



Full length article

Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations

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ABSTRACT

So far, organizations had no authoritative guidance on circular economy (CE) principles, strategies, implementation, and monitoring. Consequentially, the British Standards Institution recently launched a new standard “BS 8001:2017 – Framework for implementing the principles of the circular economy in organizations”.

BS 8001:2017 tries to reconcile the far-reaching ambitions of the CE with established business routines. The standard contains a comprehensive list of CE terms and definitions, a set of general CE principles, a flexible management framework for implementing CE strategies in organizations, and a detailed description of economic, environmental, design, marketing, and legal issues related to the CE.

The guidance on monitoring CE strategy implementation, however, remains vague. The standard stipulates that organizations are solely responsible for choosing appropriate CE indicators. Its authors do not elaborate on the links between CE strategy monitoring and the relevant and already standardized quantitative tools life cycle assessment (LCA) and material flow cost accounting (MFCA).

Here a general system definition for deriving CE indicators is proposed. Based on the system definition and the indicator literature a dashboard of new and established quantitative indicators for CE strategy assessment in organizations is then compiled. The dashboard indicators are mostly based on material flow analysis (MFA), MFCA, and LCA. Steel cycle data are used to illustrate potential core CE indicators, notably, the residence time of a material in the techno-sphere (currently 250–300 years for steel). Moreover, organizations need to monitor their contribution to in-use-stock growth, a central driver of resource depletion and hindrance to closing material cycles.

1. Introduction

Over the last decade, the circular economy (CE) concept has spurred a large movement towards the decoupling of economic development from natural resource use. Circular economy regulations at the national and international levels are now in place in China (“Circular Economy Law of the People’s Republic of China,” 2008; McDowall et al., 2017; Yuan et al., 2006; Zhijun and Nailing, 2007) and in the EU (European Commission, 2015). CE was acknowledged as a significant concept to facilitate the efficient and cyclical use of resources by the G7 Alliance (G7 Ministers, 2016). For the national, regional, and industrial park levels comprehensive sets of CE performance indicators exist (EASAC, 2016; Geng et al., 2012; Li et al., 2010; Su et al., 2013), though most of these indicators are actually resource efficiency metrics. So far, however, only some concrete (e.g., EMF, 2015a; Griffiths and Cayzer, 2016; Linder et al., 2017; Saidani et al., 2017) and no authoritative

guidance on CE principles, strategies, implementation, and monitoring was given at the organizational and product system levels (EASAC, 2016; Ghisellini et al., 2016; Giurco et al., 2014; Saidani et al., 2017).¹ To fill that gap the British Standards Institution has developed and recently, in May 2017, launched a new standard “BS 8001:2017 – Framework for implementing the principles of the circular economy in organizations – Guide” (BSI, 2017a).

This work offers a critical appraisal of the BS 8001:2017 from the perspective of environmental systems analysis (Section 2), a dashboard of existing and new CE performance indicators at the organizational and product system levels (Section 3), quantitative examples of CE indicators and constraints for the bulk materials steel, cement, and aluminum (Section 4), and a few closing reflections (Section 5). For each of the subtopics the relevant literature is summarized separately. The remainder of Section 1 provides background information.

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¹ Organizations can be companies, corporations, authorities, charities, institutions, and more (BSI, 2017).

