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Framework for implementing the principles of the circular economy in organizations – Guide

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Contents

Summary of pages

This document comprises a front cover, and inside front cover, pages i to iv, pages 1 to 81, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 May 2017. It was prepared by Technical Committee SDS/1/10, *Sustainable resource management*. A list of organizations represented on this committee can be obtained on request to its secretary.

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Although this British Standard is primarily intended to be used in the UK, it is expected that many of its provisions and guidance will be applicable in other jurisdictions.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Section 1: General

0 Introduction

0.1 Overview of this British Standard

This British Standard is intended to help organizations and individuals consider and implement more circular and sustainable practices within their businesses, whether through improved ways of working, providing more circular products and services or redesigning their entire business model and value proposition.

This standard aims to provide a framework and guidance to a broad range of organizations, of differing sizes and with varying levels of knowledge and understanding of the circular economy. Starting with smaller, "quick-win" type initiatives can be a good way for organizations new to the circular economy to gain relevant experience and confidence.

The standard is divided into two areas:

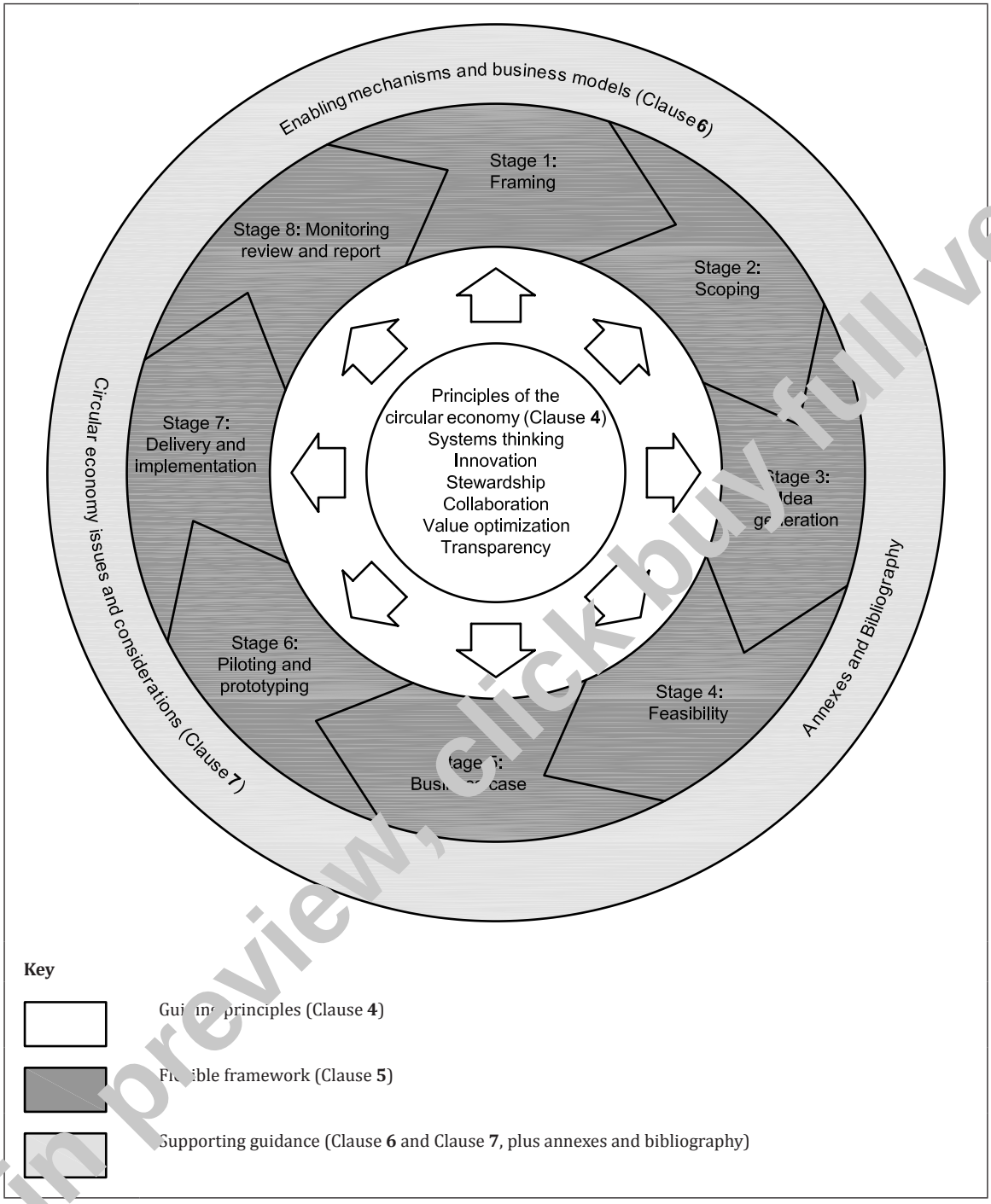
1) What is the circular economy and why move to a more circular and sustainable mode of operation? Clause **3** aims to help organizations improve their understanding of the circular economy and how it might be relevant.

