JUST2CE

A Just Transition to Circular Economy

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CHAPTER 10

Beyond GDP: Using alternative macroeconomic indicators to enact an ambitious circular economy

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Abstract

The circular economy has the potential to promote systemic change towards a sustainable future. However, the dominance of technical and market-oriented considerations has placed the circular economy as part of an eco-modernist agenda, which retains growth in Gross Domestic Product as the overarching priority. In this context, we analyse 12 existing macroeconomic indicators, developed and implemented by governments and international organisations, and determine if they could enact alternative notions of circularity. Specifically, we focus on the *performative* role that indicators can play in both defining and surmounting such reductionist views, thus helping us to address the world we want to create. We find that many of these indicators are agents of the *status quo*, but that some could disrupt the omnipotence of GDP thereby getting the macroeconomic conditions right for a more ambitious understanding of the circular economy.

Keywords: Circularity metrics, environmental sustainability, macroeconomic indicators, resource efficiency, wellbeing.

> We need to ground the development of indicators by engaging local stakeholders in the scope and definition of that which is important to measure. Asserting an ambitious vision of CE can itself have performative impact in this direction and encourage such stakeholder engagement.

10.1 Introduction

Developed as an umbrella concept built on a heterogeneous collection of different schools of thought and research fields such as industrial ecology, biomimicry, cradle-to-cradle design, and cleaner production (Blomsma and Brennan, 2017), the Circular Economy (CE) has emerged as an essentially contested concept, with undefined theoretical boundaries that lack a common and shared definition (Korhonen et al., 2018; Merli et al., 2018). Consequently, as some scholars have pointed out, the CE has predominantly been characterised in apolitical and technocratic terms that suggest a transition to circularity will primarily be led by businesses, practitioners, and

policymakers (Genovese and Pansera, 2021). Indeed, the dominance of technical and market-oriented considerations has placed CE as a salient part of the eco-modernist agenda, retaining economic growth (green growth) as its overarching priority, simultaneously underplaying the aim to displace primary production (Corvellec et al., 2021). Furthermore, CE implementation strategies show scant consideration for social dimensions of sustainability and have a strong focus on 'classic' economic and environmental impacts, both in the academic literature and industrial practice (Calzolari et al., 2022). In the face of the urgent ecological and social damages caused by the current production and consumption system, the limited transformational potential of this reductionist view of the CE has led to a call for a far more ambitious interpretation of the concept (Kovacic et al., 2019; Friant et al, 2020; Lowe and Genovese, 2022; Llorente-Gonzalez and Vence, 2019).

Polanyi's (1977) substantive understanding of human economic activity (as distinct from a more limited definition that equates 'economy' with 'market economy') is useful when grounding such an ambitious approach. In this framework, the current situation in which the global economy is shaped and dominated by market logic and ethics (Harvey, 2005; Kovacic et al., 2019) is understood as a particular and historically located institutional arrangement of the social and ecological relations by which humans interact among themselves and with their physical surroundings to satisfy their needs. This means that both the institutions and the social relations of production they sustain are susceptible to change if they cease to conform to the requirements of human livelihood (Polanyi, 1977). Therefore, the shift towards the CE in response to the present global ecological and social crisis can be regarded not only as a technical reconfiguration of the production processes, but also as a complete systemic transformation of the institutions that regulate humans' material interaction with each other and with nature. Inherent within this, the prevailing economic logic that prioritises the increase in the market value of social outputs also needs to evolve in order to reflect a new set of social values associated with the reconfiguration of the economic system in favour, for example, of global environmental justice and a Social Provisioning approach (Lowe and Genovese, 2022) (see also D1.2 and D1.3 reports of the JUSTCE project).

Consistent with this interpretation, approaches such as the post-growth paradigm exemplified by Kallis (2011), Klitgaard and Krall (2012) and Hanaček et al. (2020), challenge the market-centred vision of the economy and prioritise more ambitious goals such as human welfare and ecological sustainability (Kalimeris et al., 2020; van den Bergh, 2022). These goals better reflect the aims underlying the original systemic notion of the CE, whereby "the essential measure of the success (…) is not production and consumption at all, but the nature, extent, quality, and complexity of the total capital stock, including in this the state of the human bodies and minds included in the system" (Boulding, 1966). How, though, do we disrupt the status quo (and reductionistic visions of the CE), and move towards such ambitious circular futures that are more in line with Polanyi's (1977) substantive understanding of human economic activity?

In this paper, we assert a performative approach to answer this question, and we focus on the role of macroeconomic welfare indicators. Specifically, we suggest that such welfare indicators have the potential to influence the way we enact the economy and thus shape the nature of the economic realities that we can envisage and achieve. In this context, the status quo welfare indicator is currently Gross Domestic Product (GDP) and with it the notion of economic growth. However, as Hale et al. (2019, p.49) put it, "the economy is not GDP – it is enacted in situated practices more heterogenous than something like GDP depicts," but nonetheless, [GDP] has "come to substitute for individual, household, community and national wellbeing" (it has become ontic) despite its well-studied limitations in these areas and calls for alternative welfare indicators (e.g. Daly, 2013; Giannetti et al., 2015; Kalimeris et al., 2020; van den Bergh, 2022). Indeed, leading proponents of the CE including the EU (Colombo et al.

2019; Llorente-González and Vence, 2019; Pinyol Alberich, 2022), China (Llorente-González and Vence, 2019) and the Ellen MacArthur Foundation (Lazarevic and Valve, 2017), still rely on GDP as a principal indicator of reference when formulating their CE strategies. Therefore, as per Gibson-Graham (2008) we need to be asking what kind of world we want to create, and in response, advancing more ambitious macroeconomic indicators to achieve it.

Whilst there have been important studies that have envisaged futures beyond GDP (e.g. Svenfelt et al., 2019) and a variety of circular futures (e.g. Bauwens et al., 2020; Völker et al. 2020), the performative impact of existing macroeconomic indicators and how they could provide propitious conditions for a transition to an ambitious CE, is not something that has been studied to date. Much of the discussion of macroeconomic indicators for a CE focuses exclusively on China (Saidani et al., 2019) and the measurement of circularity itself rather than overarching welfare indicators that could supplement or replace GDP in the public consciousness. For example, Zhijun and Nailing (2007) have discussed implementing CE in China and the CE indices and indicators needed to affect this, and Geng et al. (2012) provide a critical analysis of China's existing nationally focused CE indicators. Wang et al. (2020) have recently proposed new approaches to measuring circularity in China. Outside of China, De Pascale et al. (2021) and Saidani et al. (2019) have analysed a wide range of potential indicators in the context of the CE, including at the macro level. However, again, the focus has been on circularity indicators. Similarly, Jacobi et al. (2018) and Mayer et al. (2019) have proposed economy-wide biophysical frameworks for the assessment and monitoring of a CE, whilst Schroeder et al. (2019) has discussed the relevance of the CE to the Sustainable Development Goals.