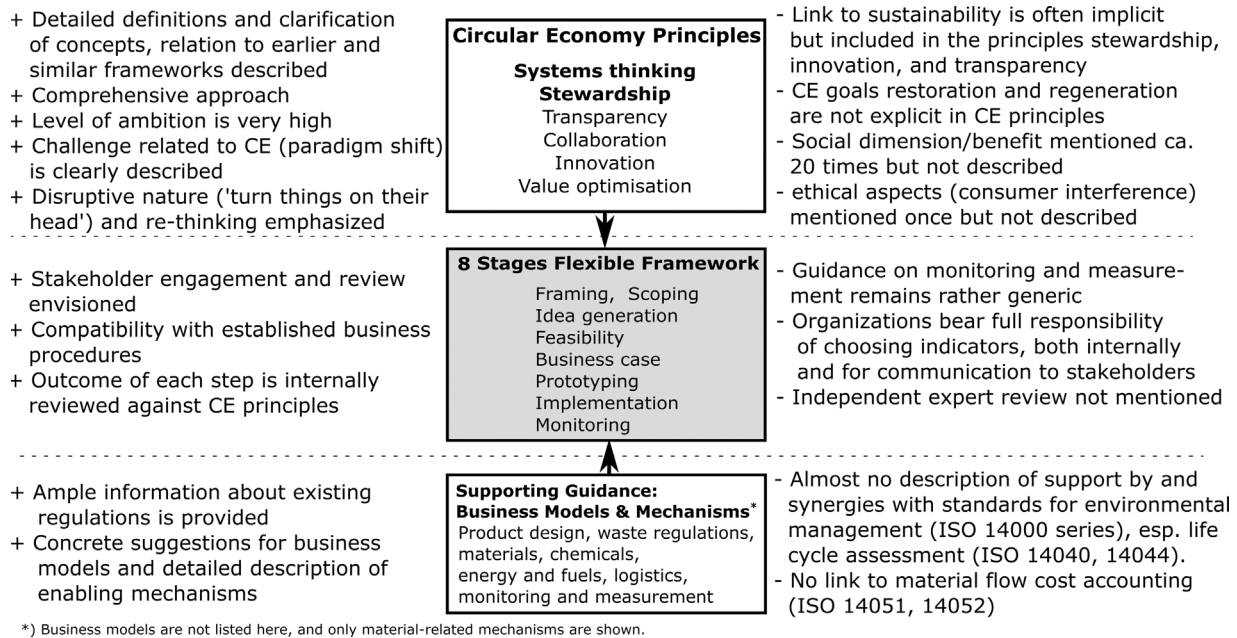


Fig. 1. Overview of the structure and the major categories used in the Circular Economy Standard BS 8001:2017 (middle), as well as a list of strengths (left) and weak points (right) of the standard in light of its overall ambition.

1.1. Circular economy, sustainable development, and the need for a standard

At the practical level, the CE framework is a combination and acceleration of strategies developed and tested under different existing systems approaches (EMF, 2015b). At the intellectual level, it can be seen as *umbrella concept* offering a new framing of existing strategies “by drawing attention to their capacity of prolonging resource use as well as to the relationship between these strategies” (Blomsma and Brennan, 2017). The exact relation between CE and sustainable development remains ambiguous (see Geissdoerfer et al. (2017) and Sauvé et al. (2016) for a detailed comparison of the two concepts) but there is a general understanding that both CE and sustainable business practice require a systems perspective on the role of businesses in the wider system of stakeholders and the environment (Murray et al., 2017). In China “circular economy (CE) has been chosen as a national policy for sustainable development” (Geng et al., 2012).

CE can be seen as part of a wider movement towards sustainable business practice (Kopnina and Blewitt, 2014). “The circular economy is not a new concept. It blends the principles of multiple schools of thought, some of which date back to the 1960s” (BSI, 2017a). The intellectual roots of CE include the 3R principle (reduce, reuse, recycle), regenerative design, performance economy, cradle-to-cradle, blue economy, green growth, natural capitalism, and biomimicry (BSI, 2017a; EMF, 2013; McDonough and Braungart, 2002) as well as the scientific fields industrial ecology, industrial symbiosis studies, and ecological and environmental economics (Andersen, 2007; Ghisellini et al., 2016). The evolution of the CE concept, its links to established research fields, and its current implementation in national policy in different countries have been described in detail (Banaité, 2016; BSI, 2017a; Cullen, 2017; Geissdoerfer et al., 2017; Ghisellini et al., 2016; McDowall et al., 2017; Murray et al., 2017; Su et al., 2013; Winans et al., 2017). The CE describes a theoretical optimum, similar to a 100% mass, energy, or exergy efficient system (Cullen, 2017). It is a counter-

principle to the often prevailing disposal-after-use consumption pattern and to uncapped growth of in-use stocks. Our current socioeconomic metabolism is far away from a closed cycle: Globally, in 2005, about 62% of all raw materials processed by the global economy were throughput, and the complement, about 38%, were added to stock, but only about 6.5% of the materials processed stemmed from recycled waste or scrap (Haas et al., 2015). The eventual impact of the CE movement on closing material cycles is yet unknown. A recent assessment of CE strategies finds a positive but limited effect on raw material demand (Fellner et al., 2017), and another study demonstrates that the global implementation of core CE strategies can lead to savings of 6–11% of the energy used to support economic activity (Cooper et al., 2017). An estimate of the impact of material efficiency in the steel cycle on material flows and GHG emissions, which includes more ambitious changes than those investigated by Cooper et al., shows that, in case of a quick strategy roll-out, a 50% emissions cut could be possible (Milford et al., 2013). In that case no new blast furnace would need to be erected for the next 60 years. It was argued that rebound effects (Zink and Geyer, 2017) and demonstrated that labor taxes (Skelton and Allwood, 2013) may partly offset the theoretical gains of CE strategies.

To seize the resource and greenhouse gas (GHG) emissions savings potential of CE strategies their underlying principles must be integrated into both: national policy and legislation and business practice (Lieder and Rashid, 2016). Linking CE with business practice requires specific business models supported by a framework capturing the CE principles (Lieder and Rashid, 2016; Witjes and Lozano, 2016). Mendoza et al. (2017) assess four existing business frameworks (sustainable business model innovation, closed-loop systems, product-service systems (Tukker, 2015), and sustainable product design) against the CE goals formulated by the Ellen MacArthur Foundation (EMF) (EMF, 2015b). They find that no business model is compatible with or contains all CE goals and conclude that further framework development is needed.

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