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Understanding the EU's circular economy policies through futures of circularity

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ABSTRACT

In April 2022, the European Commission (EC) published a set of policy proposals to foster the European Union's (EU) transition to the circular economy (CE). Despite significant academic debate on the implications of transitioning to the CE, there remains little empirical and theoretical knowledge about what kind of circular future the EC policy proposals prescribe. In this paper, we explore the circular futures underpinning the EC policies and strategies on the CE by conducting a content analysis of the EC's CE policies between 2011 and 2022 using Bauwens et al.'s (2020) theoretical approach of circular futures as an analytical framework. We find that the EC's CE policies result from hybrid combinations of often competing, different circular futures. Despite this hybridity, circular modernism imaginaries that rely on techno-optimism and centralised governance tend to dominate, leading to a weak version of the CE that may be unable to meet the EU's environmental ambitions.

1. Introduction

The circular economy (CE) is an idea that proposes planned production and consumption activities to create closed loops of materials, preventing waste and maintaining resources within the system while minimising the economy's environmental impact and resource demands (Pearce and Turner, 1990). The transition to a CE has become central in the agendas of governments, big corporations and advocacy groups (Ekins et al., 2019; Kirchherr et al., 2017; Murray et al., 2017). Such a transition requires the promotion of ambitious systemic changes in the linear 'take-make-dispose' economic model by drastically reconfiguring how natural resources will be used and transformed in the future economy (Lazarevic and Valve, 2017; Welch et al., 2016). Despite these challenges, the CE has created important expectations for the future, such as reducing the European Union's (EU) environmental footprint and resource dependence, increasing industry competitiveness, reshaping the global supply chain and creating jobs (Hartley et al., 2020; Lazarevic and Valve, 2017; Pinyol Alberich, 2022).

Currently, there is a vibrant academic debate about the implications of implementing the CE agenda within the EU. This literature discusses the feasibility of decoupling economic growth from its environmental impacts (Hickel and Kallis, 2020; Ward et al., 2016), the limitations of an efficiency-based approach to reduce resource demand (Bimpizas-Pinis et al., 2021; Zink and Geyer, 2017) and the social issues associated with a transition to a CE (Murray et al., 2017). A lack of critical review of the narratives that justify the CE may unreflexively reproduce notions like 'green growth' or 'eco-modernism', and ignore alternative concepts such as eco-feminism, global environmental justice, post-growth or degrowth, which are at the centre of alternative discourses on circularity (Genovese and Pansera, 2020; Murray et al., 2017). As a result, the CE tends to be embedded within technocratic and productivist narratives based on a weak form of circularity. In practical terms, this means that CE policies may be implemented in a context of a lack of major political contestation where its criticisms are not being addressed (Genovese and Pansera, 2020).

Despite these criticisms, the CE has become a gold standard that guides the sustainability strategies of several countries (Fitch-Roy et al., 2021; McDowall et al., 2017). A wealth of literature has recently emerged to try to understand the formation and implications of CE policies within the EU. Colombo et al. (2019) show how the CE emerged as a continuation of previous policy approaches based on a notion of weak sustainability. Friant et al. (2021) and Fitch-Roy et al. (2020) identify how CE policies reproduce a technocratic and productivist vision of the CE that reconciles growth and sustainable development.

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Suárez-Eiroa et al. (2021) confirm the adoption of a weak sustainability approach and argue that CE strategies reveal shortcomings in generating significant changes. Finally, Rivas et al. (2022) scrutinise the CE policy approach in the case of Norway and identify how the CE policy programmes perpetuate ideas such as endless economic growth while minimising and ignoring the increasing criticisms raised in academic circles.

Despite different ideas of the future implicit within CE policies, there is still a dearth of research on what a circular future would look like. Bauwens et al. (2020) propose a framework of four circular future scenarios to conceptualise how the notion of the CE can lead to quite different political outcomes. However, there is a lack of research on what these scenarios might look like in practice. Many authors have looked at the European Commission's (EC) approach to the CE, but there is a general lack of research in the literature that focuses on politics and political agendas. Previous works on the topic suggest a certain tendency of EC policies to frame CE in ecomodernism terms, i.e. a hype on market-based mechanisms and the role of technology *in fixing* environmental problems (Alvarado et al., 2020; Hartley et al., 2020; Hermann and Pansera, 2020). However, the articulation of the tensions and negotiations between different visions of circular futures in policy-making remains unclear. To address this gap, we explore the different visions of circular futures that have inspired and shaped EU policy-making activities, including their emergence and evolution.