In this context, this study's primary aim is to analyse how alternative macroeconomic indicators could enable us to envision, create and enact ambitious conceptions of the CE. To achieve this, we review a set of indicators according to a simple conceptualisation that understands the economy as being comprised of three pillars: the economic dimension, the environmental dimension, and the social dimension (Carew and Mitchell, 2008; Schaltegger and Wagner, 2017). We do not aim to formulate an ideal approach or system of indicators, or to stray into discussions of modelling the CE that have been effectively addressed elsewhere (e.g., McCarthy et al., 2018). On the contrary, this paper aims to provide an exploratory overview of how innovative existing macroeconomic indicators can enable new visions of the CE. It is, if you like, a practical 'stock take' of what indicators are available now and how these might be augmented further in the future to provide a more hospitable context within which an ambitious CE might be furthered. Indeed, we have pursued this end out of an understanding that specific CE practices can be determined by the way in which we frame, measure and envision the broader macroeconomy.

The paper proceeds as follows. Section 2 presents the methods that were employed to select and analyse the macroeconomic indicators we address here. Section 3 introduces the final 12 indicators selected, as well as the instances where these approaches have been applied in practice. Section 4 discusses the suitability of the various approaches in helping us to define and perform an ambitious CE. Finally, Section 5 concludes and suggests avenues for future research.

10.2 Materials and methods

We selected and classified a range of indicators, frameworks and metrics (henceforth just "indicators") according to the three pillars that reflect the ambition of a functional CE, namely efficiency in resource use, environmental preservation, and wellbeing (Murray et al., 2017; Korhonen et al., 2018). These pillars are also reminiscent of

'sustainability' more generally. However, we rely on the pillars here as an organisational device that captures a broader macroeconomic perspective than a traditional focus on GDP, and because invoking such a framework and broadening the definition of what is important for a CE to measure, can itself lead to performative impact that stimulates the development of additional CE indicators.

We specifically focused on macroeconomic indicators (applicable to cities, regions, nations and beyond) that were in existence when this study was conducted (March 2022), and which had been developed or implemented by NGOs, international governmental organisations, partnerships between universities and governments, or governments themselves. We also prioritised indicators with a relevant track record to examine. As a result, the focus here is more empirical in nature, which distinguishes it from a large part of the academic literature described previously. Moreover, we specifically excluded indicators that are concerned with circularity mechanisms themselves, rather choosing to focus on approaches that address the overarching economic system i.e., we effectively treat the economic system as a 'black box.' The 12 indicators that we settled on were found due to our familiarity, as a five-person research team, with the work in this area and by searching a variety of terms related to macroeconomic indicators. As discussed above, the particular focus of this paper – including academic research but focusing on policy applications – has only been studied to a limited extent. As a result, no firm list of keywords or search terms has yet been established in this specific area.

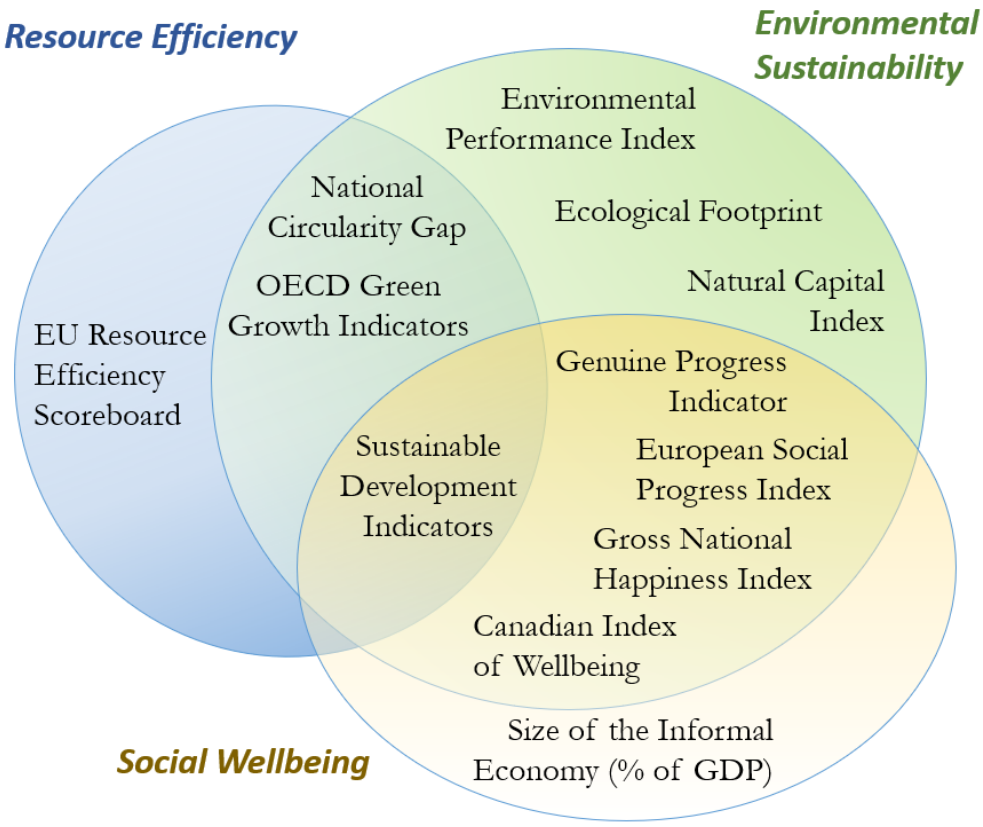
Table 10.1 and **Figure 10.1** provide an overview of the indicators that will be covered in this paper. As shown, many of these indicators are applicable to more than one pillar. Indeed, whilst we classified the indicators to the most relevant pillar based on the issues they address, in some cases, the scope of the indicators also extends to other pillars. Therefore, in Table 1 the connection between indicators and pillars is classified as either "highly relevant" or "relevant". However, in the discussion that follows, indicators are examined in the section to which they are considered as "highly relevant."

