.

69 Directive 2000/53/EC (n 16).

70 Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC.

71 Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

72 Kenya, for example, along with other African countries such as Rwanda and Tanzania, introduced on 28 August 2017 a ban on anyone producing, selling or possessing a plastic bag subject to a penalty of up to four years' imprisonment or a fine of $40,000.

products drawn in over a lengthy transitional period.[73] So, the approach which will focus on regulation of the end product emerging from the design stage will not immediately impact on the current wide range of plastic products; nor will it deal with the current problem of marine plastic waste which will require simple clean-up approaches driven by regulation and agreement on the international stage. But what it will do is subject to life cycle controls all new products entering the market so the new models will be impacted. Given the way in which the market is dominated by novelty and innovation, this is likely to have a swifter impact than might, at first, be expected.

8 CONCLUSION

In achieving a rearrangement of our systems, at the heart of a holistic environmental product policy based on life cycle thinking and a new model law dealing horizontally with products (a law for things or *codex rerum*) must be the imperative to shift the nature of the market from one based on a linear production model with its mantra of 'GDP growth' to a system where resources move round a loop with the holy grail of generating zero waste in the process. The laws of thermodynamics may prevent a completely closed loop zero waste economy[74] but the aim of the *codex rerum* is twofold: to minimise waste as far as possible; and, to avoid the use and exploitation of virgin resources by extending product life and circling products round a loop in which they are recycled, remanufactured or otherwise renewed. The codex must seek to ensure that materials including plastics are reused, building in innovation such as technological advances in the nature of plastics as part of the whole life loop with the necessary incentives. In relation to plastics, an environmental product policy would require a Product Impact Assessment of products which utilise plastics in their manufacture. Standardisation of this process would require that no fugitive emissions of plastics waste occur during the use phase and that all recovery systems are triggered to recover and reuse such plastic as is left at the end of the lifecycle of the particular product.

The key characteristics of the *codex rerum* would be that it would be based on a licensing approach which adopts a style of regulation which is both reflective and 'command and control'. The licence to manufacture and market the product would only be granted once the process of a Product Impact Assessment had been completed and approved. The process of approval would rest upon the Product Impact Assessment and the extent to which the regulatory body considers that it has satisfactorily ensured that the product and its embedded energy will be renewed or otherwise remanufactured and circulated without the use of virgin resources or the generation of waste as far as reasonably practicable. This procedural stage would enable the reflective process to be fully engaged and stakeholders including citizen groups and industry representatives would be fully involved. This Product Impact Assessment would be based on a life cycle approach which would require technical development by the relevant regulatory body. The development of this life cycle approach underpinning the Product Impact Assessment would involve technical criteria and scientific committees. So, the procedural nature of the *codex rerum* would involve: development of the product; application for licence; Product Impact Assessment (undertaken by regulatory body with Stakeholders' and Scientific / Technical Committees); issuing of licence (with or without conditions) dependent on satisfactory outcome of Product Impact Assessment; marketing of product; and, finally monitoring.

As discussed above, if the problem is the failure to deal with waste generated from plastic products then regulation is required. It is the product which must be regulated before its production. This approach is coupled with, and integral to, the drive towards a circular economy. The linear process of control stems from the Victorian era of the industrial revolution in the UK and Europe where the immediate necessity was to control the external impacts of production processes and to make towns and cities better places to live and work as well as to ensure the health and safety of workers in the factories. So, inspectorates focusing on health and safety and atmospheric controls were

73 See Part 4 of this article.

74 Roland Clift and Julian Allwood, 'Rethinking the Economy' (2011) 837 TCE: The Chemical Engineer 30.

established. More basic than our current attention to smart and sustainable cities this was about fundamental public health concerns and the need to have a healthy and live workforce.[75] As a result, the product was not the centre of concern – rather the production process including the extraction of materials was - the classic linear model of control. The product, once out on the market, was largely unregulated.[76] One answer to our current problems related to plastics waste caused by insatiable consumption is to regulate the product not just for single-use plastics or fugitive emissions but for all aspects of its impact on the environment.

The proposal is, therefore, for a new paradigm for the regulation of the environment described here as a new law for things and of things - a *codex rerum* - a law which is concerned with sustainable consumption and production and which only permits the marketing of sustainable products which have been licensed following a Product Impact Assessment.

Equally, it is clear, that there is not a one-stop solution based on regulation or other approaches. Market instruments have their role to play, but regulation is absolutely essential to a framework of tools - not as one of the tools - but to make the other tools work. Regulation needs to be primary with other instruments available to complement it. Regulation needs to start with government policy and a government determination to achieve a framework in which environmental measures are seen as an integral and indispensable part of the economy in order to advance technological development and generate a thriving market for such developments.[77] Environmentally focussed policies have failed in themselves to achieve wholesale environmental behavioural change and the market has failed in achieving material change in the nature of products. Where there is such market failure in achieving green products, other mechanisms must be sought and regulation must be the primary driver.

The current UK government and the EU have responded to the attention being given to the problem of plastics waste.[78] What is now essential is a meeting of minds between government and its policy makers, the manufacturers and the regulators. So, the next step is to establish a clear mandate for regulatory bodies to be able to regulate and enforce the *codex rerum* so that they are free to make appropriate judgments. Current proposals to reduce the environmental impact of plastics need to be followed up with a clear regulatory response based on a new paradigm for the regulation of products.

75 Rosalind Malcolm and John Pointing, 'Statutory Nuisance: The Sanitary Paradigm and Judicial Conservatism' (2006) 18/1 Journal of Environmental Law 37-54. See also Karl Marx, 'The State of British Manufacturing Industry' *New-York Daily Tribune*, No. 6016 (London, 6 August 1860) in *Marx and Engels Collected Works* (Vol 17, Progress Publishers 1980).

76 Rosalind Malcolm, 'Ecodesign Laws and the Environmental Impact of our Consumption of Products' (2011) 23/3 Journal of Environmental Law 487-503.

77 Tonner and Malcolm (n 17).

78 See Introduction.

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