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CIRCULAR ECONOMY: FROM ECONOMIC CONCEPT TO LEGAL MEANS FOR SUSTAINABLE DEVELOPMENT

ECONOMIA CIRCULAR: DE CONCEITO ECONÓMICO A INSTRUMENTOS LEGAIS PARA O DESENVOLVIMENTO SUSTENTÁVEL

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Abstract: The purpose of this article is to provide an overview of the concept of circular economy and how it has been incorporated in public policies so far, and to determine which fundamental changes must occur in different areas of the law in order to make this transition. There has been a growing interest in this topic. Circular economy is an economic system with a zero-waste purpose in which products maintain their functionality through long life cycles, and their components maintain their value and are reincorporated into the economy in subsequent production processes. It represents a revolution from our current linear economy paradigm, and it can only be created by design. The roles of all responsible market players – producers, public buyers, and private consumers – must also be considered. The European Union and eight of its Member States already have strategies for a circular economy. However, only specific projects and legislation can determine a swift transition.

Keywords: Circular economy; sustainable development; sustainable production; sustainable consumption.

Resumo: Este artigo contém uma análise global do conceito de economia circular e da forma como tem sido incorporado em políticas públicas, e identifica as alterações fundamentais necessárias em diferentes áreas do direito para a sua implementação. A economia circular, um tópico com crescente interesse, é um sistema económico com um objetivo de desperdício-zero no qual os produtos mantêm a sua funcionalidade em longos ciclos de vida, e os seus

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componentes retêm o seu valor e são reintroduzidos na economia em processos de produção subsequentes. A economia circular só pode desenhada de raiz e representa uma revolução em relação ao atual paradigma de economia linear. Neste novo contexto, têm de ser considerados os papéis dos vários agentes de mercado – produtores, entidades públicas, e consumidores. A União Europeia e os 8 Estados-membros aprovaram recentemente estratégias para uma economia circular. Contudo, apenas projetos específicos e alterações legislativas podem catalisar a transição.

Palavras-chave: Economia circular; desenvolvimento sustentável; produção sustentável; consumo sustentável.

Sumário: 1. A essência do tema; 2. O que é a economia circular?; 2.1. O conceito; 2.2. As finalidades da economia circular; 2.3. Os instrumentos para uma economia circular; 3. Políticas públicas de economia circular na União Europeia e nos Estados Membros; 4. Instrumento legais para a transição para a economia circular; 5. Conclusões.

1. The essence of the matter

The basic concept of circular economy is quite easily defined as an economic model in which extracted natural resources maintain their value in an efficient manner, and therefore never become waste. The concept of circular economy opposes that of linear economy, where humans extract, manufacture, consume and throw away, which has been the core of the development model since the industrial revolution: the "«take, make, waste» approach"[2]. As the current environmental crises is a result of overexploitation of natural resources, the potential of the idea of a circular economy that could harmonize environmental protection and economic development is appealing for environmentalists, economists, and policy makers.

This is, of course, a simplified version of what is, in fact, a complex model, with several aims and means of implementation. The latter have been and are being thoroughly studied by different areas of expertise, but not from a legal perspective. It is therefore necessary to assess how the concept of circular economy can give body to a coherent set of legal rules that enable the implementation of the sustainable development principle, as well as how public policies on the matter have so far been translated into law.

2. What is circular economy?

2.1. The concept

Circular economy is not yet a stabilized concept. Although its adequacy to modern-days' problems has led to a significant increase of published papers on the subject – more than tripled in two years[3] –, not many have had this focus. However, it is possible to identify some common grounds in most of these works.

First and foremost, circular economy is treated as, or associated to, the idea of a system – a socio-economic system or, more specifically, an industrial system. The Ellen MacArthur Foundation's proposal – currently, by far, the most frequently used definition – defines it as an industrial system[4]. Most other definitions identify circular economy with a socioeconomic system[5], or analyze it through the lens of micro-systems (product/firm level), meso-systems (regional/eco-industrial parks level) or one macro-system (global/overall industry level)[6]. In this last sense, not only is circular economy a system in itself, but it is also comprised of a virtually infinite number of smaller systems, at every level of the economy, all following the same set of principles. A system is generally defined as an "interacting or interdependent group of items forming a unified whole" or "an organized set of doctrines, ideas, or principles usually intended to explain the arrangement

4. Ellen MacArthur Foundation, *Towards the Circular Economy*, 2013, p. 7, https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation--Towards-the-Circular-Economy-vol.1.pdf.

or working of a systematic whole"[7], which includes an inherent coherency provided by a common purpose. Any paper or work will convey the idea that the purpose of a circular economy is the elimination, or at least reduction, of waste by incorporating it back into the economy, thus eliminating the need for insertion of new raw materials in the production and consumption processes. As such, circular economy is a system.

Secondly, and as follows, circular economy is associated with waste and raw materials; that is, with what are currently the beginning and the end of the life cycle of a product. The current "cradle to grave" perspective ought to be transformed into a "cradle to cradle" life cycle[8], in which waste generated in one process is used in another, with one purpose: "zero waste" or "closed-loop system"[9]. Regulation around the usage of raw materials is extremely incipient. Consequently, much of the work already done on circular economy analyzes the 3R approach to waste management and waste hierarchy – reduce, reuse, and recycle. Considering its insufficiency, researchers have proposed the adding of many other operations, such as 6R classifications – reuse, recycle, redesign, remanufacture, reduce, recover[10] – or even 10R – refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover[11].