2) How to implement the principles of the circular economy within an organizational context? These sections form the majority of the standard and Figure 1 provides an overview of the key elements which are classified as "Guiding principles", "Flexible framework" and "Supporting guidance".

   - Guiding principles: Clause **4** outlines the principles of the circular economy which underpin the flexible framework and provides a strategic frame of reference for how closely decision making and activities align with the guidance provided.
   - Flexible framework: Clause 5 provides a flexible framework for organizations to use to determine the extent to which they intend to implement the principles of the circular economy and transition to a more circular and sustainable mode of operation.
   - Supporting guidance: Clause **6** and Clause **7** provide supporting guidance and are intended to be read alongside Clause **5**. These clauses provide guidance on enabling mechanisms and business models that can support the transition to a more circular and sustainable mode of operation, as well as key factors which it might be relevant to consider when using the framework.

Many elements of the framework and guidance have been developed by drawing on experiences and lessons learned from a range of organizations, both small and large, attempting to become more circular. Many aspects mirror what could be thought to be the basics of good sustainable business practice, but in this standard they are solely being examined from a circular economy perspective.

Figure 1 — *Overview of the framework for implementing the principles of the circular economy*



0.2 General

Natural resources, including materials, water, energy and fertile soil, are the basis for sustaining society. However, the activities of the large and growing human population is rapidly eroding many of the world's natural resources, while a large part of an increasingly urban global population is still struggling to meet basic needs.

Over the next 30 to 40 years unprecedented volatility and uncertainty seems likely. The global population is estimated to increase to around 8 billion by 2030, probably to over 9 billion by 2050, with increases in average wealth further raising the demand for products and services. As a result,

competition for land, water and energy could intensify while the effects of climate change are likely to become increasingly apparent. Over this period, organizations are likely to face technological disruption, increasing trade barriers and intense competition for a wide range of material resources that become less easily available (which might also be due to geopolitical factors). Even today, some materials, such as rare earth elements and other critical raw materials, are already subject to supply pressure and price volatility.

To ensure the availability of resources in the future, current patterns and volumes of production and consumption need to change dramatically so that they are brought back. within planetary boundaries. To do this while continuing to thrive as a society, a complete re-think of how things are done is needed. Transitioning to a circular economy could offer a significant contribution to solving the emerging resource and climate problems and create opportunities for shared value.

In an organizational context, the circular economy refers to a systemic approach to the design of processes, products/services and business models, enabling sustainable economic growth by managing resources more effectively as a result of making the flow of materials more circular and reducing and ultimately eliminating waste. The energy required to fuel this needs to be extremely efficient and renewable by nature. As a term, the circular economy is increasingly gaining traction in business as more organizations recognize that the traditional, linear "take, make, use, dispose" (or "cradle to grave") economic model is potentially reaching its limits and that availability of cheap, easily accessible materials and energy can no longer be taken for granted. The economic benefits of improved circularity of resource use are also increasingly being recognized and acted upon by governments around the world (see, for example, the *EU action plan for the circular economy* [1]).

