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Analysing European Union circular economy policies: words versus actions

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ABSTRACT

Since the publication of the European Union's Circular Economy Action Plan in 2015, this new sustainability paradigm has become a guiding force behind the environmental and economic policies of the Junker Commission. The European Union (EU) has taken a particular approach to circularity, with high expectations to increase competitiveness, promote economic growth and create jobs while reducing environmental impacts and resource dependency. However, the circular economy (CE) is a contested paradigm, for which many competing interpretations exist, each seeking varying degrees of social, ecological and political transformation. Considering the emerging and contested state of the academic literature on CE, the EU's embrace of the concept is a remarkable phenomenon, which remains poorly researched. The aim of this paper is thus to address this research gap by analysing the CE discourse and policies of the Junker Commission (2014-2019) in order to critically discuss their sustainability implications and develop key policy recommendations. To do so, this research uses a combination of qualitative and quantitative research methods. The paper first critically analyses the EU's discourse based on a typology of circularity discourses. It then reviews the complex set of concrete CE policies and actions adopted by the EU and compares them to its discourse. Results show a dichotomy between words and actions, with a discourse that is rather holistic, while policies focus on "end of pipe" solutions and do not address the many socio-ecological implications of a circularity transition. Several actions are thus recommended to tackle the systemic challenges of a circular future from a plural perspective.

1. Introduction

From a little-known concept coined in the late 20th century, the circular economy (CE) is now recognized by the European Union (EU) as an "irreversible, global mega trend" (COM 2019/190, p10). The CE has indeed become an essential strategy in the ambition of the Junker Commission (2014-2019) to create a "sustainable, low-carbon, resource-efficient and competitive economy" (COM 2015/614, p6) and it is now a key component of the European Green Deal and the Coronavirus Recovery Plan of the Von der Leyen Commission (2019-present) (European Commission, 2020).

Embracing the idea that the CE will "modernise the EU industrial base to ensure its global competitive edge and preserve and restore the EU's natural capital" (COM 2019/190, p11), the EU seems to consider the CE as a "magic bullet" that can resolve the manifold economic and environmental challenges of the Anthropocene. However, the social, ecological and political implications of the CE are only starting to be understood by the scientific literature (Clube and Tennant, 2020; Geisendorf and Pietrulla, 2018; Ghisellini et al., 2016; Merli et al., 2018; Prieto-Sandoval et al., 2018). Evidence regarding the economic, social and environmental impacts of CE policies and practices is still lacking (Donati et al., 2020; Hobson and Lynch, 2016; Lekan and Rogers, 2020; Roos Lindgreen et al., 2020; Velis, 2018). Core challenges remain little researched, such as the implication of the CE on the complex trade-offs and synergies between climate change, biodiversity and resource scarcity (Bleischwitz and Miedzinski, 2018; Campbell-Johnston et al., 2020; Giampietro, 2019;

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Lehmann et al., 2018; Schroeder et al., 2019). The implications of the CE for economic growth/degrowth, social justice and global sustainability also needs to be further researched and understood, especially taking into account the impacts of entropy and the rebound effect (Mayumi and Giampietro, 2019; Millar et al., 2019; Moreau et al., 2017; Murray et al., 2017; Temesgen et al., 2019).

Considering the emerging state of the academic literature on the topic, the impressive growth and adoption of the concept by the EU is a remarkable phenomenon, which deserves further research. Indeed, the CE is still a contested concept, with many different societal actors seeking to influence its meaning and understanding with a diversity of conflicting approaches to circularity (Calisto Friant et al., 2020; Korhonen et al., 2018b; Lazarevic and Valve, 2017; Repo et al., 2018). By choosing one of many contrasting CE visions, and implementing it on a large scale, the Commission will determine the future and meaning of circularity in Europe and beyond. There are thus important conceptual implications with the EU's choice of circularity discourses and policies.

In this context, several academics have stressed the need to further investigate the EU's interpretation and implementation of the CE concept (Colombo et al., 2019; Fitch-Roy et al., 2020; Foschi and Bonoli, 2019; Krämer, 2019; Pollex and Lenschow, 2018; Rijnhout et al., 2018). While various articles have looked at specific aspects of the EU's CE policies (Baran, 2020; Colombo et al., 2019; Elliott et al., 2020; Farmer, 2020; Fitch-Roy et al., 2020; Foschi and Bonoli, 2019; Hartley et al., 2020; Kirchherr et al., 2018; Knill et al., 2020; Krämer, 2019; Lazarevic and Valve, 2017; McDowall et al., 2017; Milios, 2018; Moraga et al., 2019; Pollex and Lenschow, 2018; Repo et al., 2018; Steenmans, 2019; Talens Peiró et al., 2020; Völker et al., 2020; Wieliczko, 2019) no research so far has comprehensively analysed the discourse and sustainability implications of the CE package of the Junker Commission[1]. This paper tackles this research gap by analysing the EU's discourse and policies on the CE through the discourse typology developed by Calisto Friant et al. (2020), which classifies and conceptually differentiates circularity visions based on their position on fundamental social, political and ecological aspects. The aim of this research is thus to apply the abovementioned discourse typology to the Junker Commission's CE policy to uncover the EU's core vision regarding the transition towards a CE and critically assess its key sustainability implications with respect to other possible circular futures. The research question is hence: What discourse of the CE is advanced by the policies of the Junker Commission (2014-2019), what sustainability implications does it have and what alternative policies from the perspective of other circularity visions could be recommended?

To answer this research question, this paper first presents its conceptual framework on the CE (section 2) and explains its research methods (section 3). It then assesses the EU's discourse on the CE, through quantitative content analysis (section 4.1). Section 4.2 reviews the EU policies on the CE, including their core targets and regulations and section 4.3 critically analyses their content based on the discourse typology developed by Calisto Friant et al. (2020). Finally, the discussion reflects on these results and develops recommendations from the perspective of other circularity visions. This research unfolds the Commission's vision of the CE and points out inconsistencies between the EU's discourse and the targets and policies which are implemented by its directives and regulations. Alternative policy directions are thus recommended through interventions that tackle the systemic social, ecological and political implications of a circular future in an integrated manner.

2. Conceptual framework

To analyse the EU's perspective, this research uses the typology of circularity discourses developed by Calisto Friant et al. (2020). This typology is based on extensive research of the CE and CE-related concepts through history, leading to a comprehensive framework of analysis to better evaluate, untangle and navigate the many visions of this contested paradigm. This framework is thus very well suited to understand what circular future the EU is proposing, and what implications this has in relation to other circular futures.

Table 1 resumes this 2 × 2 discourse typology, which, differentiates between *holistic* and *segmented* discourses and between *optimist* or *sceptical* discourses (also see Fig. 1).

Segmented discourses have a homogeneous perspective that focuses only on the technical, industrial and business components of circularity in order to improve resource efficiency. *Holistic* discourses integrate the many social and political implications of circularity and thereby also seek socio-political and cultural change. *Sceptical* discourses don't believe that socio-technical innovations could prevent an ecological collapse by decoupling economic growth from environmental exploitation (eco-economic decoupling)[2]. *Optimist* discourses, on the other hand, believe that socio-technical innovations can lead to eco-economic decoupling and thereby prevent an ecological collapse (Calisto Friant et al., 2020; Calisto Friant et al., 2020).

Different combination of the two differentiations above leads to four core discourses on circularity, which are presented in Table 1. These four discourses are: *reformist circular society* (*optimist* and *holistic*) seeking a prosperous, fair, democratic and sustainable future for all through a combination of technological breakthroughs, social innovations, and alternative business models. *Technocentric circular economy* (*optimist* and *segmented*) aiming to reconcile economic and environmental imperatives through technological innovations, especially in biotechnology, renewable energy and resource recovery. *Transformational circular society* (*sceptical* and *holistic*) seeking to completely reconfigure the current societal system and democratize and redistribute wealth and power so that humanity and nature might live in mutual harmony. *Fortress circular economy* (*sceptical* and *segmented*) aiming to secure natural resources, economic prosperity, socio-ecological resilience and geopolitical power through top-down migration controls, technological innovations and economic nationalism.

3. Methods

To analyse the EU's discourse and situate it in the classification described in Table 1, this research follows a mix of qualitative and quantitative methods. The quantitative analysis adapts the methods of corpus-based research (Subtirelu and Baker, 2017) and content analysis (Kondracki et al., 2002; Wiese et al., 2012), which were previously used in similar contexts to examine the EU's policies of eco-innovation (Colombo et al., 2019), to study civil society's sustainability transition discourses (Feola and Jaworska, 2019), to comparatively analyse circular, bio and green economy discourses (D'Amato et al., 2017), and to contrast EU and citizen perspectives on the CE (Repo et al., 2018).

The method used by this paper consists of counting the frequency of a specific set of predetermined keywords within a group

[1] A Scopus search for "European Union" "circular economy" "policy analysis" OR "discourse analysis" (title, abstract, keyword) leads to 4 results, none of which examine the CE package of the Junker Commission (search conducted on the 10/06/2020).