Table 10.1The 12 Indicators covered in the paper (by pillar)

	Created by	**Resource efficiency**	**Environmental sustainability**	**Wellbeing**
National Circularity Gap	Circle Economy (non-for-profit organisation)	✓✓	✓	
EU Resource Efficiency Scoreboard	EU	✓✓		
OECD Green Growth Indicators	OECD	✓✓	✓	
Sustainable Development Indicators	UN	✓	✓✓	✓
Natural Capital Index	Stanford University		✓✓	
Ecological Footprint	Global Footprint Network (non-profit organisation)		✓✓	
Environmental Performance Index	Collaboration between Yale University, Columbia University, and the World Economic Forum		✓✓	
Gross National Happiness Index	Government of Bhutan		✓	✓✓
Canadian Index of Wellbeing	Atkinson Charitable Foundation (before 2011) and University of Waterloo (after 2011)		✓	✓✓
Genuine Progress Indicator	Non-profit organisations and universities across the USA (cases in		✓	✓✓

European Social Progress Index	Vermont, Maryland, Colorado, Ohio, and Utah) EU		✓	✓✓
Size of the Informal Economy (% of GDP)	International Conference of Labour Statisticians			✓✓

Note: ✓✓= highly relevant; ✓= relevant. EU = European Union. OECD = Organisation for Economic Cooperation and Development. UN = United Nations.



10.3 Macroeconomic indicators for an ambitious CE

The 12 macroeconomic indicators that were selected for analysis here, and the instances where these have been applied to date, are introduced in sections 3.1 (resource efficiency), 3.2 (environmental sustainability) and 3.3. (wellbeing).

10.3.1 Macro-level approaches to resource efficiency

10.3.1.1 National Circularity Gap

The notion of the existence of a "circularity gap" in a territory is derived from the economy-wide MFA approach that quantifies the exchanges of materials and energy in the economy in physical terms (Haas *et al.*, 2015). This

involves all the material and energy inputs[8], which can either be incorporated into the physical stocks and end up as outputs of the economic process (exports, emissions, and waste) or be recovered/recycled as secondary inputs. The "circularity gap" is then measured as the ratio between the recovered materials and the total amount of resources extracted and used. The most widespread measure of the circularity gap is performed by the non-for-profit organisation Circle Economy, responsible for the Circularity Gap Report initiative (CGRi). The circularity gap is calculated by CGRi mainly at the worldwide level, but it has also been applied at the national level in Austria, Netherlands and Norway, as well as the province of Quebec in Canada (CGRi, 2021).

Some scholars critiqued the National Circularity Gap and similar measures that focus on the level of circularity. Aguilar-Hernandez *et al.* (2019) argue that most circularity gap studies fail to discriminate between the materials that are emitted, added to in-use stocks or disposed of previous stocks. Including these in the material analysis leads to misleading results because they are not actually available for recovery (Aguilar-Hernandez *et al.*, 2019). Another key limitation of the circularity gap is its extreme dependence on how system boundaries are defined. In this regard, it has been reported that the circularity gaps of the richest countries tend to increase significantly when their material recovery rate is put in relation not only to their domestic extraction and direct imports, but with their total global material footprint (Llorente-González and Vence, 2020). Finally, Martínez-Alier (2021) provides a holistic critique of the notion of circularity itself, as it represents an expansion of the resource extraction and waste disposal frontiers of capitalism that does not solve the sustainability challenges of capitalism. Martínez-Alier (2021) postulates that the widespread use of circularity gap could even enable further economic growth through more resource extraction.

10.3.1.2 EU Resource Efficiency Scoreboard

The Resource Efficiency Scoreboard is a composite indicator that was designed by the European Commission (EC) to support the political actions and goals set by the Roadmap to a Resource Efficient Europe, aimed at improving the use of natural resources and monitor the trend for increasing resource productivity amongst the EU members (European Commission, 2011). Its 32 indicators followed a hierarchical structure, with resource efficiency representing the main leading indicator, followed by metrics related to the environmental impacts of resource use and thematic indicators that monitor the transformation of the economy, natural capital and key sectors (European Commission., 2015) (**Figure 10.2**). This scoreboard supports a vision of the economy that maximises the use of

[8] The MFA does not include water and air (Eurostat, 2018).

existing resources, which is in line with some of the principles of the CE. Resource efficiency, is calculated by dividing GDP by Domestic Material Consumption (DMC), indicating the amount of economic value that can be obtained per physical unit of materials.

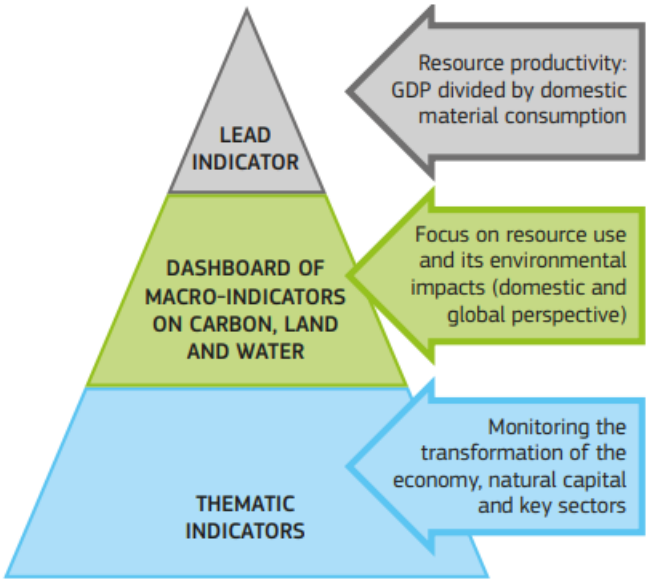


Figure 10.2 Tiered structure of the EU Resource Efficiency Scorecard (Source: Reprinted with permission from European Commission, 2014.)

Many drawbacks have been pointed out in the literature about this approach. The main issue is the fact that this indicator still relies on GDP and does not detach itself from the monetary valuation derived from the market sphere (Ward *et al.*, 2016; Nørgård and Xue, 2017). As a consequence, a rise in prices and/or changes of the economic structure of a country towards activities with higher monetary value added may lead to spurious conclusions about an apparent dematerialisation of the economy. For example, during the international financial crisis in 2008, some European countries registered a remarkable increase in material productivity, simply due to the sharp contraction in the construction sector resulting from the sudden burst of a real estate bubble. Moreover, the indicator may reflect the occurrence of relative decoupling while absolute material use may be still increasing (Ward *et al.*, 2016; Nørgård and Xue, 2017). Finally, the issue of system boundaries also applies to this indicator, as apparent efficiency gains may be obtained through displacement of the material burden to other territories (Korhonen *et al.*, 2018).