Thirdly, it should be noted that the implementation of a circular economy that goes beyond improving or optimizing current waste management systems is primarily associated not with waste, but with a "design for effectiveness"[12] of products and processes. This becomes clear when the before mentioned well-established Ellen MacArthur Foundation's definitions is as follows: "a circular economy is an industrial system that is restorative and regenerative by intention and design"[13]. A restorative system may be defined as one that rehabilitates used resources, so that they retain their economic value[14]; and a regenerative system as one in which processes renew their sources of materials and energy[15]. Hence, the image of a circle (the closed-loop system) is extremely adequate to illustrate a model that maintains itself, by "intent and design", without the need of external

7. "System," in *Merriam-Webster*, accessed March 24, 2020, https://www.merriam-webster.com/dictionary/system.

8. W. McDonough and M. Braungart, *Cradle to Cradle - Remaking the Way We Make Things*, New York, North Point Press, 2002.

9. R. Y. M. Li *et al.*, "Unmaking Waste in Construction in the EU and the Asian Circular Economy: A Formal Institutional Approach", in R. Crocker, e *et al.* (eds.), *Unmaking Waste in Production and Consumption: Towards The Circular Economy*, 1st ed., Bingley, Emerald Publishing Limited, 2018, p. 228.

10. K. Winans, A. Kendall, and H. Deng, "The History and Current Applications of the Circular Economy Concept", *Renewable and Sustainable Energy Reviews,* 68, 2017, p. 825, https://doi.org/10.1016/j.rser.2016.09.123.

11. Kirchherr, Reike, and Hekkert, *RCR* , p. 224.

12. S. Ghosh, "Introduction to Circular Economy and Summary Analysis of Chapters," in S. Ghosh (ed.), *Circular Economy: Global Perspective*, 1st ed., Springer, 2020, p. 5, https://doi.org/10.1007/978-981-15-1052-6.

13. Ellen MacArthur Foundation, *Towards the Circular Economy,* p. 7.

14. Ellen MacArthur Foundation, *Towards the Circular Economy,* p. 24.

15. Ellen MacArthur Foundation, *Towards the Circular Economy,* p. 26.

input; that is, without the need for more natural resources. In that sense, a circular economy would be similar to nature itself: unlike humans, it does not have a "design problem"[16]. It is particularly in the design dimension that the expression "revolution"[17] or "new industrial revolution"[18] is used, since design will entail subsequent alterations in all of the dimensions of implementation of a circular economy.

Fourthly, the focus on earlier stages of the products' life cycle is also manifested in the relevance of the consumer's role. This does not mean that most of the burden will not fall on the producer, like the current extended producer's responsibility schemes; on the contrary, the fact that the burden is on the producer demonstrates that a greater role must be attributed to the consumer through freedom of choice, information and empowerment against sale strategies that do not serve the consumer, nor the environment. Therefore, in a circular economy, consumers are viewed as not only "the main target of the product supply chain" but also "the starting point of the reverse supply chain"[19] – which means the movement of goods from the consumer back to the producer, by which the product, instead of being treated as waste to be disposed of, is viewed as a resource that must reenter production processes. As such, a circular economy reinforces the role of the consumer as a powerful market agent, thus surpassing the mere role of a weaker part in a contractual relationship.

Lastly, in a pragmatic perspective, the concept of circular economy is associated with certain types of activities, raw materials, and products. This selection is based on several criteria, such as the non-renewable nature of the materials, its widespread usage, low recycling rate, or environmental risk. In fact, although the issues are interdependent and include all areas of the economy, certain activities or products are responsible for a very large share of the problems created by waste and overexploitation of natural resources. This is the case of the construction sector, responsible for over a third of the waste created in the European Union (hereinafter «EU»)[20], as well as the plastics, electric, and electronic equipment

16. W. McDonough and M. Braungart, *Cradle to Cradle,* New York, North Point Press, 2002, p. 16.

17. Ellen MacArthur Foundation, *Towards the Circular Economy*, p. 12.

18. McDonough and Braungart, "The next Industrial Revolution", *The Atlantic*, October 1998, https://www.theatlantic.com/magazine/archive/1998/10/the-next-industrial-revolution/304695/.

19. E. Maitre-Ekern and C. Dalhammar, "Towards a Hierarchy of Consumption Behaviour in the Circular Economy", *Maastricht Journal of European and Comparative Law,* 26, 3, 2019, p. 395, https://doi.org/10.1177/1023263X19840943.

20. Construction created 36,4% of EU waste in 2016. Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics#Totalwastegeneration.

industries, due to its widespread usage, small recycling rate, environmental risk, and resource scarcity[21/22].

2.2. The aims of a circular economy

It is easy to identify sustainable development as the general aim of a circular economy. Sustainable development has been for long a disputed principal of environmental law, due to its high degree of vagueness; however, it is possible, as a policy principle, to identify its content as the "integration of three independent and complementary pillars – economic development, social development and environmental protection"[23]. In fact, all academic work and public policies reports sustain its argumentation on circular economy by pointing out the need to make a paradigm shift from the economic dependence of exploitation of limited natural resources to a regenerative growth model. The social pillar of sustainable development, as an independent aim, is scarcely mentioned in academic works[24]. Specifically, sustainable development in what concerns circular economy means, in short, "decoupling economic growth from resource use"[25], which, in turn, will lead to a severe reduction on the usage and extraction of natural resources.

However, it is more difficult to organize a coherent set of aims that may provide clearer guidance on the creation of legal rules. Still, it is a fundamental exercise: "far reaching (strong) environmental goals which are fixed for a long period of time are a crucial prerequisite for realising radical innovations"[26]. As an aid in this task, we will consider the different stages of the circularity, using a diagram put forth by the Ellen MacArthur Foundation. Most illustrations of circularity are either too vague, or too specific to one sector.