[2] Eco-economic decoupling is defined here as the absolute decoupling of environmental degradation from economic growth, meaning growing GDP (Gross Domestic Product) while reducing absolute environmental impacts from production and consumption activities (Kjaer et al., 2019).

Table 1
Main components of circularity discourse typology

	4 Circularity Discourse Types			
	Reformist Circular Society (optimist and holistic)	**Technocentric Circular Economy** (optimist and segmented)	**Transformational Circular Society** (sceptical and holistic)	**Fortress Circular Economy** (sceptical and segmented)
Perspective on technological innovation and ecological collapse	**Optimist:** Technical innovations can enable eco-economic decoupling to prevent ecological collapse.	**Optimist:** Technological innovations can enable eco-economic decoupling to prevent ecological collapse.	**Sceptical:** Technical innovations cannot bring absolute eco-economic decoupling to prevent ecological collapse.	**Sceptical:** Technical innovation cannot bring absolute eco-economic decoupling to prevent ecological collapse.
Approach to socio-political components of circularity	**Holistic:** includes social and political implications of circularity	**Segmented:** focuses on technical, industrial and business components of circularity.	**Holistic:** includes social and political implications of circularity.	**Segmented:** focuses on technical, industrial and business components of circularity.
Goals	Prosperity and wellbeing for all within the biophysical boundaries of the earth.	Human progress and prosperity without negative environmental externalities.	A world of conviviality and frugal abundance for all, while fairly distributing the biophysical resources of the earth	Maintain geostrategic resource security in global conditions where widespread resource scarcity and human overpopulation cannot provide for all.
Means	Technological breakthroughs and social innovations that benefit humanity and natural ecosystems.	Economic innovations, new business models and unprecedented breakthroughs in CE technologies	Complete reconfiguration of the current socio-political system and a shift away from productivist and anthropocentric worldviews.	Innovative technologies and business models combined with rationalized resource use and migration and population controls.
Value-retention focus[a]	R2-7	R4-9	R0-6	R0-9
Example concepts	- Natural Capitalism (Hawken et al., 1999) - Cradle to Cradle (McDonough and Braungart, 2002) - Performance Economy (Stahel, 2010) - Blue economy (Pauli, 2010).	- Industrial Metabolism (Ayres and Simonis, 1994) - Reverse Logistics (Rogers and Tibben-Lembke, 1998) - Biomimicry (Benyus, 1998) - Industrial Symbiosis (Chertow, 2000).	- Conviviality (Illich, 1973) - Steady-state economics (Daly, 1977) - Permacircular Economy (Bourg, 2018) - Degrowth (Latouche, 2009). - Radical Pluralism (Kothari et al., 2019)	- The tragedy of the Commons (Hardin, 1968) - The Population Bomb (Ehrlich, 1968) - Overshoot (Catton, 1980)
Example proponents	- Civil society discourses such as Circle Economy, (Verstraeten-Jochemsen et al., 2018) and the Club of Rome (von Weizsäcker and Wijkman, 2017)	- National and city government policies, corporate strategies and international organizations (Fratini et al., 2019; Valenzuela and Böhm, 2017)	- Social movements, bottom-up circular initiatives, and indigenous movements (Hobson, 2019; Kothari et al., 2019; Marin and De Meulder, 2018)	- Think tanks and geostrategic state policies (Cavanagh and Benjaminsen 2018; Fletcher 2012; Hendrixson and Hartmann 2019; Mehta, Huff, and Allouche 2019)

Source: based on Calisto Friant, Vermeulen and Salomone 2020

[a] This article follows the value-retention options (also called R-hierarchy, R-imperatives or simply R's) established by Reike, Vermeulen and Witjes (2018): R0 refuse, R1 reduce, R2 reuse/resell, R3 repair, R4 refurbish, R5 remanufacture, R6 re-purpose, R7 recycle materials, R8 recover energy, R9 re-mine.

of texts (corpus)[3]. It has been recognized as an effective tool to systematically and objectively distinguish the core discourses, concepts, and ideas in large groups of documents (Kondracki et al., 2002; Wiese et al., 2012). However, the choice of keywords is subjective, and it is thus key to select them based on a solid theoretical foundation. Therefore, the circularity discourse typology presented in section 2 was chosen as the basis for keyword selection to guarantee a strong conceptual validity.

Keywords were grouped in thematic areas corresponding to the different conceptual components of the four circularity discourse types (see Fig. 1). The comparative frequency of their use thus demonstrates the extent to which the EU's official policies focus on those topics and the circularity discourse typology that they reflect.

The analysis is carried out in a corpus based on the 10 communications, 8 regulations and the 7 Directives on the CE[4], which have been enacted by the EU's Junker Commission since the Publication of the CE Action Plan in December 2015 and up to December 2019 when the Von der Leyen commission took office. The studied corpus thus contains a total of 25 legislative documents with 300.046 words (see Table 2). EU reports and staff working documents were not mined for keywords as they are not legislative documents and don't dictate official EU positions on circularity; they might thus bring a bias to the corpus with ideas and statements, which do not reflect the official EU stance on circularity. Moreover, in policy reports, keywords might be used to criticize a concept rather than promote it. A report criticising *economic growth, eco-innovation,* or *biotechnology*, for example, might use those concepts without endorsing them. A careful revision of our query results shows that this was not the case in the selected policy documents, as their focus is to communicate and legislate on a specific area, not to critically analyse concepts or assess different policy options.

The selection of keywords for the analysis was based on a detailed examination of the four discourse types, as described by the typology, as well as a revision of their related concepts and litera-

[3] All queries and keyword mining were conducted with the program NVivo 12 Pro.

[4] Directives set binding obligations on member states, such as targets, data collection processes, and policy requirements but must be transposed into the national law of each member state in order to be implemented. Regulations are directly applicable without the need for transposition into member state law, they establish requirements on areas for which the EU has direct and often exclusive competencies, such as eco-design and product-labeling requirements. Communications have no direct legal effect, rather they establish policy directions and strategies for a topical issue, which may lead to future EU regulations or directives (Farmer, 2020).

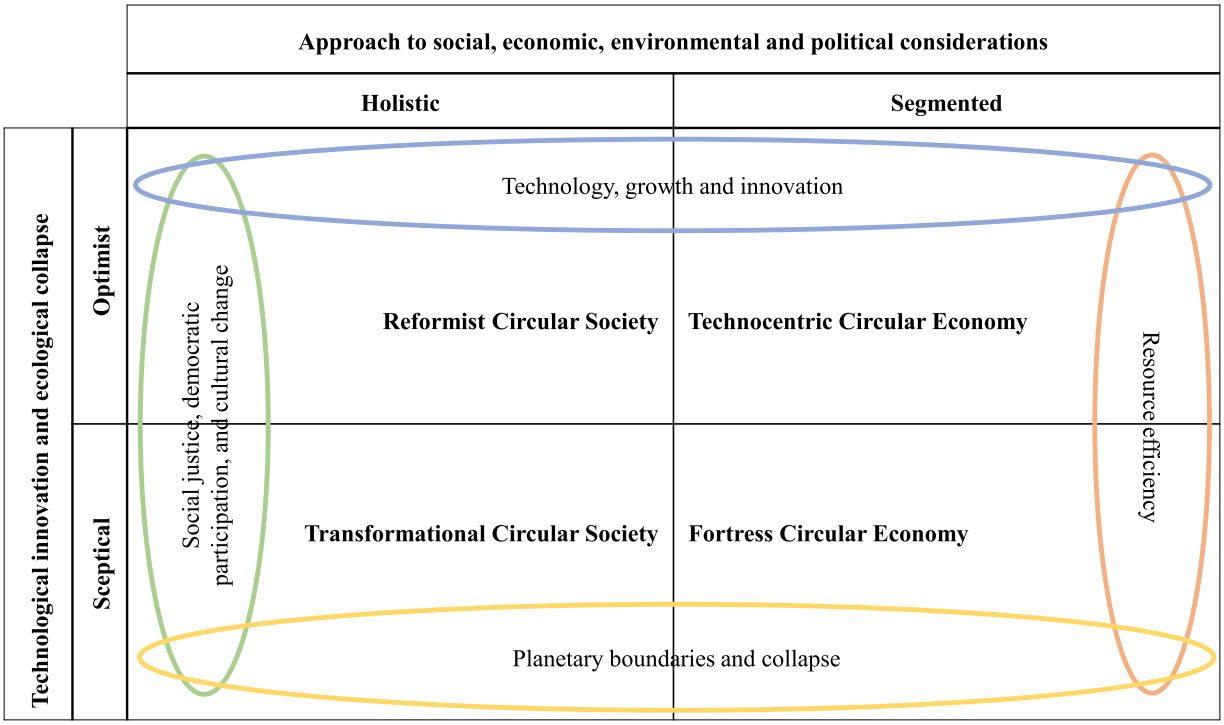

Fig. 1. Circularity discourse types and their main keyword groups

ture (see Table 1). A first set of 262 keywords was thus established, which sought to include as many relevant terms as possible. Keywords were then grouped in different thematic areas and the selection was refined by removing or changing words that had various meanings or that could be used in contexts that are not relevant for the object of this research (such as refuse, reduce, share, limits etc.)[5].