This paper unpacks the EC's vision of circularity and how this vision evolved, including the co-evolution and development of futures of circularity in practice. We explore the EC's approach to the CE by systematically analysing and comparing the EC's different legislative texts between 2011 and 2020. We identify, interpret and discuss the change across the analysed policies, and use the framework of Bauwens et al. (2020) as an analytical tool to understand the changes in the prescribed circularity futures of the EC's legislative documents. We contribute to an understanding of the different competing political agendas that underpin the development of different, sometimes contradictory, circular futures prescribed by the EC policies. These futures have important implications for the economy as they will affect who is empowered in this transition, what kind of solutions are being promoted and the future model of production and consumption. Hence, it is essential to understand what future is being built. We build on the work of Fitch-Roy et al. (2020) and Friant et al. (2021), who reviewed the extent of the novelty of CE policies in the EU. In this research, we expand their analysis by examining the first CE policy documents of 2014 and 2015, and the most recent policies and policy proposals from 2020 to 2022. This inclusion allows us to scrutinise how the CE policies evolved and identify potential changes within them.

2. Theoretical approach

There is a wealth of research on classifying different modes of circularity. Previous research, such as that of Friant et al. (2020), Frenken (2017) and Fauré et al. (2019), catalogues diverse visions of circularity, exploring different elements, such as policy fragmentation, decoupling between growth and environmental preservation, modes of governance and technological development in circularity. Bauwens et al. (2020) contribution is their approach in theorising potential circularity futures. Hence, we adopt their framework to evaluate the future of circularity envisioned in the CE policies of the EU.

Bauwens et al.'s (2020) framework divides technological innovations into low- and high-tech innovations. Low-tech innovations require minimal R&D activities and are designed to be simple, with low levels of capital investment to create and transfer (Bauwens et al., 2020; Czarnitzki and Thorwarth, 2012). High-tech innovations are characterised by advanced and complex features and intensive R&D activities and are generally less easy to replicate and less resilient (Alexander and Yacoumis, 2018; Bauwens et al., 2020). Governance can be centralised when the decision-making capacity is centralised in governmental agencies or supranational bodies, while alternative forms of governance are based on plurality and modes where power is allocated to non-state actors (Bauwens et al., 2020). The resulting four futures of circularity in Fig. 1, discussed below, are (1) planned circularity, (2) bottom-up sufficiency, (3) circular modernism and (4) peer-to-peer circularity. These four futures of circularity are theorised in terms of how CE practices can be defined at a practical level. However, the futures are not necessarily mutually exclusive, and in practice, CE developments can develop a hybrid form combining different futures.

In a *planned circularity,* governments pilot the CE's transition centrally, using strong coercive measures such as command and control regulations on production and consumption, the introduction of taxes, hard caps and bans on certain activities, legislating elements such as the right to repair and laws against practices such as planned obsolescence and low R&D (Bauwens et al., 2020). In *bottom-up sufficiency,* decentralised, locally based and small-scale production aims at satisfying the local community's needs. This future entails a drastic reduction in traffic volume and significant voluntary behavioural change from consumers to reduce their consumption patterns and reengage with a new locally based production paradigm (ibid.). *Circular modernism* relies on technological progress and a centralised political and economic decision-making paradigm to set sustainability standards. These standards provide governmental directionality to circular innovations and massive direct investments in R&D to decouple anthropogenic impacts from nature (ibid.). This future requires economic growth to generate welfare. However, there is no certainty that decoupling economic growth with environmental preservation is possible (Hickel and Kallis, 2020). Finally, *peer-to-peer circularity* involves the creation of technologies that enable decentralised collaboration, such as platforms, blockchain and 3D printing. These technologies enable a circular sharing economy where individuals can temporarily access resources on demand instead of owning them and adopt the cultural changes to accept a service-based paradigm instead of ownership (ibid.).

3. Materials and methods

We analyse the main EC policy documents that develop the EC's CE strategy, outlined in Table 1. The documents include: 1] four strategies; 2] legislative documents, including thirteen directives and regulations that preceded and were amended after the adoption of the CE, the CE Action Plan (CEAP) of 2015, ten directives and regulations derived from the CEAP 2015, and seven proposals for directives and regulations derived from the CEAP 2020; and 3] three subsidiary strategies derived from the CEAP2015 and four from the CEAP 2020. These documents define the main measures and guidelines the EC has adopted to implement the CE (Table 1).

The lead author conducted documentary analysis between July 2020 and September 2022. We compared the proposals of each policy document and the changes between them through an inductive approach to understand their content and policy implications using qualitative methods (Bowen, 2009). First, we started with open coding of the documents (Strauss and Corbin, 1998). Initially, we extracted 615 segments of data from the three documents, resulting in 472 codes that covered various topics. We further categorised these first-order codes into theoretical categories that were more abstract and easier to manage. As we iterated between coding and data, our understanding of the content of the different policies evolved, refining the coding and the creation of abstract categories. At the end of this process, five categories emerged inductively: production, consumption, waste management, the raw secondary materials market and innovation. These five categories represent the main areas where the analysed policies propose changes.