10.3.1.3 OECD Green Growth Indicators

The notion of 'green growth' emerged in the last decade as an institutional[9] response to the overwhelming evidence regarding the ecological deterioration caused by human economic activity. It is based on the premise that continued GDP growth could be achieved within the ecological limits of the planet, and thus continues the line

[9] The concept of "green growth" has been promoted to a great extent by international institutions such as the OECD and the UNEP (Smulders et al., 2014).

of previous conceptualisations on sustainable development, such as ecological modernisation and the environmental Kuznets curve hypothesis10 (Popp, 2012; Hickel and Kallis, 2020). Smulders et al. (2014) propose a conceptual distinction between the "strong green growth" approach and the "weak green growth" approach. The former is promoted by UNEP, who focus on making growth compatible with environmental preservation, and the latter is advocated by the OECD, whose approach is based on the assumption that it is possible to decouple economic growth and its implicit environmental impact (Smulders et al., 2014; Stoknes and Rockström, 2018). The vision of green growth of the OECD can use the CE as an enabler of green growth in a similar fashion to the notion of a circularity gap, as the CE can expand the limits of resource extraction and intensify resource use to further enable economic growth (Martínez-Alier, 2021).

The OECD Green Growth Indicators framework comprises 26 different indicators, categorised into four groups: (1) environmental and resource productivity, (2) natural asset base, (3) environmental dimension of quality of life, and (4) economic opportunities and policy responses (OECD, 2017). These indicators correlate with the growth of GDP, and measure on how countries improve their green-growth related performance (OECD, 2017; Koçak, 2020). The OECD Green Growth indicators maintains close similarities with the EU Resource Efficiency Scoreboard, as both frameworks are promoted to guide economic policy internationally, and both aim to promote GDP growth while reducing environmental impact. However, the main critique of these indicators is the shared assumption that economic performance is based on enabling economic growth through decoupling. While many experts defend the possibility of decoupling economic growth from resource use and environmental impact (UNEP, 2011; Schandl et al., 2016; Wu et al., 2018), others challenge the feasibility of absolute decoupling. In this sense, some scholars call for the decoupling of material use from variables other than GDP, such as those depicted in the Human Development Index (HDI) (Sanyé-Mengual *et al.*, 2019; Hickel and Kallis, 2020).

10.3.2 Macro-level approaches to environmental sustainability

10.3.2.1 Sustainable Development Indicators

The UN 2030 agenda for Sustainable Development aims to enable peace and prosperity for people and the planet through the adoption of 17 Sustainable Development Goals (SDGs) and 169 targets (UN, 2022) with relevant indicators to measure the advancements. From an ecological perspective, some of the SDGs are compatible with the main principles and goals of circularity, and their corresponding indicators could be used to analyse the transition to the CE. For instance, reducing waste generation through prevention, reduction, recycling, and reuse is currently among the targets of SDG 12 (responsible consumption and production), and the SDG 13 (climate action). Also, the improvement of agricultural productivity by the reduction, recycling and reuse of waste is contemplated in SDG 2 (Zero Hunger) (Barros *et al.*, 2020). Extended use of renewable energy sources, one of the pivotal enablers for constructing the CE (Korhonen *et al.*, 2018), is contemplated in SDG 13 (Climate Action). Also, other SDGs have both direct and indirect links with the environmental aspect of the CE agenda, such as SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 11 (sustainable cities and communities), SDG 14 (life below water), and SDG 15 (life on land).

[10] The Kuznets curve hypothesis states the existence of an inverted-U relation between economic growth and environmental damage (Cole, Rayner and Bates, 1997), thus prescribing that economic convergence among countries will lead to an overall reduction of the ecological impacts.

Despite their apparent suitability, the SDG goals are built as a set of indicators instead of a holistic indicator, leading to trade-offs as certain issues can be prioritised over others. For example, poverty-related goals might be prioritised at the expense of other SDGs related to environmental performance (Barbier and Burgess, 2019). Another factor is the attainment of different goals, such as economic growth, climate action, and responsible consumption and production, do not correlate with each other, leading to an increase between the trade-offs and contradictions within the SDG and their indicators (Fonseca *et al.*, 2020).

10.3.2.2 Natural Capital Index

The notion of natural capital is used to describe components of the natural environment that provide valuable goods or services that are critical for society including minerals, fuels, animals, plants, or ecosystems (Mace et al., 2015; Terama et al., 2016; Bateman and Mace, 2020). The Natural Capital Index (NCI) provides a structured and comprehensive approach to measure natural capital and allow decision-makers to take into account national natural capital and ecosystem services when they make decisions about economic development (Mora, 2019; Fairbrass et al., 2020).

NCI has been used in several studies to assess the status of the amount and value of the natural capital in certain locations including Mexico (Mora, 2019), Scotland (McKenna et al., 2019), and the United Kingdom (Stebbings et al., 2021). The use of NCI allows policymakers to track their action and their progress in preserving or improving their natural capital for sustainable development (Terama et al., 2016; Bateman and Mace, 2020). The use of this framework encourages a transition away from production-based indicators towards the consideration of ecological assets, which can be aligned with some of the elements that compose the CE.

A disadvantage of the NCI framework is that it adopts an environmental output perspective to address the societal performance of the economy. Although this perspective aims to weight the value of nature and its preservation, it does not distinguish if the presence of natural capital is caused by an actual shift towards more sustainable practices or by simple geographical luck. Such a perspective provides a limited view of the performance of the economy, as it disconnects the environmental impact of the economy from its ability to satisfy societal needs. Another source of criticism is the commodification of nature implicit in the use of NCI, as environmental values cannot be measured with units as money (Martinez-Alier et al., 1998), or the incompatibility of the monetised nature with market mechanisms (Brockington, 2011).

10.3.2.3 Ecological Footprint

The concept of the Ecological Footprint (EF) of a population was first introduced by Wackernagel and Rees (1996), who defined it as "the area of ecologically productive land (and water) in various classes — cropland, pasture, forests, etc. — that would be required on a continuous basis to (a) provide all the energy/material resources consumed, and (b) absorb all the wastes discharged by that population with prevailing technology, wherever on Earth that land is located" (Andersson and Lindroth, 2001). The EF aligns with the idea that the CE can reduce the environmental impact of the economy. Hence, a strong adoption of CE practices should be translated to a decreased EF in a country.