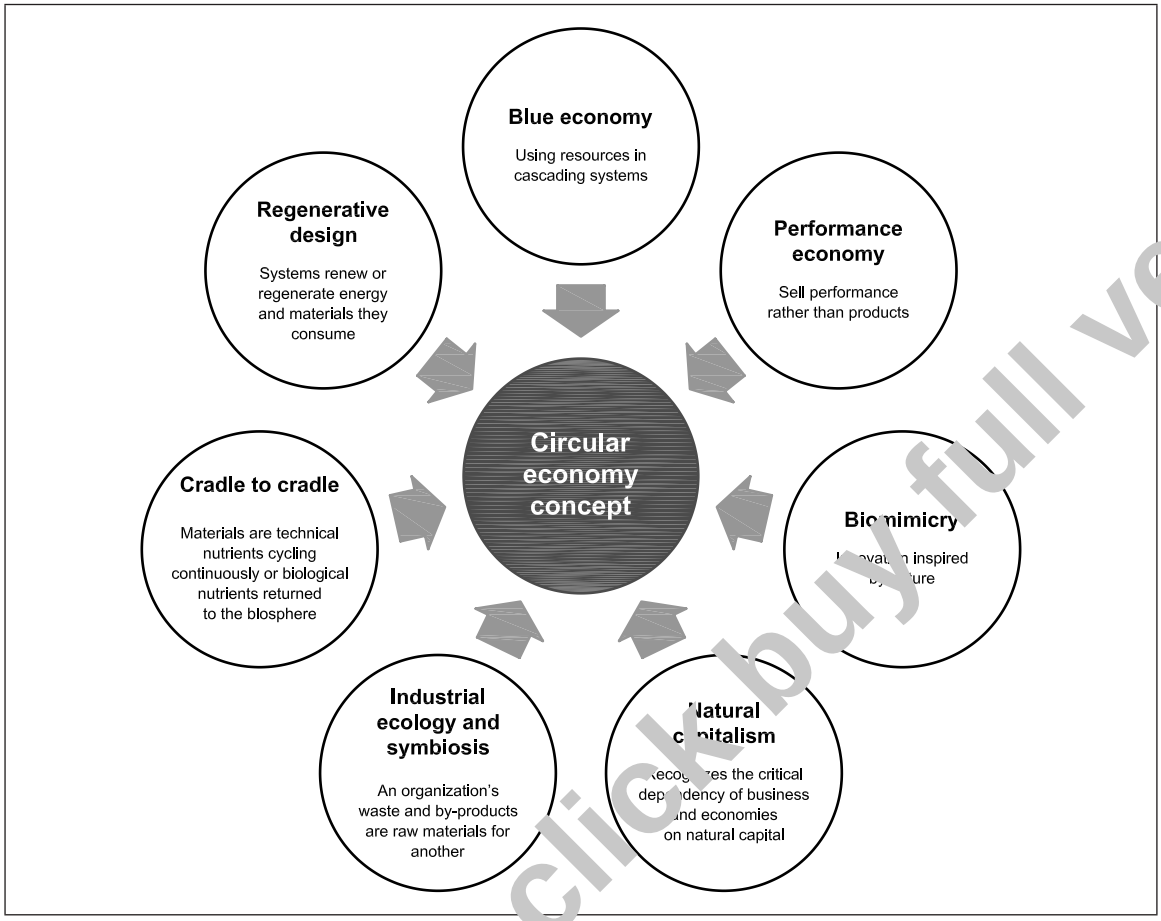
The circular economy is not a new concept. It blends the principles of multiple schools of thought, some of which date back to the 1960s. These include: industrial ecology and symbiosis, performance economy, biomimicry, cradle to cradle, blue economy, regenerative design and natural capitalism (see Figure 2). More recently, the Ellen MacArthur Foundation (EMF) has been widely credited as playing a pivotal role in engaging the business, policy and education community, focusing on the key pressure points and levers that can accelerate the transition to a circular economy.

NOTE See the following publications for further information on these schools of thought: Graedel and Allenby, 2002 [2] and Ayres and Ayres, 2002 [3] for industrial ecology; Chertow, 2007 [4] for industrial symbiosis; Stahel and Redray, 1976 [5] and Stahel, 2006 [6] for performance economy; Benyus, 1997 [7] for biomimicry; McDonough and Braungart, 2008 [8] and McDonough and Braungart, 2013 [9] for cradle to cradle; Pauli, 2010 [10] for blue economy; Lyle, 1996 [11] for regenerative design and Hawken, Lovins and Lovins, 2010 [12] for natural capitalism.