4. Results

This section is structured around five main themes identified through the analysis: *production, consumption, waste management, the raw*

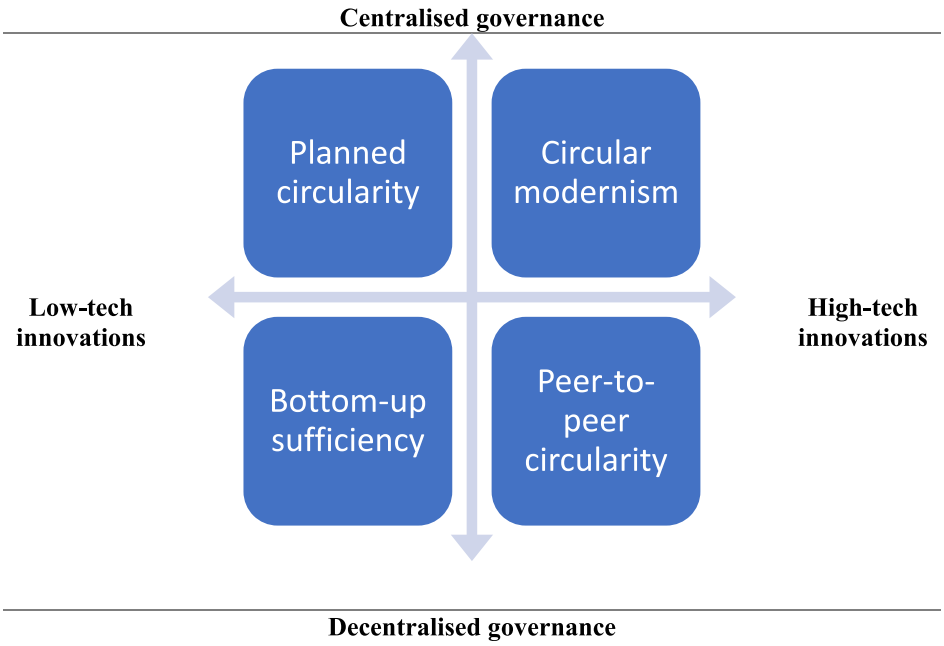

Fig. 1. Four futures of circularity (Bauwens et al., 2020).

secondary material market and innovation. Overall, we found the future the policy documents prescribe is a hybrid of the different CE models of the future that Bauwens et al. (2020) propose. However, the four CE futures of are not equally reflected across the documents. In general, we observed that the adoption of the CE did not involve a significant discontinuity or disruption with the pre-existing policy approach to sustainability but a gradual change in the ambitions and scope of the CE policies over time (Table 2).

The main policy document that preceded the CE in the EU was the 2011 Roadmap. This document proposed an idea of a sustainable economy that encouraged a more efficient use of energy and materials (eco-efficiency). This increased efficiency was expected to lower resource demand and, consequently, lower the EU economy's environmental footprint. The CE first emerged as a new paradigm in the communication COM (2014)398, which represented a shift from the Roadmap's efficiency-based approach towards the CE. The COM (2014) 398 combined the promotion of eco-efficiency with a set of more ambitious initiatives, such as closing loops of materials, more ambitious targets in waste recycling and reduction, and restricting landfill practices. The EC reviewed this vision with the publication of the CEAP 2015, where the targets of 2014 were revised or eliminated and replaced by a new approach based on economic incentives. Finally, a new CEAP was published in 2020, announcing a deepening in the scope and ambition of the CE policies. Examples of these new measures were the announcement of the reinforcement of the right to repair and measures to prevent planned obsolescence practices. The transformation of some previous directives into regulations also showed a stronger commitment of EU institutions to play a stronger role in CE adoption.

4.1. Production

Before CE's adoption, the EC had already planned to encourage resource efficiency and waste prevention. COM (2014)398 announced the creation of resource efficiency targets to facilitate the development of more circular futures for products and services through a reviewed product policy and to expand the Ecodesign Directive to incorporate resource efficiency criteria. CEAP2015 acknowledged the need to adopt new production methods inspired by circularity approaches instead of only in efficiency terms. Also, it announced the aim to broaden the Ecodesign Directive from focusing only on energy efficiency to including new issues such as repairability, durability, recyclability and upgradability in accordance with CE ideas. These ambitions were further developed, and a set of restrictions was published, including Directive 2019/904, which restricted the production of single-use plastics. Finally, the CEAP2015 proposed economic incentives to promote more recyclable production and revise existing EU legislative documents to make them coherent with the CE. These promises were developed in 2018, as the EC published a set of strategies in 2018, including the *European Strategy for Plastics in a Circular Economy*, the *Options to Address the Interface Between Chemical, Product and Waste Legislation*, and the *Monitoring Framework for a Circular Economy*.