In practice, the EF is calculated by adding up all the demands for biologically productive space measured in global hectares and is then contrasted with the total available biocapacity (European Commission, 2022). This offers an estimate of the "ecological deficit" incurred by the populations that use resources in excess of their own biocapacity, which is compensated through the consumption of the "ecological reserve" or "credit" belonging to

the inhabitants of other territories (Wackernagel et al., 2006). The Environmental Footprint is an indicator that better reflects the impact of the human activity in comparison to the NCI, as it takes into account the demands for resources. This element in especially relevant in a context of a globalised economy where most of resources are not sourced locally within a country, because it allows us to identify how wealthy countries account for global environmental degradation despite having a well-preserved local environment.

EF mainly calculates the total available biodiversity as the share of available land for cultivation and infrastructure is estimated to be equivalent to the amount of land used in practice. Consequently, the methodology does not allow for unused reserves of cropland and buildable land or distinguish between different cultivation techniques and/or ownership regimes, thus reflecting land productivity rather than land management sustainability (Matuštík and Kočí, 2021). EF is used in other measures including Global Footprint Network (GFN) to determine the biodiversity required to absorb the direct and indirect CO2 emissions linked to consumption (Matuštík and Kočí, 2021). Some scholars argue that the EF ends up being a CO2-centred static measure that does not consider potential shifts in the global energy matrix towards options with less ecological impact (van den Bergh and Grazi, 2014). Detractors also point out that the methodology penalises territorially small and commercially open rich countries, regardless of their potential to develop and use renewable energy and exploit their biodiversity more intensively and efficiently.

10.3.2.4 Environmental Performance Index

The Environmental Performance Index (EPI) measures the health of a country's environment and the vitality of a country's ecosystems using 32 measures in 11 categories (EPI, 2022). The EPI represents a collaboration between Yale University, Columbia University, and the World Economic Forum, and has been in operation since 2006, when it replaced the Environmental Sustainability Index (Esty et al., 2005). The EPI's breadth is highlighted by its inclusion of biodiversity and habitat, climate change, and water quality elements, demonstrating its strength as an environmental indicator (Ave and Babolsar, 2010). This index can contribute to a more accurate assessment in the context of the CE, as traditional measures such as GDP do not consider environmental externalities (Kalimeris et al., 2020). In this sense, the EPI and the EF share a common approach when they relativise the environmental impact of a country in relation with its own available environmental resources, while the NCI is limited to only analyse the available natural resources within each country.

One of the strengths of the EPI is that it allows comparisons of the environmental performance across countries (Saisana and Saltelli, 2010; Boleti et al., 2021) and also between sectors within the same country, as in the case of Lithuania (Baležentis et al., 2016). In this sense, the use of EPI can be useful from an output perspective, as it can estimate how much the environmental performance has improved after the adoption of the CE. Some authors point out that the EPI framework does not easily translate environmental performance into practice since it combines elements that do not describe important environmental issues but are important for tracking the performance of these elements as they affect society. For example, air and water pollution are calculated in relation to the impact on humans. As a result, the EPI is strongly correlated with the indicators relevant to environmental stress to human health, while it has a very low correlation with the indicators relevant to ecosystem vitality (Saisana and Saltelli, 2010). This is also true for estimation of wellbeing since it only monitors environmental developments that merely affect human health. Therefore, for a more comprehensive assessment, many scholars combine EPI with other indicators, such as economic growth or the human development index (Ave and Babolsar, 2010; Samimi and Ahmadpour, 2011).

10.3.3 Macro-level approaches to wellbeing

10.3.3.1 Gross National Happiness Index

The Gross National Happiness (GNH) index was created with the intention that sustainable development should take a holistic approach towards notions of progress and give equal importance to non-economic aspects of wellbeing (Thinley, 2012; Ura et al., 2012). The GNH index served as a guiding philosophy for Bhutan's governance based on nine domains (Ura et al., 2012): psychological wellbeing, health, education, time use, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standards. By using these nine domains, the GNH index aims to orient the country towards happiness by assessing the presence of the conditions that generate unhappiness.

The novelty of the GNH index is that instead of measuring aggregate or average happiness, it aims to measure how members of the population (in this case Bhutan) reach a "sufficient level" of happiness across a set of dimensions. This approach allows for a stronger focus on wellbeing and its development, leading to improved environmental preservation (Bates, 2009). Considering the fact that social aspects are largely overlooked in conventional economic performance measurement, the GNH index bears the potential to address this issue in the context of the CE. Hence, the use of an index such as the GNH aligns with a vision of the economy that does not necessarily seek economic growth, but social satisfaction, which can lead to a strong version of sustainability.

The GNH proposes an approach that measures social progress while disregarding material production. This allows the GNH to overcome the disadvantages of GDP on the economic policy debate and to provide a vision of economic performance that enables a strong vision of sustainability (Thinley, 2012; Brooks, 2013; Tideman, 2016; Laczniak and Santos, 2018). However, the main weakness of using a happiness-based indicator is that happiness is a subjective, contextual and culturally shaped notion that is defined differently across different societies (Alesina et al., 2001).

10.3.3.2 Canadian Index of Wellbeing

The Canadian Index of Wellbeing (CIW) indicator aims at generating a national, broad, and balanced instrument to show the public the evolution of wellbeing, in all its possible dimensions. The main reason behind the creation of this indicator was the over-reliance on GDP to measure the economic performance of Canada (Graham, 2015; Canadian Index of Wellbeing, 2021). Its creation is a citizen-led initiative that started at the Atkinson Charitable Foundation (ACF) in 1999, when a group of Canadian experts posed the question: "What would it take to create a tool that truly measured Canadian wellbeing?". To calculate CIW, a set of 64 different indicators are extracted from data sources provided by Statistics Canada. These indicators are grouped in 8 different domains: community vitality, democratic engagement, education, environment, healthy populations, leisure and culture, living standards, and time use (Michalos et al., 2011; Morgan, 2011).

The CIW has been used in Canada, together with GDP, to provide a different perspective to decision-makers on the main problems and challenges that Canadian society faces (Canadian Index of Wellbeing, 2021). This represents a critical difference between GNH and CIW: GNH has replaced GDP, whereas CIW is used to complement it. Although policymakers in Canada do not mention the use of the CIW in their CE policies, we can speculate that the

use of CIW could align with a vision of the economy that prioritises social welfare instead of growth, which can also lead to a strong version of sustainability in a similar fashion to the GNH.