Considering this proposal, we can identify two branches of circularity: biological nutrients, and technology. The difference is relevant, since biological nutrients should, after treatment, be returned to the biosphere – since nature has, to a

21. Less than 30% of plastic waste is collected for recycling in the European Union, 31% is landfilled and 39% is incinerated. Moreover, 95% of the value of plastic is lost after a very short period of time and 59% is used only for packaging – Communication from the Commission "A European Strategy for Plastics in a Circular Economy" (COM (2018) 28 final), p. 2.

22. Electric and electronic equipment is one of the fastest growing waste streams and less than 40% of it is recycled. Is it also one of the sectors most affected by planned obsolescence and creates significant environmental risks through hazardous substances – Communication from the Commission "A new Circular Economy Action Plan For a cleaner and more competitive Europe" (COM (2020) 98 final), p. 7. Many of the raw materials used in these equipment are finite, and reserves will be exhausted in the next decades – M. Nelles, A. Nassour, and G. Morscheck, "Status and Development of the Circular Economy in Germany," in S. K. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 132, https://doi.org/10.1007/978-981-15-1052-6.

23. V. Barral, "The Principle of Sustainable Development", in L. Krämer and E. Orlando (eds.), *Principles of Environmental Law*, Elgar Encyclopedia of Environmental Law, VI, Cheltenham/Massachusetts, Edward Elgar Publishing, 2018, p. 106.

24. Kirchherr, Reike, and Hekkert, *RCR*, p. 225.

25. Ellen MacArthur Foundation, *Towards the Circular Economy*, p. 68.

26. C. Backes, *Law for a Circular Economy,* Eleven Publishing, 2017, p. 32.

great extent, the capability to restore nutrients –, whereas technical nutrients, once produced, should not return to the biosphere since, ideally, they would be maintained in the circular economy. As such, we can identify two specific goals in a circular economy: biological nutrients must be produced and treated in a way that, after its disposal, they are returned to the biosphere and to natural cycles; and technical nutrients must be produced and treated in a way that, after its first life, they maintain their value and are kept in the circular economy.

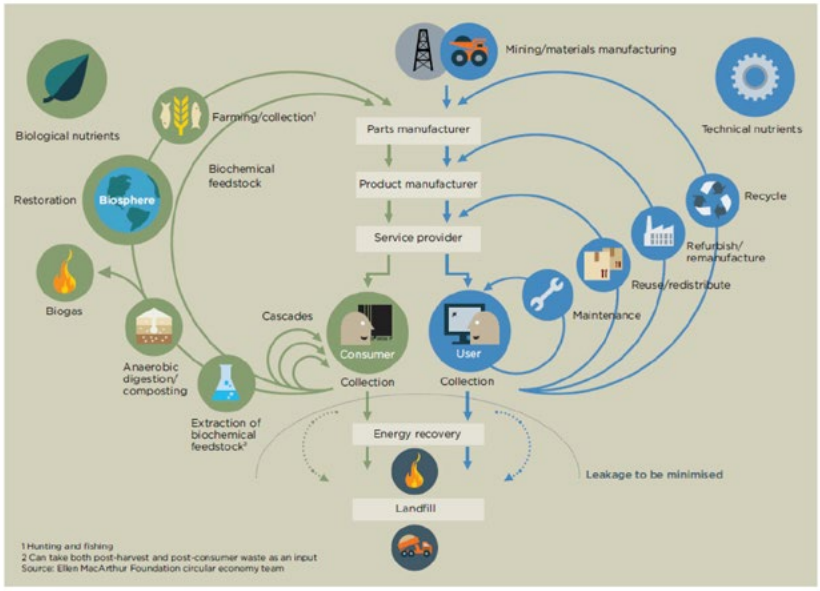

Figure 1. Source: Ellen MacArthur Foundation, "Towards the Circular Economy," 2013, p. 24, https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

From this distinction, we can also draw a line between biological nutrients that, eventually, have to be consumed individually, and technical resources that can be shared, as each use does not affect its functionality. An individual cannot really share what she eats, and therefore she has to own food; but she can share a car, and therefore she only has to use it, and not own it. This a simplification, surely, since many products contain both biological and technical resources. But it is a useful conclusion to draw a policy from.

It is of course a general purpose of a circular economy to reduce the amount of waste that is created, and to eliminate the pure waste that occurs when the producer disposes of products without them ever reaching the consumer. There are several specific aims that can be deduced from this[27], for every stage of the

27. More specification can be found at Y. Kalmykova, M. Sadagopan, and L. Rosado,

products' life cycle, such as (i) the reduction of consumption of products through a broader functionality of each product or elimination of disposable products, with very short life cycles, (ii) the reduction of waste created in the production of each final product, (iii) the elimination of planned obsolescence[28], not hindering repair and upgrading of products, as pathways to durability[29], (iv) the reusage of components and nutrients in refurbishing and remanufacturing processes, and (v) severely diminishing downcycling, by which products lose much of their functionality and value, enabling (vi) the incorporation of recycled materials into new products and processes.

This idea, in general, is already incorporated in the waste management hierarchy[30], since disposal operations are at the bottom. However, a circular economy upgrades this demand. Waste management operations have, themselves, high environmental costs, namely in terms of water and energy consumption. We must therefore move our central aim up the stream, to the level of extraction of materials, and even product design; in other words, defining the eco-planning of processes of production and consumption as an essential aim of a circular economy. This means that these processes must be designed in a way that allows compliance with the demands of a cradle to cradle economic model. Converging the aim of an eco-friendly design with the specific waste-reduction purposes means designing products in ways that: (i) ensure it has multifunctionality and is not a single-use product, (ii) its production demands few energy and raw resources, and incorporates recycled materials, (iii) allow its repair, upgrade, (iv) as well as refurbishing and remanufacture, and (v) its components and production processes provide for optimal recycling conditions.