These ambitions were broadened in the CEAP 2020, which outlined the expansion of the Ecodesign Directive and promoted more circular practices and regulating standards for recycled materials. These announcements on the Ecodesign Directive were published in detail in 2022, with a proposal for a regulation setting ecodesign requirements (COM (2022)142) and an EC communication on an Ecodesign and Energy Labelling Working Plan. In this proposal, the EC included 14 ecodesign requirements that evaluate all stages of the product life cycle. These are durability, reliability, reusability, upgradability, reparability, possibility of maintenance and refurbishment, presence of substances of concern, energy use or energy efficiency, resource use or resource efficiency, recycled content, possibility of remanufacturing and recycling, possibility of recovery of materials, environmental impacts, including carbon and environmental footprint, and expected generation of waste. Additionally, the CEAP2020 announced a legislative initiative to develop a sustainable product policy. It also announced a revision on the existing regulation to incorporate new principles in the production processes, such as durability, reusability, upgradability, repairability and material efficiency, to encourage the use of high-quality recycled materials and restrictions on single-use products. In accordance to these announcements, the EC published in 2022 an *EU Strategy for Sustainable and Circular Textiles*, which seeks to make all textile products on the EU market long-lived and recyclable by 2030 by encouraging the use of recycled fibres, restricting hazardous substances and promoting practices that respect social rights and the environment. Also, the communication on *Making Sustainable Products the Norm* tabled a legislative proposal to empower consumers in a 'green transition' though targeted amendments of EU consumer law, and the *Restrictions Roadmap under the Chemicals Strategy for Sustainability* aimed to restrict and gradually phase

Table 1
List of analysed policy documents (the policy documents' full names can be found in the supplementary materials).

Strategies
- Roadmap to a resource-efficient Europe. COM (2011).
- Towards a circular economy: a zero waste programme for Europe. COM (2014)398.
- Closing the loop – An EU Action Plan for the Circular Economy (CEAP 2015).
- A new Circular Economy Action Plan. For a cleaner and more competitive Europe (CEAP 2020).

Legislative documents
- Directive 2005/29/EC concerning unfair business-to-consumer commercial practices in the internal market.
- Directive 2010/30/EU on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products
- Directive 1999/31/EC on the landfill of waste (last amended in 2011).
- Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).
- Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products (last amended in 2012).
- Directive 2000/53/EC on end-of-life vehicles (last amended in 2013).
- Directive 2006/66/EC on batteries and accumulators, and waste batteries and accumulators (last amended in 2013).
- Directive 2008/98/EC on waste (last amended in 2014).
- Regulation (EC) 1013/2006 on shipments of waste (last amended in 2014).
- Regulation (EU) 305/2011 laying down harmonised conditions for the marketing of construction products (last amended in 2014).
- Directive 94/62/EC on packaging and packaging waste (last amended in 2015).
- Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues (last amended in 2015).
- Directive 2011/83/EU on consumer rights (last amended in 2015).
- Regulation (EU)2017/1369 setting a framework for energy labelling.
- Directive 2008/98/EC on waste (last amended in 2018).
- Directive 1999/31/EC on the landfill of waste (last amended in 2018).
- Directive 94/62/EC on packaging and packaging waste (last amended in 2018).
- Directive 2000/53/EC on end-of-life vehicles (last amended in 2018).
- Directive 2006/66/EC on batteries and accumulators, and waste batteries and accumulators (last amended in 2018).
- Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) (last amended in 2018).
- Directive (EU)2019/883 on port reception facilities for the delivery of waste from ships.
- Directive 2011/83/EU on consumer rights (last amended in 2019).
- Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment.
- Regulation (EU) 2017/1369 setting a framework for energy labelling (last amended in 2020).
- Proposal for a Regulation of the European Parliament and the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC (20r22).
- Proposal for a Regulation of the European Parliament and the Council on shipments of waste (2022).
- Proposal for a Regulation of the European Parliament and the Council laying down harmonised conditions for the marketing of construction products (2022).
- Proposal for a Directive of the European Parliament and the Council amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and better information (2022).
- Proposal for a Regulation of the European Parliament and the Council establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC (2022).
- Proposal for a Regulation of the European Parliament and the Council on the reporting of environmental data from industrial installations and establishing an industrial emissions portal (2022).

Subsidiary strategies
- A European strategy for plastics in a circular economy (2018).
- Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation (2018).

Communication on a monitoring framework for the circular economy (2018).
- Strategy for sustainable and circular textiles (2022).
- Ecodesign and energy labelling working plan 2022–2024.
- Communication on making sustainable products the norm (2022).
- Restrictions roadmap under the chemicals strategy for sustainability (2022).

out the use of hazardous chemicals, and provide transparency on new restrictions.