A further refinement of this selection of keywords was then carried out to ensure that each opposing discourse type (*holistic* versus *segmented* and *optimist* versus *sceptical*) had the same number of keywords and could thus be better contrasted and compared. A final set of 136 keywords was hence used in this analysis (see appendix for the full list of keywords).

Sceptical and *optimist* discourses were distinguished by two groups of keywords, the first representing technology, economic growth and innovation, which are the core focus of *optimist* imaginaries. The second, represent planetary boundaries and collapse, which are the core components of *sceptical* discourses (see table I in the appendix).

Similarly, *holistic* and *segmented* discourses were divided into two groups of keywords, the first related to social justice, democratic participation, and cultural change, which represent the main components of *holistic* visions. The second relates to resource efficiency which is the core focus of *segmented* discourses (see table II in the appendix).

After this quantitative keyword analysis, a qualitative analysis of EU targets and policies on the CE is carried out based on an in-depth review of the concrete measures established in the EU directives and regulations of the examined corpus (see Table 2). This qualitative work first resumes the complex set of new directives, regulations and policies established by the Junker Commission (section 4.2) in order to analyse them based on the typology of circularity visions presented in section 2. This allows for a critical analysis of the Commission's CE policies as well as an evaluation of their congruence with respect to the EU's discourse on the CE (section 4.3). The discussion reflects on the implications of the results and suggests alternative policy options and recommendations from the perspective of different circularity discourses (section 5).

4. Results

4.1. EU circularity discourse

Fig. 2 resumes the main keywords found for all the discourse types. It shows that the EU has taken an *optimist* approach to circularity, evidenced by a large number of keywords in the area of technology, growth and innovation (1477 in total), as opposed to planetary boundaries and collapse (491 in total).

Looking into further detail on the query results shows that the EU does pay close attention to geostrategic resource security issues and seeks to build resilience, protect the EU from the scarcity of critical raw materials and address migration (see Table 3). Nevertheless, an optimist approach towards economic growth, technological efficiency and innovative business models is clearly evidenced throughout the Commissions' discourse with frequent keywords such as business* (218 results), artificial intelligence (34 results), growth (149 results), innovation (376 results), and efficien* (339 results), while various keywords reflecting planetary boundaries such as entropy, exhaustion, extinct*, overshoot*, overconsum* were not used at all (see table I in the appendix for full query results)[6].

The picture is a bit more complex when investigating the *holistic* and *segmented* differentiation as both discourse areas have a similar number of keyword results (see Table 4). The EU includes

[5] For instance, the keyword "just" might refer to "fairness", "only" or "exactly". The choice of keywords was therefore carried out with great care and query results were systematically revised to ensure they are relevant to the object of this research.

[6] Keywords searched with an asterisk allow for the inclusion of all their relevant variations in query results.

Table 2
EU Communications, Directives and Regulations on the CE

10 communications

1 COM(2015) 614 Closing the loop - An EU action plan for the Circular Economy
2 COM(2016) 773 Ecodesign Working Plan 2016-2019
3 COM(2017) 479 Investing in a smart, innovative and sustainable Industry A renewed EU Industrial Policy Strategy
4 COM(2017) 33 final Report on the implementation of the Circular Economy Action Plan
5 COM(2018) 28 A European Strategy for Plastics in a Circular Economy
6 COM(2018) 29 On a monitoring framework for the circular economy
7 COM (2018) 32 Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation
8 COM (2018) 35 Report on the impact of the use of oxo-degradable plastic, including oxo-degradable plastic carrier bags, on the environment
9 COM(2019) 22 Reflection Paper Towards a Sustainable Europe by 2030
10 COM(2019) 190 final Report on the implementation of the Circular Economy Action Plan

7 Directives

1 Directive (EU) 2018/849 amending Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment
2 Directive (EU) 2018/850 amending Directive 1999/31/EC on the landfill of waste
3 Directive (EU) 2018/851 amending Directive 2008/98/EC on waste
4 Directive (EU) 2018/852 amending Directive 94/62/EC on packaging and packaging waste
5 Directive (EU) 2019/883 of 17 April 2019 on port reception facilities for the delivery of waste from ships, amending Directive 2010/65/EU and repealing Directive 2000/59/EC
6 Directive (EU) 2019/904 of 5 June 2019 on the reduction of the impact of certain plastic products on the environment
7 Directive (EU) 2019/771 of 20 May 2019 on certain aspects concerning contracts for the sale of goods, amending Regulation (EU) 2017/2394 and Directive 2009/22/EC, and repealing Directive 1999/44/EC

8 Regulations

1 Regulation (EU) 2019/1009 of 5 June 2019 laying down rules on the making available on the market of EU fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and repealing Regulation (EC) No 2003/2003
2 Regulation (EU) 2019/424 of 15 March 2019 laying down ecodesign requirements for servers and data storage products pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 617/2013
3 Regulation (EU) 2019/1784 of 1 October 2019 laying down ecodesign requirements for welding equipment pursuant to Directive 2009/125/EC of the European Parliament and of the Council
4 Regulation (EU) 2019/2021 laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC, amending Regulation (EC) No 1275/2008 and repealing Regulation (EC) 642/2009
5 Regulation (EU) 2019/2023 laying down ecodesign requirements for household washing machines and household washer-dryers pursuant to Directive 2009/125/EC, amending Regulation (EC) No 1275/2008 and repealing Regulation (EU) No 1015/2010
6 Regulation (EU) 2019/2019 laying down ecodesign requirements for refrigerating appliances pursuant to Directive 2009/125/EC and repealing Regulation (EC) No 643/2009
7 Regulation (EU) 2019/2024 laying down ecodesign requirements for refrigerating appliances with a direct sales function pursuant to Directive 2009/125/EC
8 Regulation (EU) 2019/2022 laying down ecodesign requirements for household dishwashers pursuant to Directive 2009/125/EC amending Regulation (EC) No 1275/2008 and repealing Regulation (EU) No 1016/2010

Table 3
Keywords in *Sceptical* and *Optimist* discursive areas

Area	Top 5 Keywords in each group	Count	Total Keyword count
	Sceptical		
Planetary boundaries and collapse	risk*	170	**491**
	secur*	135	
	resilien*	48	
	"critical raw materials"	43	
	migra*	35	
	Optimist		
Technology, growth and innovation	**Innovation**	376	**1477**
	efficien*	339	
	technolog*	226	
	business*	218	
	Growth	149	

many of the socio-political considerations of circularity with terms related to human health, stakeholder cooperation and employment appearing particularly often. Moreover, terms related to social justice, while less prevalent, are nonetheless important with keywords such as wellbeing (33 results), inequalit* (74 results), and fair* (59 results) appearing rather frequently (see table A2 in the appendix for full query results).

The EU also engages strongly with resource-efficiency narratives, with key attention to terms relating to recovery activities and waste management. Nonetheless, these do not prevail over other issues, showing the EU has a rather comprehensive discourse. It is, however, worth noting that the EU did not use several keywords related to cultural change such as localiz*, downscal*, convivial*, open source, commons and simple living/voluntary sim-