Finally, in a circular economy that cannot be purely imposed, turning the consumer into a decisive and informed party is also an instrumental aim in this paradigm shift. The structural nature of this revolution in our socio-economic environment demands the involvement of all stakeholders in order to make it effective[31]. This is usually associated with the inclusion of companies and other institutions, like universities and research centers, or local government and communities; however, consumers, as individuals, are key players and must

"Circular Economy – From Review of Theories and Practices to Development of Implementation Tools", *Resources, Conservation & Recycling*, 135, 2018, pp. 196-197, https://doi.org/10.1016/j.resconrec.2017.10.034.

28. E. Maitre-Ekern and C. Dalhammar, "Regulating Planned Obsolescence: A Review of Legal Approaches to Increase Product Durability and Reparability in Europe", *Review of European, Comparative & International Environmental Law,* 25, 3, 2016, p. 379, https://doi.org/10.1111/reel.12182.

29. L. Milios, "Advancing to a Circular Economy: Three Essential Ingredients for a Comprehensive Policy Mix", *Sustainability Science,* 13, 3, 2018, p. 869, https://doi.org/10.1007/s11625-017-0502-9.

30. E.g, Article 4 of the Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008, amended by Council Regulation (EU) No 1357/2014, Commission Directive (EU) 2015/1127, Council Regulation (EU) 2017/997, and Directive (EU) 2018/851).

31. S. Ghinoi, F. Silvestri, and B. Steiner, "The Role of Local Stakeholders in Disseminating Knowledge for Supporting the Circular Economy: A Network Analysis Approach", *Ecological Economics,* 169, 2020, p. 18, https://doi.org/10.1016/j.ecolecon.2019.106446.

therefore be educated, informed, and be held responsible when not complying with the necessary impositions to achieve circular economy.

2.3. The means for a circular economy

Considering both general and specific purposes, the means for a circular economy have long been put forth by researchers. One of these instruments is, of course, the law, through a regulatory approach that determines a chain of duties to all parties in the process: from all of the producers along the process, to the consumer, either public or private entities. This perspective will be developed later in section 4.

However, the success of such a revolutionary public policy depends greatly on practical aspects related to its feasibility. Therefore, although many aspects of a circular economy can be immediately implemented, many depend on innovative techniques that for allow the achievement of these goals without destroying competition, companies, and workers – the social pillar of sustainable development. Such innovative techniques include: the prevention of downcycling components of products – materials being no longer usable for their original purpose due to a change in their chemical/physical properties –; the replacement of hazardous materials that impede later recycling; the reduction of consumption of water and energy in all processes; the availability of cost-effective, time-saving and environmentally safe post-consumer collection and disposal solutions; or waste management systems that recognize environmentally safe resources that should be kept in the economy. All these depend on the invention or improvement of technology and methods. Innovation in circular economy is a transversal instrument, since it is required at all stages: designing products, production processes, organization, business models and new markets, and consumption patterns[32]. In short, it is necessary to prepare a fast transition through the clear fixation of short-, medium- and long-term targets, and the creation of strong incentives for innovation[33]. The resources at hand for this purpose are essentially of an economic nature.

Funding research targeted for specific public policy objectives has long been a useful instrument. A comparative study between 20 countries regarding advances in implementing a circular economy has been recently conducted. While innovation is present in public policies in most of these countries, Norway – considered a circular economy-driven society[34] – presents an "ambitious policy, well-functioning waste management systems, innovative technologies and good communication between the different stakeholders", providing several examples

32. X. Vence and Á. Pereira, "Eco-Innovation and Circular Business Models as Drivers for a Circular Economy", *Contaduría y Administración,* 64, 1, 2019, p. 6, https://doi.org/10.22201/fca.24488410e.2019.1806.

33. Backes, *Law for a Circular Economy*, p. 31.

34. S. A. Ghosh, "Introduction to Circular Economy and Summary Analysis of Chapters", p. 12.

of research projects[35]. The need for innovation is also highlighted in public policies by such different economies as Malaysia[36], India[37], Italy[38], Kenya[39], and Israel[40]. Funding of research, however, is not sufficient when it comes to incentivizing medium size companies that are not dedicated to technological innovation. The extraction of raw materials, landfilling, and incineration are still cheaper alternatives to recycling, recovery of nutrients, or designing for refurbishment. Therefore, other type of economic incentives must be used when it comes to altering company practices, such as tax incentives and fees, like the waste disposal fee system adopted in Korea since 2018[41], by which recycling becomes the less expensive option. The fixation of targets of recovery, associated with economic benefits of penalties, may also be strong arguments that favor entrepreneurship.

Another set of measures destined to integrate companies' business in a circular economy are those related to the creation or strengthening of secondary resource markets. In fact, markets of recycled or otherwise recovered products have been growing; however, their full development depends on safety guarantee and lowering transaction costs. Total lack of information on the "qualities and properties of potentially recyclable or reusable materials and products", or asymmetric information – both well-studied market failures –, are barriers to safety and efficiency of any market[42]. Any public policy on circular economy must allow for the full development of these markets by securing all preconditions to its functioning.

These are all measures designed to influence private companies towards the shift to a circular economy. However, two other types of actors also influence the market and must contribute to the transition. An immediate and reliable measure is the insertion of circular economy criteria in public procurement, through procurement of recycled products or materials, requesting circular processes, requiring life-cycle information as an indicator of resources use, using eco-label

35. K. H. Karstensen, C. J. Engelsen, and P. K. Saha, "Circular Economy Initiatives in Norway" in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 300, https://doi.org/10.1007/978-981-15-1052-6.

36. P. Agamuthu and S. B. Mehran, "Circular Economy in Malaysia", in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 263, https://doi.org/10.1007/978-981-15-1052-6.

37. S. A. Ghosh, "Circular Economy in India," in S. A. Ghosh (ed.) *Circular Economy: Global Perspective*, Springer, 2020, p. 176, https://doi.org/10.1007/978-981-15-1052-6.