4.2. Consumption

The 2011 Roadmap acknowledged the need to transform consumption patterns into a more sustainable model. This acknowledgement was accompanied by a proposal to strengthen the requirements of Green Public Procurement (GPP) and aimed to provide better information about the environmental impact of products (Directives 2011/83/EU and 2005/29/EC). To regulate public consumption, the CEAP2015 announced a revision on the standards in GPP. To influence consumer behaviour, the measures proposed were based on improving the reliability of information through measures such as a more comprehensive and accurate labelling system, enforcing guarantees and addressing false green claims rights (Directive (EU) 2019/2161). Consequently, Directive 2010/30/EU on labelling and standard product information on energy consumption was repealed for Regulation 2017/1369, setting a framework for energy labelling. The concern about planned obsolescence emerged for the first time in the CEAP 2015, and an amendment to Directive 2011/83/EU in 2019 created a programme of independent testing within the Horizon 2020 programme to identify potential planned obsolescence practices.

The CEAP2020 continues in this 'nudging' approach, where consumers are encouraged to change purchase decisions by receiving information. The EU-wide labelling systems to strengthen the protection against greenwashing and reinforce product guarantees are examples of this circular modernist approach. However, the emergence of new policy approaches among the proposals of 2020 seems to prescribe a more nuanced CE future that goes beyond the idea of circular modernism. Examples of these new measures were tighter controls for producers, and some bans, the revised EU consumer law, the establishment of the right to repair, making GPP mandatory with targets and banning false information within the Ecodesign Directive, elements that echo a planned circularity. In accordance with these proposals, Regulation 2017/1369, which established an energy-labelling framework, was amended in 2020. Also, the Directives 2005/29/EC on unfair consumer practices and Directive 2011/83/EU on consumer rights are amended in 2022 by a proposal to prevent greenwashing, end early obsolescence practices, ban misinformation and enforce the provision of reliable information to consumers.

4.3. Waste management

The 2011 Roadmap aimed to improve the recovery of materials from waste, reduce waste generation, improve the reuse and recycling of materials, and set minimum standards to ensure safe disposal to protect human health and the environment. In COM (2014)398, the EC proposed a ban on the landfilling of recyclable and biodegradable materials, by 2025, while it requested Member States to virtually eliminate landfill by 2030. The COM (2014)398 also announced a simplified waste legislation for better monitoring and implementation, and new ambitious targets to encourage recycling and waste reduction. After the adoption of the CE in 2015, the proposals of 2014 were ditched in favour of new proposals to minimise waste generation and to enhance producer responsibility. The 2014 targets were ditched in favour of the promise to refine long-term targets on waste and the prioritisation of economic instruments instead of targets to discourage waste generation. The CEAP2015 also encouraged industries to recover their own material to start incorporating circular practices and restricted landfilling. These goals were published within the amendments to waste legislation, including Directive 2008/98/EC on waste, Directive 1999/31/EC on landfill, Directive 94/62/EC on packaging and packaging waste, Directive 2000/53/EC on end-of-life vehicles, Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and Directive 2012/19/EU on waste electrical and electronic equipment

Table 2
Overview of the EU's the main approach to CE policies.

	2011 Roadmap	CEAP2015	CEAP2020
Production	Encourage efficient use of resources.	Encourage circular production methods.	Mainstream circular practices through regulations and standards.
Consumption	Provide better information to consumers on sustainable options.	Ensure the reliability and comprehensiveness of the information provided to consumers.	Provide better information to consumers. Ban misleading information on sustainable options. Establish the right to repair.
Waste management	Set standards for safe disposal that protect human health and the environment.	Develop economic instruments to discourage the generation of waste and restrictions on landfilling.	Update targets on recycling.
Market for secondary raw materials	Create end-waste criteria.	Promote regulations on key resources, such as water and fertilisers, to promote the quality of recycled materials.	Restrict the use of hazardous materials and create a market observatory for secondary materials to ensure the quality of recyclates.
Innovation	Mobilise private funds towards resource-efficient practices. Mobilise the Horizon 2020 funds.	Mobilise private funds towards circular practices. Initial mobilisation of the Horizon 2020 funds. Expand more funds, such as the Cohesion Policy funds or the LIFE funds for innovation.	Mobilise several EU funds for CE innovation and improve the circularity of CE practices. Improve the coordination of the CE research.

(WEEE). Also, the Directive (EU) 2018/850 amending Directive 1999/31/EC enacted restrictions on landfilling to all waste that is suitable for recycling or energy recovery by 2030.

The CEAP2020 revised and updated the previous waste targets. The recycling of municipal waste should reach 65% by 2030 and waste derived from packaging should constitute 75% of the total. In addition, landfill should not represent more than 10% of municipal waste by 2030, these targets should be enacted in a revision of the Directive 2008/98/EC that has not been published. The CEAP2020 also aims to prevent waste exportation to third countries by promoting reuse and recycling and reviewing the EU rules on waste shipments (Proposal for a Regulation on shipments of waste and amending Regulations (EU) No 1257/2013 and (EU) No 2020/1056. The EU institutions also committed to playing a stronger role in monitoring the implementation of this regulation. The CEAP2020 also proposed minimising toxic materials emissions by updating their standards and creating systems to track these substances to control their disposal and storage though the Restrictions Roadmap under the Chemicals Strategy for Sustainability.