10.3.3.3 Genuine Progress Indicator

The creation of the Genuine Progress Indicator (GPI) has been motivated by the lack of comprehensiveness of GDP, and the need to create metrics broader than GDP that put economic, environmental and social elements into a common framework and observe progress in a more comprehensive way (Asheim, 2000; Hanley, 2000; Talberth et al., 2007). Thus, the creation of the GPI was an attempt to provide a more accurate measure of welfare and to gauge whether an economy is on a sustainable time path (Cobb et al., 1995; Hamilton, 1999; Costanza et al., 2004). The use of the GPI as a complement to GDP is shared by the CIW. GPI consists of more than twenty aspects of economic lives that are ignored by GDP (Cobb et al., 1995). These aspects are grouped in the following five categories: (1) built capital, (2) financial assets, (3) natural capital, (4) human capital, and (5) social capital (Hamilton, 1999). The result is an index that attempts to measure our collective welfare in terms of principles of sustainable development drawn from the economic, social, and environmental domains. Moreover, because the GPI explicitly recognises the contribution of unpaid work in the home to economic well-being, it is aligned with feminist and ecological economics as discussed at greater length in D1.3 (Martinez-Alvarez and Barca, 2023) of the JUST2CE project.

One of the main characteristics of GPI is that it considers income distribution, where an increase in the income of the poor carries a higher weight than an increase in income of the wealthy. For example, the difference in income weighting is justified as income inequality and is correlated with several social problems, such as higher rates of drug abuse, incarceration and mistrust, and poorer physical and mental health (Costanza et al., 2004). However, GPI is also criticised for lacking robust valuation techniques and lack of appropriate data to value many of its components that are assumed. For instance, GPI measures the cost of non-monetised elements such as the cost of crime, the cost of noise pollution, the cost of family breakdown, or the cost of lost leisure time (Lawn, 2003). There is no consensus about the valuation process and the data used for measuring some of the aforementioned components.

10.3.3.4 European Social Progress Index

The European Social Progress Index (ESPI) indicator was developed to measure social progress as a complement (and not a substitute) to traditional measures of economic progress, such as GDP. It was developed within the framework of the “Beyond GDP” discussion, and there have been only two editions published, in 2016 and 2020 (European Commission, 2021). The ESPI is developed by the EU-SPI Pilot project and funded by the EC to improve policymaking, in particular for those initiatives aimed at enhancing cohesion across the EU (European Commission, 2022). The Index measures social progress using twelve components that are aggregated into three broader dimensions describing basic, intermediate and more subtle aspects of social progress, respectively: (1) basic human needs: nutrition and basic medical care, water and sanitation, shelter, personal security; (2) foundations of wellbeing: access to basic knowledge, access to information and communication, health and wellness, environmental quality; (3) opportunity: personal rights, personal freedom of choice, tolerance and inclusion, access to advanced education.

The ESPI is intended to complement and not replace GDP. This use and design suggest critical similarities with the CIW and the GPI. However, given the novelty of this indicator and the lack of literature that has analysed it and

practices using this indicator, it is challenging to foresee its applicability to policymaking. Given its design and intended use, we can expect that the ESPI will have a similar impact to the GPI and CIW. However, a critical difference of ESPI is that it has been developed by the EU institutions and not an external academic organisation or an NGO. This suggests that the ESPI may have more potential than its Canadian and US counterparts in shaping EU policy. The use of this index could enable a stronger version of sustainability in the CE transition, in a similar fashion to the GPI and CIW.

10.3.3.5 Size of the informal economy (as a percentage of GDP)

The International Conference of Labour Statisticians (ICLS) defined the informal economy as labour that is outside the scope of social protection mechanisms and labour legislation (International Labour Organization, 2003). Some specific examples of the informal economy include child employment, domestic labour, and unpaid care work. GDP is not inclusive of the informal economy, even though it has been estimated to account for more than 60 percent of the World's employed population. It is worth mentioning that the informal economy is associated with social vulnerability due to precarious labour conditions and lack of social protection (International Labour Organization, 2018).

Taking into account the social dimension associated with the quality of employment is particularly relevant for monitoring the transition to CE, as many of the circular activities linked to recovery, repair and reuse have been reported to rely on low remunerations and high rates of unpaid employment (Llorente-González and Vence, 2020).

Table 10.2 provides a summary of the 12 indicators that were included in the final analysis.

Table 10.2 Comparison of alternative indicators/frameworks for measuring economic performance

Indicator/ framework	**Implementation context**	**Elements measured**	**Shortcomings**
National Circularity Gap	43 countries in different regions	Performance in recovering waste	Focused on waste management. Dependent on the geographical definition of recycling (local waste collection vs. local waste processing) and of total material use (domestic use vs. material footprint).
EU Resource Efficiency Scoreboard	European Union	Multi-factor framework consisting of several indicators focusing mainly on: - Resource efficiency - Land/Water productivity - Carbon footprint - Waste management - Supporting research and innovation - Environmental and energy tax - Biodiversity management	Interpretation for some indicators requires extra accuracy since there are indicators that overshadow each other; no social factor has been taken into consideration.
OECD Green Growth Indicators	38 member states of the OECD	Multi-factor framework consisting of several indicators focusing mainly on: - Economic growth - Labour markets - Resource productivity - Biodiversity and ecosystems	Some of the indicators are still in the phase of development and it is not clear how they are measured; no social factor has been taken into consideration.

		- Renewable and non-renewable stocks - Environmental dimension of quality of life - Technology and innovation - International financial flows - Environmental taxation	
Sustainable Development Indicators	UN Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs)	- Climate change - Energy - Zero hunger - Life under water - Life on land - Sustainable cities and communities	The flexibility in which precise indicators are chosen by a nation makes it difficult to make a full comparison across countries.
EPI	180 countries (including Denmark, Luxembourg and Switzerland)	- Environmental health - Ecosystem vitality	The methodology to calculate EPI scores has evolved multiple times since its inception. Furthermore, although the score was calculated in 2020 for 180 countries, a few nations are still missing.
Ecological Footprint		- Environmental impacts - Energy and material consumption - Waste management	This indicator only focuses on the environmental output of the economy and the natural elements present in a country.
NCI	Calculation only in exploratory and academic studies	- Water availability - Biodiversity management - Agricultural fertility - Natural stocks	This indicator only focuses on the environmental output of the economy and the natural elements present in a country.
GNH	Government of Bhutan	- Psychological wellbeing - Health - Education - Time use - Cultural diversity and resilience - Good governance - Community vitality - Ecological diversity and resilience - Living standards	This indicator has been calculated only in Bhutan. It has been developed as an initiative of the monarchy without public involvement.
CIW	Canada	- Community vitality - Democratic engagement - Education - Environment - Population health - Leisure and culture - Living standards - Time use	This indicator has only been used by one country (Canada). The data necessary to calculate this indicator is often unavailable or challenging to calculate.
GPI	State of Vermont, State of Maryland, State of Washington, State of Hawaii (USA)	- Built capital - Financial assets - Natural capital - Human capital - Social capital	This indicator has only been used by a few states within the USA. The data necessary to calculate this indicator is often unavailable or challenging to calculate.
ESPI	European Union	- Nutrition and medical care - Water and sanitation - Shelter - Personal security - Access to knowledge - Access to information and communication	This indicator is still under development, and it has not been used yet by the EU.