38. F. Di Maria, "Circular Economy in Italy," in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 207, https://doi.org/10.1007/978-981-15-1052-6.

39. M. K. Koech and K. J. Munene, "Circular Economy in Kenya," in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 236, https://doi.org/10.1007/978-981-15-1052-6.

40. S. Daskal and O. Ayalon, "Circular Economy—Situation in Israel," in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 190, https://doi.org/10.1007/978-981-15-1052-6.

41. S.-W. Rhee, "Circular Economy of Municipal Solid Waste (MSW) in Korea," in S. A. Ghosh (ed.), *Circular Economy: Global Perspective*, Springer, 2020, p. 326, https://doi.org/10.1007/978-981-15-1052-6.

42. Milios, *SS*, p. 871.

criteria, or others conditions that support recycling, reuse, or recyclability[43]. Not only are public entities large consumers of goods and services, and are therefore capable of strongly influencing private suppliers[44], it has been demonstrated that collaboration between procurers and suppliers can lead to relevant reduction in raw material usage and waste generation[45]. Monitoring and defining targets in circular economy indicators are also an efficient way of prioritizing determined public policies.

The third actor to be considered in this deep paradigm shift is the private consumer. Even though citizen's awareness in environmental matters has greatly improved in the last decades, it has not been established in the consumer's perception that sustainability is determined by consuming patterns. Moreover, circular economy creates relevant questions in terms of public health. While all waste management operations imply risk for human health, the uncertainty, on the consumer's side, regarding, for example, the safety of products containing recycled materials or the usage of treated waste water for certain purposes, can be a new factor to consider – these are new choices for the consumer. This may hinder the shift to a circular economy. As such, transparency[46] through strong and specific eco-labels and certifications, as well as general education and awareness initiatives, play a key role in ensuring that products made in a circular process are not rejected by consumers, and that products are used in a sharing economy, rather than owned individually[47].

3. Public policies on circular economy in the European Union and Member States

The EU has had a leading role in advancing public policies on circular economy. This is the foreseeable result of the fact that many of the most developed countries in these matters are European countries. Despite some isolated initiatives[48], the first plan for the transition was presented by the Commission in 2015[49]. The Commission, after an introduction to the concept of circular economy and the needed transition, focused on product design, production processes, consumption, and waste management, presented an action plan for the transformation of waste into resources, identifying priority areas (plastics,

43. K. Alhola et al., "Exploiting the Potential of Public Procurement: Opportunities for Circular Economy", *Journal of Industrial Ecology,* 23, 1, 2019, p. 100.

44. Milios, *SS*, p. 870.

45. S. Witjes and R. Lozano, "Towards a More Circular Economy: Proposing a Framework Linking Sustainable Public Procurement and Sustainable Business Models", *Resources, Conservation & Recycling,* 112, 2016, pp. 37–44, https://doi.org/10.1016/j.resconrec.2016.04.015.

46. Maitre-Ekern and Dalhammar, *MJECL*, p. 399.

47. Maitre-Ekern and Dalhammar, *MJECL*, p. 401.

48. B. P. de las Heras, "La gestión eficiente de recursos en la Unión Europea: alcance e impacto de la normativa europea para una economía más sostenible y circular", *Revista De Derecho Comunitario Europeo*, 55, 2016, p. 787, https://doi.org/10.18042/cepc/rdce.55.01.

49. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2015) 614 final) on *"Closing the loop – An EU action plan for the Circular Economy"*.

food waste, critical raw materials, construction and demolition, biomass and bio-based products) containing several horizontal and sectorial measures. The sectorial development of this action plan, as well as the monitoring that followed, led the Commission to present a report on the implementation[50] and a communication on waste-to-energy processes[51] in 2017, two communications in 2018, on a monitoring framework for the circular economy[52] and a strategy for plastics[53], as well as a Proposal of a Regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable development[54], still undergoing the due legislative procedure[55].

The Environment Action Programmes are always relevant policy instruments to consider in the EU. The 7th Environment Action Programme (2014-2020) contained a "vision" to "help guide action up to and beyond 2020" that included a "circular economy where nothing is wasted", the identification of a need for "a framework that gives appropriate signals to producers and consumers to promote resource efficiency and the circular economy", and the objective of reviewing existing product and waste legislation "so as to move towards a circular economy"[56]. The Council has already approved its conclusions in 2019 on an 8th Environment Action Programme, still not approved or presented. In these, the Council highlighted "the need to accelerate the transition towards a resource-efficient, circular, non-toxic, safe and climate-neutral economy" and called upon "the Commission to come up with a new Circular Economy Action Plan and a long-term strategic framework, including a common vision, for a circular economy"[57]. However, the Commission has since then, already in 2020, presented a new Circular Economy Action Plan[58], which constitutes the most recent public policy on this subject and should therefore be analysed in more detail.

50. Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2017) 33 final) on the implementation of the Circular Economy Action Plan.

51. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2017) 34 final) on *"The role of waste-to-energy in the circular economy"*.

52. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2018) 29 final) on a monitoring framework for the circular economy.

53. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2018) 28 final) on "A European Strategy for Plastics in a Circular Economy".

54. COM (2018) 353 final.

55. https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:52018PC0353

56. 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", pp. 176, 183, and 186.

57. "The 8th Environment Action Programme – Turning the trends together – Council Conclusion", adopted in 4 October 2019, available at https://www.consilium.europa.eu/media/40927/st12795-2019.pdf.

58. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (COM (2020) 98 final) on "A new Circular Economy Action Plan For a cleaner and more competitive Europe".