4.4. Market for secondary raw materials

The 2011 Roadmap aimed to promote a recycled materials market by creating a set of incentives and common waste criteria and developing end-waste criteria. These incentives tried to encourage the use of recycled materials and avoid strict obligations or prohibitions. The CEAP 2015 announced a new system of quality standards and an information system about materials to create more trust in recycled materials among producers. This announcement maintained the previous approach of avoiding bans and taxes, which seems to be aligned with a circular modernism future. This approach materialised through measures such as facilitating water reuse, the creation of a Raw Materials Information System (COM/2018/032), the adoption of an EU regulation on fertilisers to facilitate the identification and quality of organic and waste-based fertilisers, and the promotion of a digital product passport to improve the use of recyclates.

The CEAP2020 presented a new set of policy ambitions that maintained the previous approach based on the creation of standards and information. Also, the EC announced the establishment of a market observatory for key secondary materials to promote material standardisation and its use. The presence of restrictions was limited to toxic substances. These restrictions are the main strategy in building a market of secondary raw materials that reflect a planned circularity approach, while the other policy proposals suggest a dominant modernist vision of a circular future.

4.5. Innovation

The 2011 Roadmap aimed to promote the mobilisation of private investments to innovate and contribute to a resource-efficient EU. Also, the funds of the Horizon 2020 programme and the public research funding of the EU member states should be directed to achieve the ambitions of the Resource Efficiency Roadmap. The CEAP2015 and CEAP2020 maintained the stimuli to private-funded innovation. One of the main changes of the CEAP2015 is the central role of the EC in directly funding research and innovation to use technology as an enabler for the CE. In this sense, the CEAP 2015 committed to creating direct investments funded by the EC under the Horizon 2020 Work Programme. Later on, as stated in COM (2019)190, these investments were expanded into the Cohesion Policy funds, the European Fund for Strategic Investments and Innovation, and the LIFE funds.

The CEAP2020 further expanded this approach by announcing new funding for innovation. The EC committed to create and adapt up to six different funds for research to promote CE adoption: the European Regional Development Fund, LIFE, Horizon Europe, the Marie Sklodowska-Curie programme, the European Data Space and the funds of the European Institute of Innovation and Technology. Finally, the European Institute of Innovation and Technology will coordinate innovation initiatives on CE in collaboration with universities, research organisations, industry and SMEs within the knowledge and innovation communities.

4.6. Fitness within a circular future

We found that Bauwens et al.'s circular modernism is the most predominant vision within the analysed documents, although the documents also contain some elements that reflect the planned circularity future. Finally, the bottom-up sufficiency and the peer-to-peer circularity futures were not present in the CE policies of the EC. The emphasis on technological innovations and market-based solutions to address the environmental crisis leads to long-term objectives, such as the decoupling of material use and economic growth. The set of changes and regulations are specially selected to make existing business models compatible with, or adaptable to, the CE and to avoid major changes in the relationship between consumers and businesses and in major public regulations to the market (De Jesus and Mendonça, 2018; Kirchherr et al., 2018). However, the CE policies slowly included more bans and a stronger role of the EU institutions, suggesting a stronger influence of other CE visions of the future, such as a planned circularity (Bauwens et al., 2020). The restrictions on landfilling (Directives 2008/98/EC and 1999/31/EC), legislative proposals for the right to repair and against planned obsolescence (Proposal for a directive empowering consumers for a green transition (COM (2022)143)), restrictions on lightweight plastic bags (Amended Directive 2008/98/EC of 2018), and restrictions on single-use plastics (Directive 2019/904) are examples of policies that could also be categorised within a planned circularity future. We also observed a change in 2020, when the EU institutions took a more active role in fostering the CE transition by changing directives into regulations, investing more funds in adopting CE practices, and monitoring the

Table 3
Summary of the CE future prescribed by EU policies.

	2011 Roadmap	CEAP2015	CEAP2020
Dominant future	Development of production standards to provide governmental directionality among practitioners. Direct investments in R&D towards circularity. Mainly circular modernism.	Development of production standards to provide governmental directionality among practitioners. Direct investments in R&D towards circularity. Presence of certain restrictions. Mainly circular modernism with some elements from planned circularity.	Development of production standards to provide governmental directionality among practitioners. Direct investments in R&D towards circularity. More broad presence of restrictions. Mainly circular modernism, although there are growing elements from planned circularity.

implementation of CE policies. This shift involved a stronger governmental role without necessarily requiring a complex level of innovation. Thus, although the EC's construction of the CE mostly falls within the category of circular modernism, some state-driven regulations regarding waste and product durability break this pattern and give a certain role to the member states to intervene in the market.