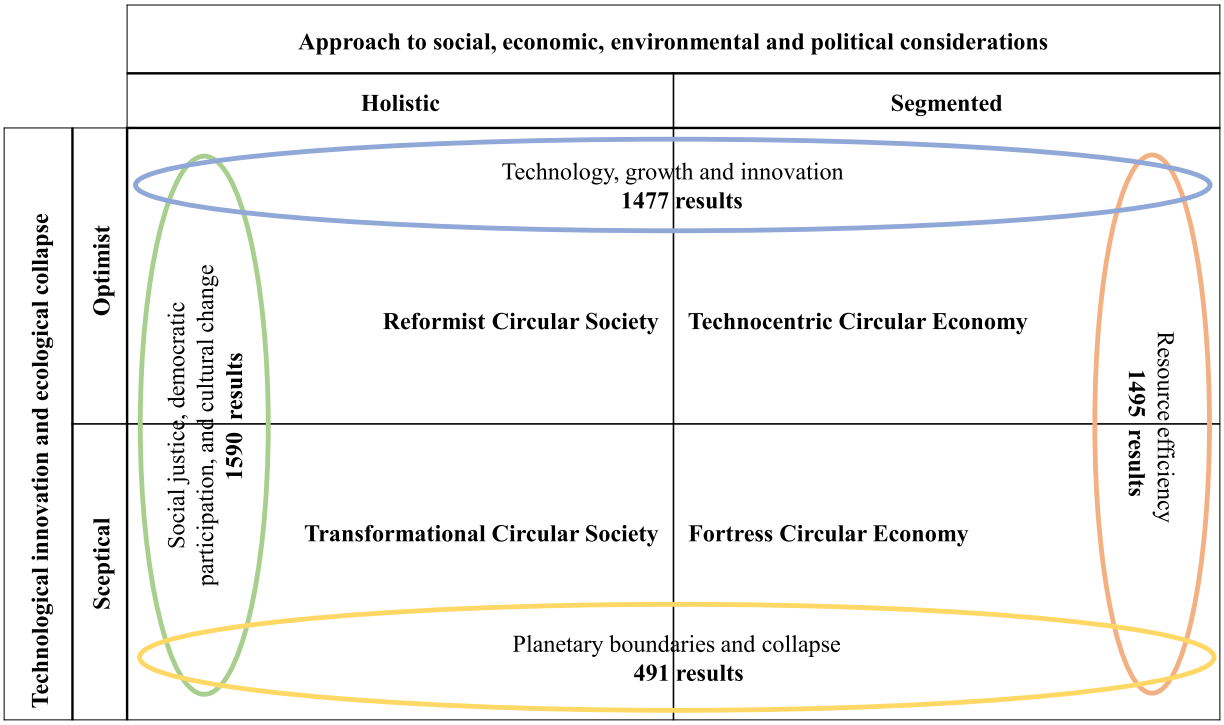

Fig. 2. Circularity discourse types and their main keywords results

Table 4
Keywords in *Segmented* and *Holistic* discursive areas

Area	Top 5 Keywords in each group	Count	Total Keyword count
	Segmented		
Resource efficiency	**Recycling**	407	**1495**
	repair*	248	
	"waste management"	172	
	reuse*	126	
	"energy efficiency"	74	
	Holistic		
Social justice, democratic participation, and cultural change	health*	223	**1590**
	safe*	175	
	stakeholder*	123	
	cooperat*	118	
	job*	115	

plicity. This shows that, even though the Commission took a rather holistic approach, it did so in an uncontroversial and reformist manner, which did not challenge modernist worldviews and systemic socio-cultural structures that many academics see as the core elements of the present socio-ecological crisis (Beling et al., 2018; D'Alisa et al., 2014; Escobar, 2014; Kothari et al., 2014; Meadows, 1999).

To sum up, the EU's discourse can be described as moderately *holistic* and highly *optimistic*, which, overall, puts the EU in the *reformist circular society* discourse type.

4.2. Review of EU policy on the CE

This section of the results reviews the content of CE directives and regulations of the Junker Commission (2014-2019) to assess the EU's implementation of circularity.

4.2.1. Updated Waste Directives

Since the publication of the "Circular Economy Action Plan" in 2015, the EU has carried out a wide-ranging set of policy reforms.

The Landfill of Waste Directive and the Waste Framework Directive were amended to reduce landfilling and improve the recycling of waste (see Table 5 with the updated targets and measures).

The updated Waste Framework Directive (2008/98/EC) also requires member states to establish waste prevention programmes[7] which, must contain at least the following type of measures:

- Encouraging the manufacture and design of resource-efficient, durable, repairable, reusable and upgradable products.
- Ensuring the conservation of critical raw materials.
- Encouraging the re-use and repair of products, including the availability of spare parts and manuals.
- Reducing industrial waste in extractive, manufacturing and construction sectors.
- Reducing food waste and fostering food donation.
- Reducing the content of hazardous substances in products as well as the generation of waste that cannot be reused, repaired or recycled.

[7] Waste prevention programmes may be part of Member State Waste Management Plans or other environmental policy.

Table 5
Targets and measure of updated EU Waste Directives

Target Year	2025	2030	2035	2018 levels (Eurostat 2020)
Directive (EU) 2018/851 amending Directive 2008/98/EC on waste	The preparing for re-use* and the recycling** of municipal waste is increased to 55 % by weight (Article 11.2).	The preparing for re-use* and the recycling** of municipal waste is increased to 60 % by weight (Article 11.2)	The preparing for re-use* and the recycling** of municipal waste is increased to 65 % by weight (Article 11.2)	EU municipal waste recycling rate: 47,4%
Directive (EU) 2018/850 amending Directive 1999/31/EC on the landfill of waste		All waste suitable for recovery, shall not be accepted in a landfill (Article 5.3a)	Max amount of municipal waste landfilled is 10 % (Article 5.5)	EU landfill of waste rate: 24%

* Preparing for re-use = checking, cleaning or repairing waste products so they can be re-used without any other pre-processing.
** Recycling = reprocessing organic and non-organic waste materials for the original or other purposes. It does not include energy recovery nor backfilling operations and it is only counted when recycled or composted materials actually re-used rather than simply reprocessed.

Table 6
Targets and measure of the updated packaging and packaging waste Directive

Target Year	2025	2030	2017 levels (Eurostat 2020)
Directive (EU) 2018/852 amending Directive 94/62/EC on packaging and packaging waste	65 % of all packaging waste recycled as well as: (i) 50 % of plastic packaging; (ii) 25 % of wood packaging; (iii) 70 % of ferrous metal packaging; (iv) 50 % of aluminium packaging; (v) 70 % of glass packaging; (vi) 75 % of paper and cardboard packaging (Article 6.1)	70 % of all packaging waste recycledas well as: (i) 55 % of plastic packaging; (ii) 30 % of wood packaging ; (iii) 80 % of ferrous metal packaging; (iv) 60 % of aluminium packaging; (v) 75 % of glass packaging; (vi) 85 % of paper and cardboard packaging (Article 6.1)	EU recycling rate for all packaging waste: 67,5%; Plastic packaging: 41,7%; Wood packaging: 41.2 %; Metal packaging: 80,7 %; Glass packaging: 75,9%; Paper and cardboard packaging: 85,5%

- Identifying and preventing the main sources of harmful environmental littering, especially marine litter.
- Developing awareness-raising campaigns about littering and waste prevention.

To implement these measures, the updated Directive requires the establishment of economic instruments including, but not limited to: landfill charges, pay-as-you-throw systems, extended producer responsibility (EPR) systems, deposit-refund schemes, green public procurement (GPP), phasing-out unsustainable subsidies, supporting the development of CE technologies, and fiscal incentives for recovered or re-used products and materials (Annex IVa and IVb). Moreover, these Waste Prevention Programs must be elaborated with some level of public participation and cooperation (Article 31).

The directive also establishes renewed requirements for EPR schemes so that they operate more effectively, transparently and democratically. In line with the polluter pays principle, the amended Directive mandates that EPR systems must fully cover the costs of the separate collection, transport, treatment and recovery of waste as well as reporting and data gathering costs (Article 8a). It also encourages the use of eco-design policies, which account for the impact of products throughout their lifecycle (Article 8.2). Furthermore, the Directive requires EPR systems to have transparent governance structures with clear roles and responsibilities and regular dialogues between relevant stakeholders from the private, public and social sectors, including social economy actors repair networks and recyclers (Article 8a).

In addition to this, the amended Waste Framework Directive restricts the export of waste by reversing the burden of proof so the exporter must show that the waste is properly managed to count as “recycled” (Article 11a.8).

4.2.2. Updated Packaging Directive

The updated Packaging Directive establishes renewed recycling targets for different types of packaging waste (see Table 6) and mandates the establishment of extended producer responsibility schemes for all packaging by the 31st of December 2024 (Article 7.2). It also requires member states to establish general preventive measures to minimise waste generation and to encourage the use of reusable packaging (Articles 4 and 5).

4.2.3. New policies for plastics

The Directive on the Reduction of the Impact of Certain Plastic Products on the Environment (EU 2019/904), places a set of measures on single-use plastics (SUPs) which are resumed in Table 7. The Directive bans several SUPs including cotton buds, cutlery, stirrers, plates and straws (Article 5). For other SUPs the Directive places consumption reduction measures, for which member states must achieve a measurable reduction in their consumption by 2026 compared to 2022, but the EU does not prescribe specific measures to reach this objective (Article 4). The Directive also mandates that by July 2024, SUP bottles must have caps and lids that stay attached to the containers to avoid losses and facilitate recycling. Moreover, all SUP bottles have separate collection targets (Article 7) and those made of PET (Polyethylene Terephthalate) have additional targets regarding their recycled plastic content (Article 6). Beverage cups, tobaccos, wet wipes and sanitary towels must include clearly legible markings informing consumers of the appropriate and inappropriate waste management options, as well as the ecological impact of mismanaged plastic (Article 7). For all SUPs, which are not directly banned by the Directive, EPR systems must be established and awareness-raising measures must be put in place to encourage reusable alternatives and reduce litter (Articles 8 and 10).

To deal with other plastics, the Commission has focused on establishing a voluntary pledge with industry instead of imposing a target on the use of secondary plastic in new products. The Commission thus created a Circular Plastics Alliance with industry partners, which committed to ensuring that 10 million tonnes of recycled plastics are used to make new products in the EU by 2025 (in 2016 less than 4 million tons of recycled plastics were sold in Europe, just 8% of the market) (European Commission, 2019).