The Commission includes this Action Plan in a concerted strategy launched by the European Green Deal, and associates it to a new EU industrial strategy and to the 2030 Sustainable Development Goals. Similarly to the Council's conclusions, the Commission reaffirms the need to accelerate the transition. The general targets are the reduction of consumption to planetary boundaries, and to double the circular material use rate in the coming decade. Comparing to the 2015 Action Plan, it should be noted that almost the entirety of the plan is drawn from a product perspective, divided into four areas:

(i) *Designing of products*. By proposing the adoption of a sustainable product policy legislative initiative, the Commission intends to establish a set of sustainability principles that: improve product durability, reusability, upgradability, and reparability; increase the recycled content in products; enable remanufacturing and high-quality recycling; restricts single-use and counters premature obsolescence; bans destruction of unsold goods; incentivizes usage instead of ownership; broadens digitalization; and rewards sustainability. It should be noted that the presence of hazardous chemicals in products is also identified as an essential part of a product policy for product efficiency;

(ii) *Empowering private consumers*. By ensuring trustworthy information on sustainability issues regarding products and product's life cycle, such as the availability of repair services, spare parts and repair manuals, combating green washing through labels and logos; and by recognizing a right to repair;

(iii) *Reinforcing green public procurement*. By imposing minimum mandatory green public procurement criteria and targets by sectors, accompanied by compulsory reporting;

(iv) *Circularity of processes*. By including circularity in industrial activity regulations; facilitating industrial symbiosis, by which waste or by-products of one industry become resources for another; strengthening of bio-based circular industry; promoting digital technologies for tracking, tracing and mapping of resources; and creating a registry of green technologies that allow for certification of processes.

Much like any other public policy for a circular economy, the Commission identifies key product value chains:

(i) Electronics and information and communication technologies[59], the relevance of which will lead to the adoption of a Circular Electronics Initiative with the purpose of addressing specific inefficiencies of these products related to software update, related hardware (e.g., chargers), parts (e.g., batteries), and dependence on hazardous materials that hinder recovery;

59. B. P. Cociña, "Gestión y Prevención de Residuos de Aparatos Eléctricos y Electrónicos (RAEE): Una Propuesta Para Promover La Economía Circular", *Actualidad Jurídica Ambiental*, 84, 2018, pp. 6–36.

(ii) Batteries, that are becoming increasingly relevant, considering evolution on electro-mobility, but still bear considerable ecofootprint in terms of waste management, particularly recovery of materials;

(iii) Vehicles, that must improve its recycling efficiency in order to allow for the creation of mandatory recycled content in new vehicles. Also, it is a prime area for the implementation of sharing economy;

(iv) Packaging, that must be addressed both in a reduction perspective, considering current overpackaging, and in an efficiency of recovery perspective, since packages must be designed in a way that allows re-use and recycling. It should be noted that this is an area of particular sensitivity in matters of public safety for packaging of food products;

(v) Plastics, that are already the object of a specific EU strategy with the purposes of integrating recycled plastic content in all processes and addresses the problem of microplastics, which is still a largely unknown problem. The emergence of new solutions, such as bio-based and biodegradable plastics, also plays an important part in the future development of these strategies. Reducing single use products is also a specific goal when it comes to plastics;

(vi) Textiles[60], which are always in high demand in terms of primary raw materials, and will therefore be the object of a specific EU Strategy for Textiles, since there is much room for improvement in basic circular economy matters, such as sorting, re-use and recycling;

(vii) Construction and buildings[61], that account for 50% of extracted materials and over a third of the waste produced, is another sector that will be specifically analyzed in a Strategy for a Sustainable Built Environment. The recovery of materials, the durability and adaptability of products and the recycled content of new construction and buildings are key aspects to be addressed;

(viii) Food, water and nutrients deal essentially with food waste, and what we have called the biological nutrients that can be returned to the biosphere for natural renewal processes, under certain conditions.

In terms of waste, the solutions adopted by the Commission are the same as those already implemented in terms of waste management, with improvements such as harmonizing collection systems and extended producer liability schemes. However, there is one area of real reinforcement, and another of significance shift. The first regards the need to manage information on substances of concern, and articulate rules on hazardous waste and on chemicals. The second regards the need to create well-functioning markets of secondary raw materials; since

60. V. Jacometti, "Circular Economy and Waste in the Fashion Industry", *Laws,* 8, 4, 2019, p. 27, https://doi.org/10.3390/laws8040027.

61. L. A. L. Ruiz, X. R. Ramón, and S. G. Domingo, "The Circular Economy in the Construction and Demolition Waste Sector – A Review and an Integrative Model Approach", *Journal of Cleaner Production,* 248, 2020, https://doi.org/10.1016/j.jclepro.2019.119238.

this is the last stage of a cradle to cradle economy, almost all of the inefficiencies previously identified will result in costly, low-performance secondary raw material markets.

Contrary to almost all scholarly articles on the matter, the Commission highlights the social pillar of sustainable development, arguing the case for the social benefits of a circular economy that creates new business opportunities and new jobs. Finally, the Commission points out the transversal nature of circular economy policies, in the sense that circularity is necessary for climate neutrality, and will greatly enhance research, innovation, and digitalization. This new strategy of action plan was presented in March, 2020. Future monitoring and the presentation of related strategies within the Green New Deal will allow us determine how successful this initiative will be in terms of speeding up the transition.

In 28 EU Member States, a total of eight have structured national policies, two have very relevant national initiatives towards circular economy, and three have regional or municipal programs[62]: Finland was, in 2016, the first Member State to approve a road map to a circular economy, and municipal and regional soon followed; The Netherlands also presented, in 2016, a Government-wide programme aimed at developing a circular economy; Germany, later that same year, adopted a resource-efficiency programme; Italy presented a document containing its strategic framework towards a model of circular economy in 2017; by the end of the same year, Portugal presented an Action Plan focused on leading the transition; in 2018, Greece approved a National Action Plan on Circular Economy; later that year, France and Slovenia approved their own roadmaps; Austria was in 2019 the first country in the world to actually measure the circularity of its economy, and, in that same year, Luxembourg launched a circularity dataset initiative to address the problem of the lack of information on the circular properties of products. Belgium has regional strategies and programs in Flanders and Brussels; and Spain has regional strategies in Catalonia and Extremadura.