Because the idea of a circular economy proposes a real paradigm shift and a different way of thinking about the economy, it cannot easily be reduced to one simple definition. As a result, there are various interpretations of the idea across organizations, together with an abundance of terminology, often misused or used interchangeably. This adds to the complexity of the concept, which can in turn deter organizations seeking to improve how they manage resources.

This British Standard focuses on the circular economy as it is relevant for organizations. The central tenet is to take full advantage of the reusability of products, components and materials, the restorative and regenerative capacity of natural resources and to optimize value creation (both directly and indirectly). It is an approach which promotes optimal use of resources, reuse, repair, refurbishing, remanufacture and the recycling of materials and products (shown conceptually in Figure 3), as well as the preservation and regeneration of natural capital by returning biological nutrients into the biosphere. Process and product or service design and innovation (e.g. for repair, reuse, recyclability) can be complemented by business model design and innovation using approaches such as performance-based models to manage how products and materials circulate within the system.

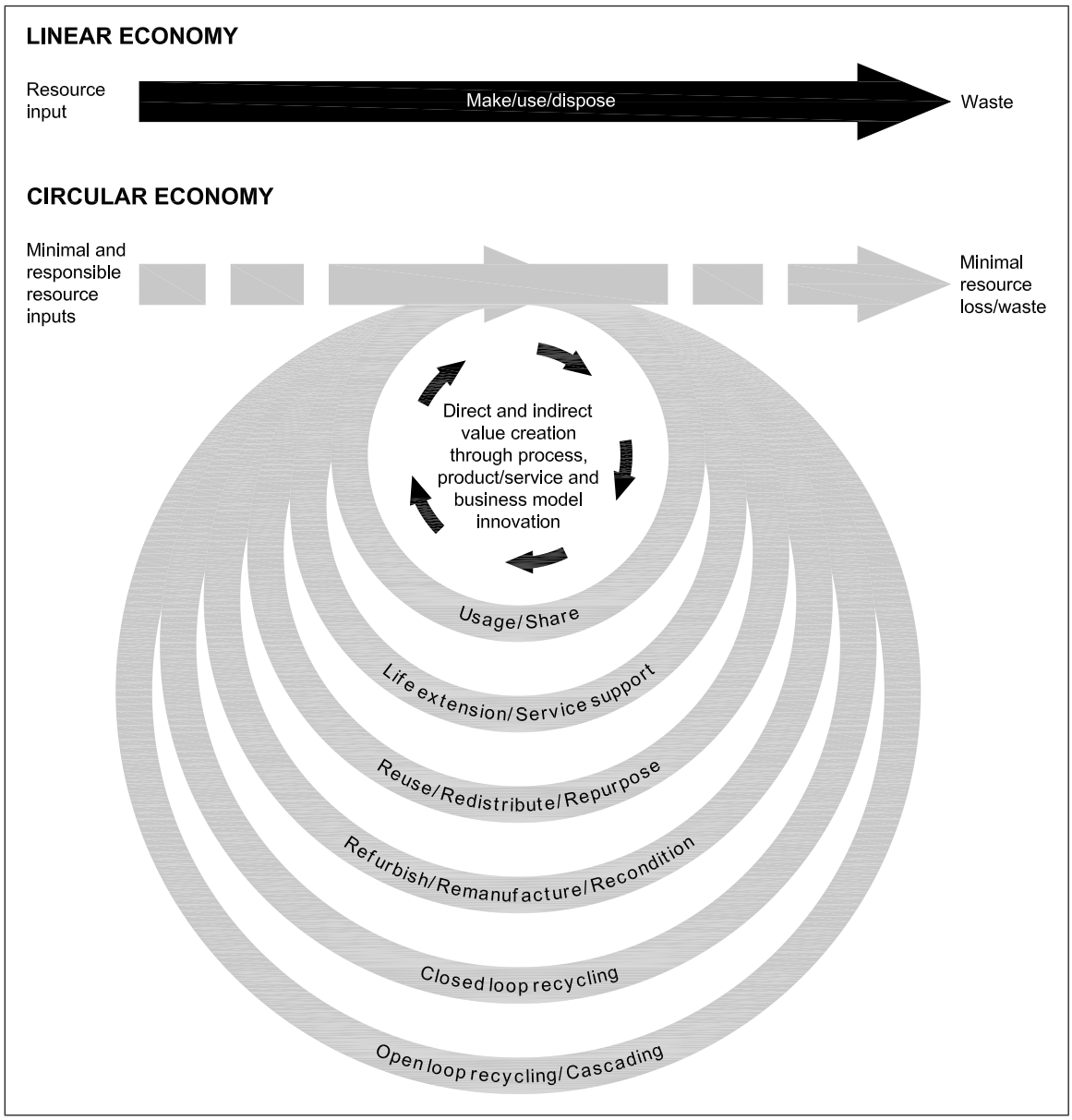
Figure 2 — *Circular economy schools of thought*