		- Health and wellness - Environmental quality - Personal rights - Personal freedom - Tolerance and inclusion - Access to advanced education	
Size of the Informal Economy	South Africa, North Korea, Latin America, Soviet countries, Pakistan, Romania, the Caribbean, and Spain	Extent of labour that is outside the scope of social protection and labour legislation.	The informal economy has not been calculated on a regular basis for most nations. Furthermore, there are several methodologies adopted for its calculation, which makes it hard to make reliable comparisons across nations.

10.4 Discussion

In light of the preceding analysis, there seems to be (at least) two ways in which we could address the main goal of this paper - i.e., to analyse how alternative macroeconomic indicators could enable us to envision, create and enact ambitious conceptions of the CE. First, we could take a narrow pragmatic or technical point of view and think about the extent to which the 12 indicators represent a broader conception of the economy, beyond that offered by GDP, as framed by the three pillars outlined (efficiency in resource use, environmental preservation, and wellbeing). Second, and the main focus of this paper, we could invoke a performative approach and think about how each indicator might itself be an agent that helps us move beyond its specific instrumental merits or demerits and enact a still more ambitious vision of the CE.

Taking a pragmatic or technical approach and starting with the resource efficiency-based approaches, we can see that despite their attempt to combine economic and physical dimensions, they continue to reflect a productivity-based vision of the economy. In this sense, GDP still plays a major role in the calculation of the embedded indicators, ultimately subjecting the results to monetary-price valuation. Consequently, most of the indicators only account for improvements in terms of relative decoupling, which can give rise to the emergence of rebound effects, and therefore may be achieved through absolute increases in resource use (Zink and Geyer, 2017; Figge and Thorpe, 2019). These drawbacks, frequently observed within frameworks that measure efficiency for sustainable development, can play down the importance of focusing on environmental and social issues that the CE claims to address (Geng et al., 2012; Llorente-González and Vence, 2019; Padilla-Rivera et al., 2020).

The case of the National Circularity Gap is different from the other metrics related to resource efficiency. In this case, the National Circularity Gap is built entirely upon physical quantities. It is also focused mainly on materials recovery, in contrast to the EU Resource Efficiency Scoreboard and the Green Growth Indicators, which measure multiple dimensions. The strength of the Circularity Gap is that it provides both a simple and direct measure to keep materials in circulation at the macroeconomic level. However, there are also weaknesses around the lack of accounting for related matters such as the energy consumption of recycling activities, and the potential for misleading results: improvements in the form of a reduction in the circularity gap may be obtained by increasing material efficiency and recycling rates but can also be the result of economic downturns due to recessions or

crises. Moreover, this approach has proved to be very sensitive to the criteria chosen to determine the total amount of materials used by an economy (with domestic material consumption and global material footprint as the two extreme cases), and to account for the international trade of recyclable residues. Depending on these crucial methodological decisions it may be possible for a country to reduce its circularity gap by simply shifting the burden to other territories.

With regard to the environmental sustainability-based indicators, these refer to a specific aspect of public priority. For example, the Sustainable Development Indicators, which measure the achievement of the UN's Sustainable Development Goals. Whereas these indicators measure elements related to environmental preservation, they also include metrics related to other dimensions that reflect the levels of social welfare and human development. Nevertheless, it is important to highlight the contribution of indicators such as the EF to account for the unevenly distributed global environmental impacts underpinning the higher levels of welfare, efficiency, and sustainability of the richest countries (Fitzgerald and Auerbach, 2016; Givens et al., 2019; Hickel et al., 2022). This issue of uneven impacts is addressed in D1.2 (Meira et al., 2022) of the JUST2CE project, which discusses how the prevalent and reductionist view of the CE has the potential to drive new forms of global environmental injustice by feeding unequal geographical impacts.

A common problem across the sustainability-based indicators is that there is often not sufficient data available to calculate the indicators for all countries. There is also a notable trade-off between specificity and breadth among the environmental approaches. The SDI are broad and cover many aspects of the environment, whereas EF, EPI, and NCI are limited to calculating the environmental output of the economy. These indicators provide an interesting example of how to acknowledge the environmental performance of a country and to avoid the idea of a profit-driven economy but fail to provide a vision of human development.

Concerning the wellbeing indicators, the definition of wellbeing can vary across cultures and social contexts. Consequently, all the wellbeing-based indicators may be aligned with different notions and policy priorities. For instance, the definition of GPI shares common values with the notion of eco-efficiency, whereas the GNH index aligns with the post-growth paradigm given that it was designed to replace GDP. Moreover, each country has developed its own wellbeing-based indicator given the diversity of ways to define this concept. This represents a challenge because of the implicit social values within each indicator. Also, these indicators differ in the extent to which they are used. While ESPI is an experimental indicator that is not fully established, the other wellbeing indicators (GNH index, CIW, and GPI) are somewhat standard in their respective countries and exert a visible influence on the policy debates where they are implemented. One common observation among all the wellbeing-based indicators is that they diverge in how to operationalise the notion of wellbeing, reflecting different conceptions of this concept. For instance, the CIW includes elements such as democracy, or leisure time, whereas the ESPI focuses on elements such as unemployment or poverty. Another characteristic from most of the wellbeing-based indicators, namely GNH, CIW, GPI and ESPI, is that they place some emphasis on the environment, whether through operationalising and including environmental performance, or by considering metrics reflecting the quality of the environment and nature.

Overall, it seems clear that whilst there are limitations associated with the existing stock of macroeconomic indicators, taken together or in combination, they provide a more comprehensive picture of the economy than GDP, as framed by the three pillars. Namely, these indicators reflect critical elements of the economy, such as the use of materials, the achievement of global goals towards a sustainable development, and the preservation of the environment, and they attempt to conceptualise socially relevant ideas, such as social progress, wellbeing, or

happiness. From an instrumental point of view, these indicators can provide critical insights for the development of new indicators to overcome the productivism paradigm associated with GDP, and to enable the development of more ambitious notions of the CE.