The approval of strategies may be a good indicator of policy priorities, and provide a good framework for cross-cutting actions. However, only specific projects and legislation can really determine a swift transition[63].

4. Legal instruments for transitioning to a circular economy

At this point, it has become clear that while much of the transition is dependent on technical innovation, economic incentives, collaboration among stakeholders, and complete information, the fast transition aimed by European countries

62. https://circulareconomy.europa.eu/platform/en/strategies

63. Y. Hu, X. He, and M. Poustie, "Can Legislation Promote a Circular Economy? A Material Flow-Based Evaluation of the Circular Degree of the Chinese Economy", *Sustainability,* 10, 4, 2018, p. 990, https://doi.org/10.3390/su10040990.

and needed to halt environmental degradation requires and must be pushed by legal enforcement. To this purpose, several traditional environmental law regimes must be improved and strengthened, while other legal areas must be simultaneously "refurbished" and "upgraded" to incorporate or, at the very least, allow, circularity. Several others must be altered, like public procurement and tax law, since they can be powerful instruments, as already mentioned. As these do not need to be altered in any fundamental way, they will not be analyzed in this article.

(i) Waste law

The idea of a zero-waste society may leave us to wonder if waste law will still be needed in the future, since the focus must be on products and production processes[64]. Waste has a bad reputation and is subject to heavy regulation with significant environmental and administrative costs. However, waste law regulates essential activities for a circular economy, such as recycling and recovery operations, and simply needs to be more efficient in the implementation of its current hierarchies. Moreover, there will probably always be products that eventually have to leave the circular economy, since they no longer hold value. Therefore, we can assume that there will still be a place for waste law, even in a distant future when innovation and other legal regimes have greatly reduced its relevance.

The first concept we have to draw our attention to is waste[65]. Article 3(1) of the Waste Framework Directive defines waste as "any substance or object which the holder discards or intends or is required to discard". If waste is to be reduced to substances or objects that cannot keep the entirety or most of its value, this concept, along with that of end-of-waste, needs to be revised. Article 4, on waste hierarchy, includes prevention, preparing for re-use, recycling, recovery, and disposal. As we now know, a circular economy offers many options before recycling, and they must all be either included as a waste management operation, or the concept of waste must be greatly restricted. If a product still holds its value, or if its components do, even if the full functionality of the product does not, options such as reuse, repair, refurbish and remanufacture must assume priority, in a new hierarchy of product (and not waste) management. The solution put forth in the 2018 amendment to the Directive, that expands the usage of the by-product exception in Article 5, in very insufficient.

This entails greater responsibilities for both consumers and producers. In what concerns producers, the extended producer responsibility (henceforth "EPR") scheme maintains its full utility and must merely be expanded to new ways of product management. EPR is "a financial and/or operational instrument which has a double key aim: internalising environmental externalities related to end-of-life management and fostering the operational implementation of sustainable

64. Backes, *Law for a Circular Economy*, p. 23.
65. Backes, *Law for a Circular Economy*, p. 27.

product and waste management schemes in line with the waste hierarchy and with qualitative recycling and recovery targets"[66]. EPR is a policy principle, and, but several legal impositions may derive from it, such as product take-back requirements, economic and market-based instruments such as refund systems and disposal fees, performance standards, and information-based instruments. By extending its range of action, EPR can cover almost all of the new obligations that must be imposed to producers, such as bans on disposal and landfill operations, imposition of product standards that allow longer life, product and component functionality, and ensure secondary raw material content and recyclability. We can therefore conclude that EPR must be upgraded to a circular economy principle, acting in all the life stages of a product, and not just a waste management principle, as it is today[67].

As follows, sectorial waste legislation must also be adapted to meet these purposes. For example, electronic and information and communication technologies legislation must be revised to specifically address problems on planned obsolescence and limitation regarding the substitution of parts, of universal complementary hardware, such as chargers, headphones, cables, printers, upgrading software, and matching warranty deadlines to life product expectancy[68]. Another example is landfill regulations. In what concerns new or already existing landfills, it is necessary to determine to what extent we can allow landfill mining, thus transforming landfills into long-term storage that allows for the recovery of materials – an option that is not possible under today's landfill regulations[69].

(ii) Product legislation: eco-design, eco-labelling, and chemicals

Product legislation is primarily focused on safety. In this domain, a substantial evolution is expected, particularly in three essential areas: eco-design, eco-labelling, and chemicals legislation.

In what concerns the designing of products, the Ecodesign Diretive[70] has already led the way in terms of energy-related products. The obvious way forward, already assumed by the Commission in its Action Plan, is the broadening of scope of the Directive – it must be applicable to other than energy-related products – and of the product characteristics that are to be assessed and are essential to a circular economy – including toxicity, durability, recyclability, availability of

66. K. Pouikli, "Concretising the Role of Extended Producer Responsibility in European Union Waste Law and Policy through the Lens of the Circular Economy", *ERA Forum*, 2020, https://doi.org/10.1007/s12027-020-00596-9.

67. K. Pouikli, *ERA Forum*, point 3.

68. Cociña, *AJA*, p. 17.

69. T. J. Römph, "Terminological Challenges to the Incorporation of Landfill Mining in EU Waste Law in View of the Circular Economy", *European Energy and Environmental Law Review*, 25, 4, 2016, pp. 106–119.