4.2.4. Eco-design policies

The Ecodesign Directive (2009/125/EC) has not been amended but the Ecodesign Working Plan (2016-2019) incorporates circular-

Table 7
Measures in the EU Directive on single-use plastics

Measures for SUPs by plastic type	Consumption reduction	Market restriction	Product design requirement	Marking requirement	Extended Producer Responsibility	Separate collection objective	Awareness-raising measures
Cotton bud sticks		Ban by July 3rd 2021					
Cutlery, plates, stirrers, straws							
Sticks for balloons							
Oxo-degradable plastics							
Containers made of expanded polystyrene							
Beverage containers, their caps & lids			PET SUP bottles must contain 25 % recycled plastic by 2025 and 30% by 2030. Caps and lids must remain attached to bottles		EPR systems must be established by the 31st of December 2024 in line with the requirements of Directive 2008/98/EC. Moreover, new EPRs must pay for awareness-raising measures of this directive	77% by 2025 and 90% by 2029	Must incentivise responsible consumer behaviour by informing on re-usable alternatives, the environmental impacts of SUP, and the best waste management options
Food containers	Each MS must establish measures						
Cups for beverages				Markings on waste treatment options and environmental impacts of waste must be placed by July 3, 2021			
Tobacco product filters							
Wet wipes							
Sanitary towels							
Lightweight plastic carrier bags							
Fishing gear							

ity criteria along with energy, noise, and water efficiency regulations. New ecodesign regulations were hence adopted in 2019 after consultation processes with recyclers and producers (Talens Peiró et al., 2020) and will enter into force between 2020 and 2021. The updated regulations include the following resource efficiency requirements for 7 of the 28 product groups covered by the EU's ecodesign regulations (refrigerators, dishwashers, electronic displays, washing machines, welding equipment and servers and data storage products):

- Key spare parts must be easily available to professional repairers for a minimum period of 7 to 10 years after placing the last unit on the market.
- Spare parts must be replaceable with commonly available tools.
- The repair and maintenance information must be available to professional repairers for a reasonable and proportionate fee.
- The delivery of spare parts must take a maximum of 15 working days.
- Some components must be marked with a visible sign to facilitate their recycling such as certain polymers, flame retardants, and critical raw materials.
- The latest version of the firmware must be available for at least 8 years, free of charge or at a fair, transparent and non-discriminatory cost. The latest security update to the firmware must be available free of charge for at least 8 years.

4.2.5. Monitoring framework

To track the circularity transition, the Commission has established a set of indicators in its COM(2018)29 "on a monitoring framework for the circular economy" (see Table 8). Most indicators are shared with the EU's Resource Efficiency Scoreboard and the Raw Materials Scoreboard (Moraga et al., 2019). As can be seen from Table 8, the vast majority of indicators don't have respective targets or policy actions, which limits them to a purely informative role.

4.3. Critical analysis

This section analyses the results presented in sections 4.1 and 4.2 by comparing the EU's discourse and policies on circularity. It uses the typology of circularity discourses (Table 1) as the basis of this critical reflection to better map and contrast the EU's words and actions.

4.3.1. Reformist circular society discourse

What is most significant in the results from the keyword queries was perhaps not the terms used by the EU, but those that it deliberately and strategically chose not to mention. As Foucault states: "*manifest discourse […] is really no more than the repressive presence of what it does not say; and this 'not-said' is a hollow that undermines from within all that is said*" (Foucault, 1972: p.25). The "not-said" is precisely what is most telling as the EU has chosen not to talk of rebound effects, entropy, overshoot, overconsumption and downscaling (see section 4.1). This discourse thus allows for the positioning of what Lazarevic and Valve (2017) call a "*deliberately vague, but uncontroversial, circular economy*" (p.67).

Results demonstrate that the EU gives disproportionate attention to the technical and economic considerations of circularity, especially compared to cultural aspects and lifestyle transformations (see tables 3 and 4). The CE is thus viewed as an avenue for "green growth" and the decoupling of economic growth from environmental degradation. Indeed, the EU states that "*green growth would 'lift all the boats'*" (COM(2019) 22 p.14) and mentions 11 times that decoupling is happening or is being actively pursued (see table I in the appendix).

While various social matters are addressed, such as the need to reduce inequalities, this is conditioned on having a growing economy: "*member states will work towards ensuring inclusive and sus-*

Table 8
EU CE indicator framework and respective EU actions and targets

Indicator		Relevant EU Targets or Actions	Latest figures
1. EU self-sufficiency for raw materials (%)		None	N/A
2. Green public procurement (GPP)		Only an indicative 50% GPP target (COM/2008/400)	N/A
3. Waste generation	3a. Generation of municipal waste per capita (kg per capita)	No targets but Member State's waste prevention programmes are encouraged to include measures in this regard	492 kg/capita (2018)
	3b. Generation of waste excluding major mineral wastes per GDP unit		66 kg per thousand euros (2018)
	3c. Generation of waste excluding mineral wastes per domestic material consumption (%)		12,8% (2018)
4. Food waste (million tonnes)		The EU has committed to SDG 12.3 to halve per capita food waste by 2030 but has no binding target	70 million tonnes (2016)
5. Overall recycling rates	5a. Recycling rate municipal waste (%)	Recycling targets and measures set in Directive (EU) 2018/851 (see table 5)	47,5% (2018)
	5b. Recycling rate excluding major mineral waste (%)	No explicit targets or actions.	56% (2016)
6. Recycling rates for specific waste streams	6a. Overall packaging (%)	Recycling targets and measures set in Directive (EU) 2018/852 (see table 6)	67,5% (2017)
	6b. Plastic packaging (%)		41,7% (2017)
	6c. Wooden packaging (%)		41,2% (2017)
	6d. E-waste (%)	Target of Directive (2012/19/EU): 65% collection rate by 2019	34,8% (2018)
	6e. Bio-waste (%)	No explicit target but Bio-waste must be separated and recycled at source or separately collected by end of 2023 Directive (EU) 2018/851, article 22:	83 kg/capita (2018)
	6f. Construction and demolition waste (%)	Target of old Waste Framework Directive (2008/98/EC): 70% of construction and demolition waste recycled or recovered (including backfilling) by 2020	88% (2018)
7. Contribution of recycled materials to raw materials demand	7a. End of life recycling input rates (EOL-RIR)[1] (%)	No targets but member states are encouraged to develop measures to increase the share of secondary materials in total material demand	N/A
	7b. Circular material use rate[2] (%)		11,2% (2017)
8. Trade in recyclable raw materials	Imports from non-EU countries (tonnes)	No targets, limited strengthening of export requirements outside the EU (Directive (EU) 2018/851) and facilitation of trade of fertilizers within EU Regulation 2019/1009	8.9 million tonnes (2019)
	Exports to non-EU countries (tonnes)		25.5 million tonnes (2019)
	Intra EU trade (tonnes)		47.9 million tonnes (2019)
9. Private investments jobs and gross value added	9a. Gross investment in tangible goods (% GDP)	No targets, some financial mechanisms in place to help transition to a CE (10 billion invested from 2015 to 2019)	0,12% (2017)
	9b. Persons employed (% of total employment)		1,72% (2017)
	9c. Value-added at factor cost (% of GDP)		0,96% (2017)
10. Patents	Number of patents related to recycling and secondary raw materials		337 patents (2015)

Source: Adapted from COM(2018) 29 and Pardo and Schweitzer, (2018), figures in last column from Eurostat, (2020).

[a] Measures, for a set of specific critical raw materials, how much of their input into the production system comes from recycling of "old scrap".
[b] Share of material recovered and fed back into the economy as % of overall material use, for all material types.

tainable growth in the EU, a necessary condition to reduce inequality" (COM(2019) 22 p.96). Hence inequality reductions are only envisaged by better distributing future economic benefits and not by redistributing present wealth. This presupposes that social equity can only be improved when the GDP increases, which assumes the capacity of the biosphere to sustain further economic growth, despite mounting evidence of the contrary (Hickel and Kallis, 2019; Jackson, 2016; Parrique et al., 2019; Ward et al., 2016).

This is very much in line with r*eformist circular society* discourses, which assume the possibility of eco-economic decoupling and promote a continued era of green growth and eco-innovation to improve human well-being and environmental sustainability (see Table 1).

4.3.2. Technocentric circular economy policies

The review of EU CE policies shows a clear focus on resource efficiency and technological change as an avenue for circularity. Indeed, most measures and almost all targets are aimed at improving the recycling of different types of waste (R7). Repairing (R3) is also promoted by the updated ecodesign regulations, but it only affects a limited number of electronic products, and there are no targets or indicators on repair activities. The most ambitious policies relate to SUP with some bans (R0 refuse) as well as consumption reduction and awareness-raising measures (R1 reduce). Yet they only apply to a limited number of plastic products.