There are very few cases of measures within the analysed documents that could fit within the bottom-up sufficiency or the peer-to-peer CE future. For instance, the proposal to enable the right to repair, in the amended version of 2018 of Directive 2008/98/EC and in the CEAP 2020, represents a measure that favours a planned circularity model, and also Bauwens et al. (2020, p. 6) use the legislation of the right to repair as an example of a planned circularity. We found that this measure could also benefit a decentralised and small-scale production if the right to recycle is legislated to enable local workshops to repair all kinds of products, regardless of brand or product. However, this depends on the efforts to involve SMEs, communities and users. Also, alternative governance principles, such as establishing collaborative platforms, are not mentioned in the analysed documents. An exception to this trend is the proposal of a regulation for the ecodesign requirements (COM (2022)142). This proposal commits to supporting the SMEs in implementing these requirements and setting up special norms to ensure a fair implementation that includes SMEs. However, such measures are exceptional within CE policies. Thus, the absence of these alternative principles may leave CE governance to the centralised entities of governments and larger corporations, who are more able to induce changes in the supply chain, while SMEs and small economic actors can be less engaged (Bassi and Dias, 2019; Garrido-Prada et al., 2021).

In summary, the CE policies of the EC prescribe a hybrid form of CE future where most measures and policies fall within a circular modernist future. However, the most recent CE policies have increasingly proposed more bans, restrictions and regulations, together with the announcement of a stronger role for EU institutions, suggesting a gradual shift towards a more hybrid approach and with more elements from a planned circularity future. Although the circular modernist approach is not the only approach adopted by EC policies, it remains the hegemonic vision of the CE in the EU (Table 3).

5. Discussion

Our analysis suggests that the CEAP2015 and CEAP2020 prescribe gradually adopting a circular modernist paradigm. This evolution, though, is unstable, contested and hybridised with elements from other circular futures, especially planned circularity futures. Many of the CE's core ideas, such as decoupling economic growth and material use and the need to transform waste into a resource and prevent further waste generation, were already present in the previous European economic strategies. However, the CE policies still frame change in terms of updating the pre-existing production and disposal targets, encouraging innovation, inducing change within the market and improving governmental practices towards circularity. These changes have been selectively developed to foster a transition based mostly on technological innovations and mobilise businesses and customers to enable a modernist circularity. Although the circular modernist approach is central in adopting the CE, this approach is nuanced by measures, especially on waste management, that fit into a planned circularity model, especially regarding waste management.

These findings are in line with other research cases that also identify the centrality of modernism approaches within policy-making and the exclusion of alternative versions of circularity (Fitch-Roy et al., 2020; Friant et al., 2021; Khan et al., 2021; Leipold, 2021; Suárez-Eiroa et al., 2021). However, our findings expand the analysis to most policies and proposals published by the EU. This expansion enables us to observe how the EU institutions' policy approach is evolving to include measures with a stronger role for these institutions, such as bans and restrictions, suggesting the planned circularity approach has an increasing influence on EC policy proposals. These findings also suggest a gradual shift in scope among policymakers and their policy ambitions. Despite this expansion of scope, the EU's approach to the CE is still dominated by a circular modernist approach.

CE scholars have been very critical of circular modernism, highlighting its inability to fulfil the EU's environmental ambitions (Corvellec et al., 2021; Fitch-Roy et al., 2020; Friant et al., 2021). In conceptual terms, CE scholars argue that a circular modernist approach fails to challenge the perpetual need of capitalism to expand (Genovese and Pansera, 2021). Rather, it enables the EC to unlock new sources of materials and to intensify the use of these materials in the economy to support current growth trajectories rather than to rationalise its use (Martínez-Alier, 2021). Such a perpetuation of a growth-based economy can jeopardise the decoupling from resource use and its environmental impact, undermining environmental ambitions (Hickel and Kallis, 2020). Further, circular modernism focuses on the redesign of manufacturing activities and business models to reduce resource demand without recognising the social aspects inherent in other conceptualisations of sustainability (Murray et al., 2017). CE scholars have pointed out how circular modernist policies propose insufficient measures to achieve the EU environmental ambitions, instead, focusing on "end of pipe" solutions that ignore the many socio-ecological implications of a circularity transition (Friant et al., 2021). For example, Fitch-Roy et al. (2020) identified a mismatch between the EU's CE policies and the scale, pace, and scope of the transformation necessary to build a strong vision of the CE. These critiques suggest circular modernism may not be a sufficiently strong sustainability paradigm, nor achieve the EU's environmental ambitions.