In theory, the smaller the loop (activity wise and geographically) the more profitable and resource efficient it is likely to be. For example, it might be that the nearer to their original state products, components and materials can be kept the more value can be captured through the avoidance of processing, transport and other costs. However, in practice, which loop is best for an organization depends on the specific circumstances and a wide range of business risks or consequential impacts need to be considered (e.g. sourcing and geopolitical risks, energy usage and costs, environmental and social impacts, complexity, geographic scope, organizational capability, economic viability/return on investment).

In the circular economy, materials should not be discarded as wastes, but treated as raw materials with inherent value. The prevailing policy and legislative landscape, changing economics and emerging technologies can ultimately play a major part in deciding how far the transition to full reuse and recovery of material can be achieved. Ultimately, the circular economy is about organizations "turning things on their head" and completely re-thinking how resources are managed in order to enhance financial, environmental and social benefits, both in the short and long term.

Figure 3 — *The circular economy at a glance – optimizing value creation through circularity*



0.3 Relationship with resource efficiency

Resource efficiency needs to be embodied within a circular economy approach. Whilst resource efficiency and the circular economy are sometimes referred to interchangeably, there are some distinct differences. Resource efficiency does not necessarily challenge the linear model of consumption and production.

Resource efficiency is a broad umbrella term used to describe efforts to reduce the total environmental impact of the consumption and production of products and services, from raw material extraction to final use and disposal. In a materials context, it is concerned with the efficient use of materials, waste prevention and reduction, and causing minimal damage to the environment and depletion of natural resources. It means doing more with less and delivering greater value with less input.

Organizations might become more resource efficient through relatively simple, incremental actions. A circular economy takes a whole systems perspective, where resources are systematically restored or regenerated. It means being more effective and optimizing how resources are managed

across their life cycle in order to have a positive impact on the natural environment and society. Implementing its principles in an organization might require a paradigm shift in how an organization operates.

0.4 Relationship with zero waste

Over the last few decades, zero waste has become an aspirational goal for transitioning from a "throw-away" society. Several high profile businesses around the world have set zero waste targets, orientated predominately around sending nothing to landfill. A number of cities around the world have also adopted zero waste goals as part of their waste management strategies.

Zero waste is a philosophy that encourages the re-design of resource life cycles so that all materials and products are reused or recycled. It discourages the use of waste to energy, incineration or landfill, and ultimately seeks to eliminate the concept of waste altogether. In practice however, the concept can be perceived as waste focused and has been applied loosely and inconsistently. For example, zero waste claims have been made solely on the basis of 100% landfill diversion made possible by relying disproportionately on waste to energy or by not reporting wastes generated throughout the supply chain.

NOTE For further information on zero waste, see <http://zwia.org> [last viewed 9 May 2017].

Whilst zero waste does not necessarily lead to more circular solutions, if applied with the right mind-set the concepts are complementary and it is possible to progressively step towards a circular economy.

0.5 Relationship with the bioeconomy

The bioeconomy or bio-based economy refers to parts of the economy that use renewable resources which are biological in nature from land and sea (such as crops, forests, fish, animals and microorganisms) to produce food, materials and energy.