While Waste Prevention Programs must now include some high-value retention options such as reduction (R1), reuse (R2) re-

		Approach to social, economic, environmental and governance considerations	
		Holistic	**Segmented**
Technological innovation and ecological collapse	**Optimist**	**EU "Talk"** The discourse includes social and environmental aspects. Many topics are covered but with a focus on competitiveness, eco-innovation and green growth.	**EU "Action"** Targets and measures based mostly on resource efficiency and waste management with only basic participatory and cultural elements, and no social justice components.
	Skeptical		

Fig. 3. Circularity talk and action of the EU

pair (R3), upgradability (linked to R4 refurbish) and remanufacture (R5) policies no specific targets or obligations are placed for those. Therefore, the precise measures for those aspects of circularity are left to the discretion of member states, which don't have an incentive to make stringent requirements as they can hamper the competitiveness of their economies in the single market. Therefore, while some R0 to R5 policies are pursued, the majority of constraining policy objectives and measures are geared towards R7 (recycling), which is the value retention focus of *technocentric circular economy* visions (see Table 1).

Furthermore, the governance implications of the CE are only partly dealt with through the requirement that Waste Prevention Programs must be elaborated with some level of stakeholder cooperation and participation and the need for EPR systems to have transparent governance structures and dialogues with relevant social stakeholders (see section 4.2.1).

The EU's CE policies don't include measures directed specifically at social and cultural aspects of circularity such as open source technologies, sustainable sourcing of materials, promotion of social and solidarity economies, etc. On the cultural side, only some awareness-raising measures are established in Directives 2018/851 and 2019/904, but they are rather limited as they focus on reducing littering rather than challenging overconsumption and materialism.

In line with *technocentric circular economy* discourses (see Table 1), the EU thus implements a depoliticized vision of circularity, where equity in the ownership of circular technology and fairness in the distribution of its benefits is not addressed, and one where participation amounts to little more than public consultation and information. It is a circularity policy that assumes the possibility of decoupling between economic growth and environmental destruction, and a CE without trade-offs and compromises in the complex nexus between water, food, land, energy, and materials. The EU's CE measures are thus mainly updates of old waste policies from the late 1990's early 2000's (such as Directives 2008/98/EC on waste, Directive 94/62/EC on packaging and packaging waste, and Directive 1999/31/EC on the landfill of waste), which represent *technocentric* visions that mainly seek to increase recycling rates rather than building transformative change that would shrink, slow, localize, redistribute and democratise resource cycles (Farmer, 2020; Fitch-Roy et al., 2020; Homrich et al., 2018; Moraga et al., 2019).

The results of this research are in line with the observations of various scholars (Colombo et al., 2019; Fitch-Roy et al., 2020; Knill et al., 2020; Lazarevic and Valve, 2017; Pollex and Lenschow, 2018; Repo et al., 2018; Stegemann and Ossewaarde, 2018; Völker et al., 2020), which found that the EU has had a weak sustainability vision through eco-modernist discourses and policies, which focus on techno-innovations, green growth and competitiveness rather than reducing the EU's ecological footprint.

4.3.3. Talk versus Action

From the above results, one can conclude that there is a dichotomy between EU discourse (talk) and EU policies (actions) on the CE. Referring back to the circularity discourse matrix (see Table 1 and Fig. 1), EU talk is in the *optimist* and *holistic* framing of *Reformist Circular Society* discourses, while EU action falls within the *segmented* and *optimist* typology of *technocentric circular economy* discourses (see Fig. 3).

This dichotomy between discourse and policy is in line with the findings of Fitch-Roy, Benson, and Monciardini (2019) which found that the EU's CE policies merely place "*old wine in new bottles*" (p.996) by updating waste directives and recycling targets rather than seeking further transformative change. These findings are also in line with those of Knill, Steinebach, and Fernández-i-Marín (2018), who evidenced a "hypocrisy" (p.375) between EU environmental talk and action from 2000 to 2016. As they point out, this is most probably caused by the Commission's strategy to retain its image as an active environmental policy entrepreneur, while also slowing down on environmental regulations to focus on economic growth in a time of economic recovery and stagnation (Knill, Steinebach, and Fernández-i-Marín 2018). Thus, it is very likely that the Commission continued the same strategy, and, considering that it received the Circulars Award at the World Economic Forum in 2019, this appears to have paid off.

5. Discussion and recommendations

This section critically discusses the key limitations and implications of the EU's CE policy direction from the perspective of other circular visions to propose alternative pathways to a sustainable circular future.

5.1. Targets and indicators

From the set of policy targets and indicators chosen by the EU to measure and foster the transition to circularity, only one relates to a social dimension (the employment indicator in the CE Monitoring Framework (COM(2018) 29). Yet, this indicator has no

mandatory target nor accompanying policy or regulatory measure, so it is only used for monitoring purposes.

A *holistic* vision of circularity would have promoted many mandatory targets including, but not limited to, job generation, investments in the social and solidarity economy, number of cooperatives and social enterprises working on circularity, wealth and income Gini indexes, and percentage of consumption of products with recognized socio-ecological certification programs[8]. A *holistic* vision would also establish bans on destroying unsold stocks and set higher restrictions on waste exports outside the EU (or even bans for certain high-risk materials), as they not only cause high transport emissions but also move the problem away to areas of the world which are poorly equipped to manage waste, thus creating considerable impacts to human health and natural ecosystems (Bishop et al., 2020).

Furthermore, except for the two indicators of the CE Monitoring Framework on end-of-life recycling input rates and circular material use rate (see section 4.2.5), there are no other indicators or policy measures to incentivise a reduction of the linearity of the EU's economy at a macro level. Many academics have pointed out that any CE policy should ultimately seek to reduce the overall footprint of human activities and bring our socio-economic system in line with the biophysical boundaries of the earth (Arnsperger and Bourg, 2017; Junnila et al., 2018; Lehmann et al., 2018; Rijnhout et al., 2018; Vita et al., 2019). The EU currently has a material footprint per capita between 40 and 50 tons per year, way beyond a scientifically recognized sustainable level of around 7 to 8 tons per capita per year (Hickel, 2020; Hickel and Kallis, 2019; Mont et al., 2014; Rijnhout et al., 2018). A reduction of over 80% is thus required for Europeans to live within the biophysical limits of the earth, and it is key for any circularity policy to go in this direction. However, research on eco-economic decoupling has clearly evidenced that achieving such a reduction in material footprint, while also growing GDP per capita is impossible (Albert, 2020; Haberl et al., 2020; Hickel and Kallis, 2019; Pardo and Schweitzer, 2018; Parrique et al., 2019). Despite this inconsistency between ecological imperatives and continued economic growth, the EU has chosen a *technocentric* discourse championing the CE Action Plan as a way to "unlock the growth and jobs potential of the circular economy" (Preamble, COM(2015) 614, p.2) and decouple economic growth from environmental degradation. From a *sceptical* position on circularity, many other targets and indicators would thus be necessary, such as targets to reduce per capita waste generation, per capita material demand and per capita ecological footprint, as well as goals on increased self-sufficiency on raw materials.

Another issue is that there are no targets for the use of secondary materials in new products, except for SUP bottles and the voluntary commitments of the Circular Plastics Alliance (see section 4.2.3). Mandatory recycled content targets could boost the demand for recovered plastics which are currently facing considerable price and market barriers (Baran, 2020; Elliott et al., 2020; Milios et al., 2018). Facilitating the establishment of EU-wide online platforms for the trading of circular goods (recycled materials, recovered components, repurposed products, second-hand goods etc.) would also be beneficial in this regard (Hartley et al., 2020).

Another limitation of the EU's targets is that many member states might choose to incinerate a large amount of their waste to meet the new 10% landfill target (see section 4.2.1). This could lead to higher greenhouse gas emissions and to sub-optimal uses of potentially re-usable, recyclable or compostable resources. Settings limits to total energy recovery rates or stronger restrictions on the incineration of recyclable wastes could address this issue (Milios et al., 2018).

5.2. Eco-design

The revised ecodesign regulations are geared towards repairability and recyclability, as they increase the availability of spare parts and the ease of disassembly of these products. From a *sceptical* and *holistic* circularity perspective, these regulations would also have to encourage other value retention options (especially R0-R5) through measures that require improved product durability, multifunctionality, upgradeability, and modularity. They would also need to reduce the overall ecological footprint of products by establishing mandatory product passports and sustainability labels (such as socio-ecological impact labels) as well as compulsory information on product durability (Pardo and Schweitzer, 2018).

From a *circular society* perspective, other policies would have been necessary, such as making repair manuals completely free and open-source (and not just available to professional repairers at a fee), as well as promoting open source innovation, such as mandating that all hardware and software from discontinued products must become open-source. Increasing minimum mandatory guarantee periods from 2 to 3 or more years would also be necessary, as academics (Bihouix, 2014; Latouche, 2009; Lazarevic and Valve, 2017) and consumer groups have been asking[9].

The measures adopted by the Commission don't reduce the high cost of repairs, which incentivise the purchase of new products. Key measures in this regard would be a reduction of Value-Added Tax (VAT) for reused, remanufactured, refurbished and repaired goods (and repair services) (Hartley et al., 2020) as well as establishing subsidies for repair services to help low-income groups (Bihouix, 2014).