Taking a performative stance now, it is clear from the preceding analysis that there are (at least) two broad groups of indicators, which cut across pillars, and reflect differences in underlying assumptions. Gasparatos (2010) suggests that indicators are effectively value articulating institutions (Vatn, 2005) that adhere to embedded worldviews about what is important to measure and how to measure it even if this is not always explicit. On the one hand, the EU Resource Efficiency Scorecard, the OECD Green Growth Indicators and the GPI accord with the concept of eco-efficiency and the broader notion that environmental and social impacts can be monetised and subject to trade-offs, usually via market mechanisms. As a result, these approaches lead us to perform a very specific type of CE, and one that is ideologically aligned with neoclassical economic theory. In their recent paper, Bauwens et al. (2020) articulated four different plausible circular futures, one of which, circular modernism displays a clear faith in technology, markets and consumerism to lead the transition to circularity. It is just such a scenario that is likely to be performed when the focus is on the EU Resource Efficiency Scorecard, the OECD Green Growth Indicators and the GPI (and GDP), a reductionist scenario that is characterised by eco-modernism and the idea of 'green growth.'

On the other hand, indicators such as the Circularity Gap and the GNH do not reflect the same productivism approach. As we have seen, the Circularity Gap measures physical quantities and does not attempt to commensurate these using a monistic numeraire. In a philosophical sense, the GNH is similar in that it attempts to measure social progress in a context that is defined by "sufficient levels" of happiness, which itself depends on minimum conditions. What we have, therefore, is indicators that are not as sympathetic to competitive markets and that, as a result, leads us to perform alternative and (some might say) more ambitious versions of the CE. For example, Bauwens et al. (2020) define a bottom-up sufficiency scenario, which is critical of the eco-efficiency agenda and more attuned to the de-growth literature. Indeed, the primary focus in this scenario is on reducing resource consumption rather than increasing resource productivity. Consequently, higher R strategies – such as refuse, reduce and reuse – are privileged. In such a context, where economic growth in no longer the priority, "it is conceivable that this scenario is more likely to focus on resilience and ecological integrity rather than cost-based notions of efficiency" (Lowe and Genovese, 2022, p.10). As a result, indicators that observe thresholds and limits may be the most compatible and thus most able to enact such alternate and ambitious visions of the CE.

Reflecting on these underlying assumptions helps us to design indicators in a more thoughtful and impactful way, considering their potential performative impact. Indeed, to really to be able to disrupt the omnipotence of GDP and help us to address what kind of world we want, as Gasparatos (2010) says, the selection of indicators "needs to be consistent with the values of affected stakeholders" (p.1613). Therefore, given the selection of any indicator is contingent on a set of societal values and public objectives, the scrutiny of these potential indicators should be opened to the general public and their design should allow civil society to determine the main priorities based on their own needs. In this sense, the case of the CIW of Canada provides a good example of how to develop an indicator engaging civil society organisations and scholars to provide a new macroeconomic logic. More specifically, most of the indicators analysed are complex and multicriteria indicators, which aim to complement GDP.11 Examples of this are the CIW, GPI, ESPI, and the SDIs. These indicators allow complex and multi-

[11] To date, only the GNH index has been used to replace GDP.

dimensional phenomena to be summarised. However, incorporating diverse criteria into a single measurement needs an approach to balance elements such as resource efficiency and environmental and social factors in a way that is widely accepted in different contexts, and it is in this respect that affected stakeholders also need to be considered.

In addition, though, there is clearly a tension here: such complex indicators take a holistic approach, but their very complexity may mean that the indicator does not become ontic in the same way that GDP has done i.e., it does not end up substituting for the goal it is meant to represent and thus does not impact the anticipated stakeholders. This represents a dilemma for policy makers who may rightly be wary of the tendency to search for one single almighty indicator given that the CE is more inclined towards an understanding of the economy as a system of complex social relations embedded into broader ecological system. Furthermore, this view could be reinforced given the role of power relations in defining the abstractions that indicators come to represent.

Where does that leave us then? Picking up on this idea of power relations, perhaps the real challenge is not replacing or augmenting GDP per se but making sure that the reductive influence of an indicator or indicators does not end up serving the primary interests of the powerful and therefore simply measuring what is acceptable rather than what is necessary to achieve our ambitions (Hale et al., 2019). As part of this, we must recognise that the tendency to utilise a pillar-based approach, whilst intuitive as an organisational device, can reinforce ontological boundaries and exacerbate inequities given that this masks how these silos are "often overlapping, co-constructed, and experienced differently in local experience" (Ibid, p.49). Moreover, such an approach risks stymying the emergence of new priorities beyond the pillars such as social resilience, cultural preservation or geopolitical safety. Therefore, to obtain performative impact in a positive sense, impact that goes far beyond what indicators are meant to represent.

10.5 Conclusion

The CE is an essentially contested concept which has increasingly become associated with ecomodernism and a concomitant focus on GDP growth rather than the displacement of primary production. Consequently, the ontic nature of GDP – whereby it "substitute[s] for individual, household, community and national wellbeing" – goes unchallenged by this dominant and reductionist conception of circularity (Hale et al., 2019). This is the starting point for this paper, which aimed to analyse how alternative and more ambitious conceptions of a CE can be more or less determined by the way in which we frame, measure and envision the broader macroeconomy. In other words, we have sort to assert a performative approach to macroeconomic indicators and think about how these can help us create the world we want and one that is more attuned to Polanyi's (1977) substantive understanding of human economic activity.

With this in mind, this paper analysed 12 macroeconomic indicators across three pillars that have been used to define a CE – resource efficiency, environmental sustainability, and social wellbeing – and which together provide a broader conception of macroeconomic logic that includes environmental and social elements. These indicators have all been developed and implemented by international organisations, civil society organisations, and public institutions, thus providing a relevant track record and a practical appreciation of the approaches in these three areas that are currently available. As described earlier, this is a practical exercise in taking stock of what indicators

are available now and how these might be augmented further in the future to provide a more hospitable context within which an ambitious CE might be furthered

The 12 indicators were discussed in instrumental terms (i.e., the extent to which their merits and demerits allow us to measure the three pillars that we focused on) and in performative terms (i.e. how the indicators allow us to transcend a reductionist view of the CE and further alternative CE visions). Overall, we suggested that despite significant limitations, the indicators reflect critical elements of the economy missed when giving pre-eminence to GDP, and thus provide guidance for the development of new indicators to overcome the productivism paradigm characteristic of GDP. However, in addition, reflecting on the performative potential of indicators, we suggested that this allows us to design indicators in a more thoughtful and impactful way. Indeed, the potential for performative impact demands that the design of indicators is opened to affected stakeholders, not least to ensure that the reductive power of indicators does not end up going unquestioned and serving the interests of the powerful.

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