This research illustrates the applicability of Bauwens et al.'s (2020) framework to assess and map the political position of public policies and strategies related to the CE. This framework allowed us to map the political position of the main CE policies of the EU and to envision what future of circularity the EC policies were building over a ten-year period. We look at how these futures can help us position a certain policy or strategy and how this approach may evolve over time. Bauwens et al. (2020, p. 11) argue that the different futures are not mutually exclusive and that western countries are more likely to adopt a circular modernist approach. Our research confirms this claim, as the circularity approach of the EC mostly aligns with the modernist model, although it includes some elements, especially from planned circularity, of waste management. One of the elements not included in Bauwens et al.'s (2020) framework is how those futures may evolve. In our analysis, we observed a temporal evolution within the EC approach, which in 2011 was based on a circular modernism approach with the only exception of the waste management policies. However, we also observed the increasing influence of the planned circularity approach. This approach

has slowly incorporated new elements, as in 2015 with the direct EU funding on CE research, and in 2020 with the bans on the destruction of unsold durable goods, restrictions on single-use products and the legislation on the right to repair. These elements have slowly given a stronger role to public institutions and challenged the idea that the EC approach to the CE is solely based on circular modernism.

This research contributes broadly to the research on CE policy enactment and how this enactment builds a specific version of the CE (Fitch-Roy et al., 2020; Friant et al., 2021; Rivas et al., 2022; Suárez-Eiroa et al., 2021). For instance, our findings align with those of Fitch-Roy et al. (2020) on identifying the gradual fashion of the policy change implicit with CE adoption and the broad continuity with the general approach associated with a modernist circular future. However, these findings have several limitations. First, a single case study has inherently limited validity, although we selected a critical case study to overcome this limitation (Flyvbjerg, 2006). Also, this approach allows the researchers to analyse one case in great detail (Yin, 1981). The second limitation is the limited scope of the documents selected. The policy documents analysed represent policy output, but other relevant documents, such as parliamentary debate minutes, open statements by policy groups or stakeholders and media reports, could help understand the process of how the EU's CE approach was built. In this case, we decided to limit the scope of this research to EC policy documents to create a more detailed understanding of the output of the CE policies. In this sense, further research could identify how the circular modernist approach has been built, to explain the dominance of circular modernism, and how alternative visions of a circular future can influence public policy or economic practices. As this research identifies a shift in the scope of CE policies, future studies can expand on explaining this shift. Also, existing research that focuses on the approach of the EU member states to adopt the CE (Fitch-Roy et al., 2021; Pinyol Alberich, 2022) could be expanded and further compared with EU institutions' approach to building a CE future, or to understand their impact in the supply chain and in existing business models. A final limitation is that many documents that correspond to the CE policy package of 2022 are still proposals which are still in different stages of policymaking and political negotiation in the EU. Hence, the final enacted versions of the analysed documents might still change.

6. Conclusion

The transition to the CE has the potential to reduce the demand for raw materials and energy and to decrease waste generation. Nevertheless, CE can be framed in multiples ways underpinning quite diverse values, purposes and sociotechnical imaginaries. This paper analyses how the CE is being operationalised in the EU through public policies using Bauwens et al.'s (2020) framework of multiple CE future scenarios. Although we identify a gradual adoption of measures inspired by the planned circularity scenario, our analysis suggests that CE policies at the EU level mainly align with a circular modernist future. As an increasing number of scholars argue, eco-modernist visions with their blind faith in technology and endless economic growth are particularly problematic because they promote a weak form of circularity that is likely to be insufficient to address the present environmental crises (Corvellec et al., 2021; Fitch-Roy et al., 2020; Friant et al., 2021). As evidence problematising the eco-modernist approach piles up, it became legitimate to question the credibility and feasibility of the EU aspirations to make a real transition towards a strong sustainability paradigm. The alignment of the CE action plans with the modern circularity and, at least partially, with the planned circularity seems more a reflection of the influence of powerful actors such as corporations, big consulting groups and governments who might be more interested in incremental changes rather than a radical system change (Bauwens et al., 2020). Unfortunately, such an alignment has also the effect to leave out alternative circular futures that might offer not only technical solutions based on strong sustainability but also modes of more democratic governance of the transition towards CE. Opening up opportunities for the *repoliticisation* of the CE – that is allowing alternatives visions of CE to be publicly debated - can provide new energies to promote a more credible sustainability agenda to be translated into policy (Stirling, 2008). In this sense, there are remarkable examples of CE scholars that proposed new and more radical versions of the CE that propose a radical reconsideration of the economic system (Belmonte-Ureña et al., 2021; Clube and Tennant, 2020). Other examples, such as that by Lowe and Genovese (2022), also suggest opening up the definition of the CE by reviewing key issues, such as ownership or control of means of production. This opening up needs to enable more ambitious visions of the CE that more likely to meet the EU's environmental ambitions, and to deliver a sustainable future.

CRediT authorship contribution statement

Josep Pinyol Alberich: Conceptualization, Methodology, Data curation, Writing – original draft, Investigation. **Mario Pansera:** Conceptualization, Supervision, Validation, Writing – review & editing. **Sarah Hartley:** Conceptualization, Supervision, Validation, Writing – review & editing, and.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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