Finally, it is worth noting that the eco-design regulations only apply to large electronic goods, with rather long lifespans such as washing machines, refrigerators and dishwashers. Fast-moving consumer electronics, such as mobile phones, tablets and computers, should have been included to expand the scope and impact of the EU's eco-design requirements.

5.3. Economic incentives

The EU broadly encourages pay-as-you-throw systems, fiscal incentives for food donations, deposit-refund schemes, ending fossil-fuel subsidies, taxing virgin materials, and lower VATs on recycled, repaired, remanufactured or refurbished goods. However, none of these measures are mandatory (see section 4.2.1). Thus, subsidies for fossil fuels amongst EU member states have actually risen by 3% between 2008 and 2016, reaching a total of €55 billion a year in 2017 prices (Rademaekers et al., 2018). This dwarfs the Commission's investments on the CE, which amounted to 10 billion euros between 2016 and 2019 (COM 2019/190). Furthermore, taxes for rail transport remain higher than for road and air in most EU member states, which further inhibits a transition to a zero-carbon circular future (Rijnhout et al., 2018).

Holistic and *sceptical* circularity positions would have sought much stronger measures to transform fiscal policy so resources (especially raw materials) are taxed instead of labour (Antikainen et al., 2018; Arnsperger and Bourg, 2017; Lazarevic and Valve, 2017; Stahel, 2010; von Weizsäcker and Wijkman, 2017). Eliminating financial paradises and establishing EU-wide taxes on wealth and financial transactions are also seen as key measures

[8] Such as the certifications which are members of the ISEAL Alliance like Fairtrade, MSC and FSC (Vermeulen, 2015)

[9] Based on the presentation of Euroconsumers on the 6th of Martch at the 2019 Circular Economy Stakeholder Conference in Brussels.

to fund a fair and equitable ecological transition (Piketty, 2019; Schratzenstaller and Krenek, 2019). Mandatory circular and green public procurement requirements should also be established to foster circular innovations by mobilizing the €2 trillion euros spent annually on public procurement in the EU (Hartley et al., 2020; Klein et al., 2020; Milios, 2018). However, fiscal matters require unanimity in the European Council, and this might very well be the limiting factor for these kind of actions. Nevertheless, as long as the price signals favour linear models, circular options will likely remain niche sectors of the economy. In fact, recent reviews of the major barriers for the CE found that market and financial factors, such as low virgin material prices and lack of fiscal incentives, pose some of the largest barriers to a circularity transition (de Jesus et al., 2019; de Jesus and Mendonça, 2018; Kirchherr et al., 2018; Milios et al., 2018).

The above point also demonstrates the need to democratize the EU's decision-making structure to better address the key socio-ecological challenges of the 21st century through policies such as increasing transparency, improving decision-making procedures, and establishing a citizen assembly of randomly selected EU citizens with tangible powers on European socio-ecological policies (Kamlage and Nanz, 2017).

5.4. Awareness raising and over-consumption

The awareness-raising obligations of the new circularity Directives stress recycling and adequate disposal rather than consumption reduction and lifestyle change. As Bihouix (2014), Monsaingeon (2017) and Valenzuela and Böhm (2017) argue, this discourse of circularity through waste management creates the illusion that the present sustainability crisis can be overcome by recycling alone. Yet, as we know from the laws of thermodynamics, there are inevitable losses in quality and quantity in any recovery process which means it can only supply a fraction of overall material demand (Cullen, 2017; Giampietro, 2019; Skene, 2018). Recycling alone is thus far from enough to address the current overconsumption of natural resources and overshoot of planetary boundaries (Bruel et al., 2019; Giampietro, 2019; Korhonen et al., 2018a; Reuter et al., 2019; Skene, 2018; Zink and Geyer, 2017). It is thus key not only to recycle but to also reduce overall material consumption and economic growth (Arnsperger and Bourg, 2017; Fressoz and Bonneuil, 2016; Lorenz et al., 2018; Mayumi and Giampietro, 2019; Millar et al., 2019).

Promoting awareness-raising without touching on marketing and advertising, which is building demand for conspicuous consumption, is thus a missed opportunity for transformative change. Indeed, no matter how eco-efficient a product is, its impact will always be greater than if it wasn't produced in the first place (Bihouix, 2014; Hickel, 2017; Korhonen et al., 2018a). From a *sceptical* and *holistic* perspective on circularity, it would have been key to promote non-material aspirations through policies, such as taxes on advertisements, bans on commercials for ecologically harmful goods such as SUVs and reducing working hours to 30 or less per week (Arnsperger and Bourg, 2017; Ashby et al., 2019; Cosme et al., 2017; Latouche, 2009; Pollex and Lenschow, 2018). Moreover, encouraging convivial (Caillé, 2019) and "frugally abundant" lifestyles (Latouche, 2009), with a greater connection to both nature and other peoples, can significantly improve quality of life, health and wellbeing (Alexander, 2015; Caillé, 2015; D'Alisa et al., 2014; Escobar, 2018; Kallis et al., 2018; Kothari et al., 2019; Latouche, 2018; Raworth, 2017).

5.5. Biodiversity and energy

Following a *technocentric circular economy* perspective, the EU has treated circularity, energy and biodiversity as separate issues. However, they form a deeply interrelated nexus, and actions taken in one area will enviably affect the other (Antikainen et al., 2018; Bleischwitz and Miedzinski, 2018). Moreover, as Repo et al. (2018) have found, citizens groups already see the circularity transition as an integral element of the energy and ecological transition. The need to closely integrate EU environmental policies on energy, biodiversity, and circularity into a holistic and coherent strategy has also been argued by many academics (Kaźmierczyk, 2018; McDowall et al., 2017; Milios, 2018; Repo et al., 2018; Rijnhout et al., 2018; Wuttke, 2018).

The EU currently has no targets or indicators linking its CE strategy to its biodiversity strategy and there is a deep necessity to do so as we are now in the midst of a biodiversity crisis on the scale of a mass extinction event (IPCC, 2019; von Weizsäcker and Wijkman, 2017). The midterm review of the EU's Biodiversity Strategy (COM/2015/0478) found that its headline target to "halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020" will most likely not be reached. In fact, biodiversity is continuously decreasing throughout the EU due to the destruction of habitats, the rise in artificial surfaces, the impacts of industrial agriculture and the gross overexploitation of marine resources (Krämer, 2019). A review of the Common Agricultural Policy is key to reduce this trend, especially if a *holistic* approach is taken that subsidises farmers based on the social and ecological services they provide to their communities rather than based on the size of their farms (De Schutter, 2019; Frantzeskaki et al., 2019; Scown et al., 2020; Wieliczko, 2019). Setting mandatory targets to reduce food waste and promoting healthier plant-based diets are also key in this regard as food waste and meat-production have significant impacts on climate change and biodiversity (Allen and Hof, 2019; Niles et al., 2018; Springmann et al., 2018; Stoll-Kleemann and Schmidt, 2017; Vita et al., 2019).

On a positive note, it is worth noting that the EU has already reached its 2020 goal for a 20 % reduction in EU greenhouse gas emissions from 1990 levels, and will likely reach its 40% goal for 2030 (Krämer, 2019). Discussions in the EU are carried out in 2020 to establish a European Green Deal with a 2050 climate neutrality target (Von Der Leyen, 2019). These steps are important, but according to many civil society organizations, this is not enough, as they seek a 2040 target for net-zero emissions to keep the earth within the goal of limiting temperature rise to 1,5 degrees Celsius as established in the Paris Climate Agreement (CAN, 2018; Greenpeace, 2018; WWF 2018). Other citizen groups demand an even earlier 2025 date to reach both net zero-emissions and net-zero biodiversity loss (Extinction Rebellion, 2019). Recent academic research finds that, to achieve the Paris Agreement targets, climate neutrality must be reached between 2030 and 2040 (Hickel and Kallis, 2019; Höhne et al., 2019; Nieto et al., 2019). These dates are closer to some civil society demands than to current EU policies. Moreover, various academics have also suggested that the scale and speed of this transition means that the Paris Agreement objectives can only be achieved through a post-growth strategy (Hickel, 2020; Jackson and Victor, 2019; Nieto et al., 2019). This questions the EU's insistence on the CE as an avenue for low-carbon economic growth.