70. Directive 2009/125/EC of the European Parliament and of Council of 21 October 2009, amended by Directive 2012/27/EU.

repair services, etc[71]. These measures must be complemented by the inclusion of circulatory conditions for Best Available Techniques Reference Documents – for facilities subject to the industrial emissions Directive[72] – and new mandatory eco-labelling rules.

Eco-labelling has been implemented in the EU in essentially two ways: as a market instrument that is not mandatory, as it is used by companies as way to communicate with environmentally-concerned consumers[73]; and in a regulatory approach, as a condition for entering the market, in energy related products subject to the Ecodesign Directive. The broadening of the scope of the Ecodesign Directive to other products should imply that eco-labels will be a mandatory requirement for all products. As a consequence, the label should reflect environmentally relevant circumstances, such as: predicted consumption of materials, energy, and other resources such as fresh water; anticipated emissions to air, water or soil; anticipated pollution through physical effects such as noise, vibration, radiation, electromagnetic fields; expected generation of waste material; possibilities for repair, reuse, recycling and recovery of materials and/or energy[74].

Product regulation must also refer to production processes and recovery processes, which pose new questions of safety for human health and the environment. The mismatch between chemical legislation, in particular REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) Regulation[75] and waste law has long been identified[76], but it is now clearer than ever. The applicability of these regimes is dependent on what is considered waste and what is not. Because circularity imposes changes precisely at this point of intersection (where almost everything that is waste returns to a status of non-waste), it is pressing that these two regimes be merged, or, the very least, have them follow essentially the same patterns, mechanisms, and demands. Furthermore, the lack of information on the composition and previous lives of recycled materials, which should be growingly integrated into new products,would make it impossible for a producer to comply with REACH obligations[77].

71. L. T. Peiró *et al.*, "Advances towards Circular Economy Policies in the EU: The New Ecodesign Regulation of Enterprise Servers", *Resources, Conservation and Recycling,* 154, 2020, https://doi.org/10.1016/j.resconrec.2019.104426.

72. Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010.

73. Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009, amended by Commission Regulation (EU) No. 782/2013, and Commission Regulation (EU) 2017/1941.

74. Backes, *Law for a Circular Economy*, p. 39.

75. Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006, already amended by 55 acts, the last one being Commission Regulation (EU) 2020/171.

76. J. Alaranta and T. Turunen, "Drawing a Line between European Waste and Chemicals Regulation", *Review of European, Comparative & International Environmental Law,* 26, 2, 2017, pp. 163–73, https://doi.org/10.1111/reel.12205.

77. T. J. Römph and G. Van Calster, "REACH in a Circular Economy: The Obstacles for Plastics Recyclers and Regulators", *Review of European Comparative & International Environmental Law,* 27, 3, 2018, pp. 267–77, https://doi.org/10.1111/reel.12265.

(iii) Law on consumption

As we have previously mentioned, a fundamental shift towards a circular economy regards the position of the consumer. From a weak party that must be protected from abusive commercial practices, the role of the consumer must evolve to the fundamental economic actor that he/she in fact is. The basis of this evolution is information – a new mandatory and cross-cutting eco-label, in the terms described previously, is a fundamental part of this. Another market dimension of the protection of consumers is related to servitization[78], which implies a shift from buying products to using products, and from selling products to selling services. In fact, the buyer paradigm has created the misconception that owning products is essential for the satisfaction of consumer needs, and consumer protection policies do not currently address this. Another misconception that must also be addressed in the revisal of competition law is that the way to protect consumers is by lowering prices through pure competition. Circular economy requires collaboration, and competition law is already hindering progress in terms of circularity[79].

A rights-approach is also needed, namely through a right to repair, a right to spare parts and complementary hardware, a right to upgradable software and so on[80]. But we also need a duties-approach, in the sense that most of the definition a product's future is dependent on how its owner decides to handle it when he/she no longer wants it. For example, today's waste management systems efficiency depend on how consumers dispose of such a waste, in terms of sorting it correctly for recycling. While we increase the number of possibilities – reuse, repair, refurbish, remanufacture, recycle – and make the system more complex, awareness is key, but legal accountability of consumers must also make its way.

5. Conclusions

Circular economy is an economic system with a zero-waste purpose in which products maintain their functionality through long life cycles, and their components maintain their value and are reincorporated into the economy in subsequent production processes. Such a cradle to cradle loop system can only be created by design and with active roles between all responsible market players – producers, public buyers, and private consumers. In terms of policy, the focus must shift from waste management to product and processes design, as well as consumption behavior, particularly with products or economic activities that have high environmental costs and low circularity rates. The implementation of

78. V. Mak and E. Terryn, "Circular Economy and Consumer Protection: The Consumer as a Citizen and the Limits of Empowerment Through Consumer Law", *Journal of Consumer Policy,* 43, 1, 2020, pp. 227–48, https://doi.org/10.1007/s10603-019-09435-y.

79. A. Gerbrandy, "Solving a Sustainability-Deficit in European Competition Law", *World Competition,* 40, 4, 2017, pp. 539–62.

80. E. Terryn, "A Right to Repair? Towards Sustainable Remedies in Consumer Law", *European Review of Private Law,* 27, 4, 2019, pp. 851–73.

circular economy depends greatly on eco-innovation in products and processes. This eco-innovation must be publicly funded, but also incentivized by taxes, fees, and collaboration models. Moreover, the creation of efficient secondary raw materials depends on the creation of transparent processes that eliminate today's market failures.

The EU and eight of its Member States already have strategies that essentially follow these notions and build upon the need to create these technological and market conditions. However, only specific projects and legislation can determine a swift transition. Public procurement and tax law are powerful instruments, but do not require any fundamental change to meet this purpose. On the contrary, waste law, product legislation on eco-design, eco-labelling, chemicals, as well as law on consumption all require deep revision in order to become instruments in favour of a circular economy.

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