On the other hand, the CE can play a key role in a zero-carbon ecological transition as production and consumption processes account for 45% of greenhouse gas emissions (GHG) (the other 55% corresponds to energy provision) (Ellen MacArthur Foundation 2019). Recycled materials generate fewer GHG emissions than virgin ones (Aurez et al., 2016), and eliminating landfilling and reducing food waste can significantly reduce GHG emissions (Hawken, 2017; Jurgilevich et al., 2016). Moreover, reducing demand for goods through longer use-rates and simple living and convivial lifestyle transformations is key to reduce GHG emissions (Bengtsson et al., 2018; Nieto et al., 2019; Vita et al., 2019). Fur-

Table 9
Policy alternatives based on a plurality of circularity visions

R-focus	Circularity discourse	Policies	Discussed in section
R8	All	Establish limits to total energy recovery rates and/or stricter restrictions on the incineration of recyclable, re-usable or compostable wastes.	5.1
R7-9	RCS and TCS	Heavily restrict or ban the export of waste outside the EU.	5.1
R4-7	All	Ban the destruction of unsold stocks.	5.1
R4-7	All	Establish mandatory product passport with information on all materials and components to facilitate product and material recovery.	5.2
R3-7	All	Expand eco-design regulations to fast-moving consumer electronics such as mobile phones, tablets and computers.	5.2
R3-6	RCS and TCS	Promote open source innovation (e.g. by mandating that all hardware and software from discontinued products becomes open source).	5.2
R3	RCS and TCS	Improve eco-design regulations to ensure repair manuals are completely free and open-source.	5.2
R3	RCS and TCS	Establish subsidies for repair services to help low-income groups.	5.2
R2-9	All	Establish EU-wide online platforms for the trading of secondary materials and products.	5.1
R2-6	All	Reduce VAT for reused, remanufactured, refurbished and repaired goods and repair services.	5.2
R1-8	RCS and TCS	Tax resources (especially raw materials) instead of labour.	5.3
R1-8	All	Eliminate subsidies on fossil fuels.	5.3
R1-7	TCE, RCS and TCS	Establish mandatory circular and green public procurement targets and requirements.	5.3
R1-7	All	Establish targets on the percentage of secondary materials or sustainable renewable materials in new products and buildings.	5.1
R1-5	All	Improve eco-design regulations by adding measures on product durability, multifunctionality, upgradeability, and modularity.	5.2
R1-3	RCS and TCS	Increase minimum mandatory guarantee periods.	5.2
R1	All	Establish mandatory targets to reduce food waste.	5.5
R0-7	TCS and FCE	Establish targets to reduce per capita waste generation, per capita material demand and per capita ecological footprint, and to increase self-sufficiency on raw materials.	5.1
R0-1	RCS and TCS	Revise the Common Agricultural Policy to subsidise farmers based on the social and ecological services they provide.	5.5
R0-1	RCS and TCS	Mandate compulsory information on product durability, especially for electronic goods.	5.2
R0-1	RCS and TCS	Establish mandatory sustainability labels (with product socio-ecological impacts).	5.2
R0-1	RCS and TCS	Promote healthier plant-based diets.	5.5
R0-1	TCS	Taxes on advertisements and bans on commercials for ecologically harmful goods such as SUVs.	5.4
R0-1	TCS and FCE	Establish carbon-tariffs for imported goods.	5.5
R0-1	RCS and TCS	Update consumer taxes (VAT) based on the socio-ecological footprint of products.	5.5
R0	TCS	Promote non-material aspirations and values and slower, and more convivial ways of life to improve human wellbeing while reducing material consumption.	5.4
Beyond Rs	TCS	Reduce working hours to 30 or less per week.	5.4
Beyond Rs	RCS and TCS	Establish targets on social aspects of circularity (e.g., job generation, investments in cooperatives and social enterprises working on CE, and percentage of consumption with a recognized socio-ecological certification program).	5.1
Beyond Rs	RCS and TCS	Democratize the EU's decision-making structure by increasing transparency, improving decision-making procedures and establishing an EU-wide citizens' assembly.	5.3
Beyond Rs	RCS and TCS	Develop redistributive policies to ensure that the economic burden of a circularity transition does not fall on the most vulnerable.	5.5
Beyond Rs	RCS and TCS	Eliminate financial paradises and establish EU-wide taxes on wealth and financial transactions.	5.3
Beyond Rs	RCS and TCS	Increased financing and technology transfer to the Global South for climate change, biodiversity and circularity projects.	5.5

RCS = Reformist Circular Society; **TCS** = Transformational Circular Society; **TCE** = Technocentric Circular Economy; **FCE** = Fortress Circular Economy; **R0-10** = Value retention focus of each policy option based on R-hierarchy developed by Reike et al., (2018); **Beyond Rs** = Policy option addresses socio-ecological concerns, which are beyond the value-retention hierarchy.

thermore, regenerative agriculture and agro-ecology can create circular food systems with significant climate change mitigation and adaptation benefits (Del Borghi et al., 2020; Jurgilevich et al., 2016; Reynaud et al., 2019). Nonetheless, a mismanaged CE transition could also hamper mitigation targets by overly relying on energy recovery, biofuels and bio-materials, which generate substantial amounts of GHG emissions and increase the land-use change pressure on biodiversity (Bihouix, 2014; Heck et al., 2018).

Moreover, energy is needed to recycle any end-of-life product or material. A CE can thus increase the demand for high-temperature heat, which is hard to obtain from renewable sources of energy (Cullen, 2017). To manage these complex trade-offs and synergies, it is key to integrate the climate, ecological and circularity transitions from a holistic perspective. Policies, in this regard, are lacking at the EU level (Kaźmierczyk, 2018; Wuttke, 2018) and could include carbon-tariffs for imported goods, and consumer taxes based on the ecological footprint of products as well as redistributive policies to ensure that the economic burden does not fall on the most vulnerable (Arnsperger and Bourg, 2017; Frantzeskaki et al., 2019; Piketty, 2019; Vita et al., 2019). Increased financing and technology transfer to the Global South for climate change, biodiversity and circularity projects would also be required from a *holistic* perspective to facilitate the global ecological transition.

5.6. Towards a plural policy mix

This paper has presented a total of 32 alternative policy options to improve the EU's CE package from a plural perspective that goes beyond its current *technocentric circular economy* focus. The full list of policy suggestions is presented in Table 9, which classifies each policy based on the value retention option it focuses on. The diversity of policy recommendations derived from this research address all 10Rs, including the highest and most sustainable Rs in the value retention hierarchy (R0-R6) (Reike et al., 2018). This demonstrates that a plural understanding of the topic, which embraces the perspective of many alternative circularity visions, can lead to a more comprehensive policy approach compared to the package of the Junker Commission, which disproportionally focuses on R7. Furthermore, some recommendations go beyond the 10Rs by adding key social justice and fairness elements, which are essential components of a circularity transition, yet remain ill-recognised by the literature (Hobson and Lynch, 2016; Millar et al., 2019; Moreau et al., 2017; Temesgen et al., 2019).

6. Conclusion

Considering the complexity of policymaking between 28 sovereign states, the CE policies that the Commission has managed to pass are quite an achievement. The EU's circularity train has been started, with lots of expectations on its social, environmental and economic benefits. Yet, more holistic long-term thinking will be needed, to ensure that EU policies don't remain stuck in end-of-pipe solutions and actually bring about tangible socio-ecological change.

The EU's focus on closing resource cycles will without a doubt create an unprecedented boost for the recycling industry. However, this t*echnocentric circular economy* perspective will not significantly contribute to the shrinking, slowing, redistributing and democratizing of resource cycles. Most importantly, by focusing on growth and competitiveness rather than human well-being and ecosystem health, the EU might be creating new business opportunities from some, while doing little towards addressing the core socio-ecological challenges of the 21st century.

Considering the influence and power of the Commission, it's choice of CE vision will impact the implementation of circularity policies well beyond its borders. By setting a *reformist circular society* discourse and *technocentric circular economy* policies, the EU is sending a key signal to remain a global leader in environmental policymaking, while doing little to seriously disrupt linear business-models and practices within its borders.

This paper fills an important research gap as there are still few studies on the EU's CE discourse and policies. The policy recommendations developed by this paper can thus be relevant for both practitioners and academics seeking to better understand CE implementation. They are also useful for the development of circularity policies at member state and EU level as well as outside the EU.

Moreover, this research tests the usefulness of the circularity discourse typology to open the imaginary on the CE and develop more inclusive and holistic pathways to sustainable, fair and resilient circular futures. By evidencing which visions are missing the discourse typology can help bring new ideas and perspectives to the table. This allows for better and more comprehensive policymaking, which tackles the systemic and long-term challenge of sustainability from a plural perspective.

One of the core limitations of this research is that the state of implementation of the EU's CE policies has not been assessed, mainly because European CE policies are so recent that it is too early to measure their outcomes. Moreover, the political process of policy formulation was not analysed as it is beyond the scope of this paper. The circularity discourse typology (Calisto Friant et al., 2020) could provide a solid framework to analyse the EU's political decision-making process in order to understand what actors and discourses were included, and which ones were excluded and why. It can thus help understand whether the process was democratic, plural and deliberative. Moreover, this research focuses on the Junker Commission (2014-2019), a similar study would be valuable for the Von der Leyen Commission (2019-present) and its European Green Deal. Overall, further research on CE policy formulation and implementation is needed and, in doing so, the circularity discourse typology can be a useful methodological and conceptual tool.

Declaration of Competing Interest

None.

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Supplementary materials

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