The bioeconomy is defined by the origin of the resources, not their management or use. Biological resources can be used or reused to make new products, components or material (e.g. paper or card) or returned to the biosphere in a way that rebuilds natural capital (through composting or anaerobic digestion, for instance).

The circular economy covers all renewable and non-renewable resources. There is a perception that the bioeconomy is inherently circular because biological resources are renewable. In practice, it can be quite linear because it is possible for resources to be used faster than they are replenished and might not be returned safely and appropriately to the biosphere to rebuild natural capital. However, a circular bioeconomy has a major role to play in helping the transition away from using fossil and other finite resources through the provision of bio-based products which can managed via the biological or technical cycles.

0.6 Relationship with lean thinking

Lean thinking describes a holistic continual improvement approach to creating more value for customers with fewer resources. Lean organizations aim to use fewer human resources, less material to create products, less time to develop them and less energy and space to produce them. Lean is focused on customer demand and developing high quality products and services in the most effective and economic way. Although lean thinking is most commonly associated with manufacturing and production, it can be applied to all aspects of an organization including internal functions, supply chains and the organization's wider value chains.

Lean thinking has enabled many organizations to deliver high-quality products and services at lower cost. However, this does not necessarily mean that circular opportunities will be identified and acted upon and lead to positive systemic change.

Whilst the circular economy and lean thinking both aim to eliminate waste, they approach it from different perspectives. Lean focuses on removing anything that does not add value to the customer, whereas the circular economy is about re-thinking and optimizing how resources are managed to create value in its broadest sense. However, as with many initiatives, what's achieved very much depends on the organization's level of ambition. If approached with the right mindset, the circular economy could be a natural extension of lean thinking. It would involve thinking systemically about how resources are or could be managed. Many of the tools and techniques advocated by lean thinking (e.g. value stream analysis and future state mapping) have the potential to be adapted in this regard. It is also likely that implementing the principles of the circular economy would enhance lean outcomes.

0.7 Outcomes

This British Standard aims to give guidance to organizations of all types and sizes, wherever they are in the world, on the steps they can take to transition to a more circular and sustainable mode of operation. Specifically, it aims to provide organizations with an understanding of:

a) what the circular economy is and how it might be relevant both now and in the future; and

b) how to implement the principles of the circular economy in order to create direct and indirect value as a result of process, product or service or business model innovation.

Implementing the principles of the circular economy offers organizations an opportunity to re-think how they do business, potentially enabling them to be more circular, sustainable and competitive. For example, business opportunities could arise from understanding resource use and adopting new ways of working, both internally and across the value chain.

Progress can be achieved through:

1) the identification and effective management of current and future business impacts, risks and opportunities to improve resilience, avoid environmental harm and drive societal benefits;

2) making the most of resources while minimizing the production of waste (e.g. ensuring unused and/or unwanted items are returned to productive use);

3) strengthening relationships through effective collaboration with the value chain;

4) developing trust and confidence through greater accountability and transparency; and

5) using the principles of the circular economy as a framework for improving or completely changing the value proposition as a result of stimulating learning and innovation, thereby enabling the organization to begin to transition to a more circular and sustainable mode of operation if it makes sense to do so. An example of this is illustrated in Annex A.

1 Scope

This British Standard provides a framework for and guidance on implementing the principles of the circular economy within organizations. This guidance is intended to apply to any organization, regardless of location, size, sector and type.

2 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

2.1 accession

legal principle whereby the ownership of a product carries with it the right to ownership of any new components or materials that are added to the product

2.2 anaerobic digestion

process of controlled decomposition of biodegradable materials under managed conditions where free oxygen is absent, at temperatures suitable for naturally occurring mesophilic or thermophilic anaerobic and facultative bacteria species that convert the inputs to biogas and whole digestate

NOTE 1 Digestate can provide nutritional benefits to plants grown in soils that have had digestate (whole or separated) applied and can reduce the use of artificial fertilizers significantly dependent on the soil type.

NOTE 2 Digestate that meets approved quality standards can be viewed as a form of open loop recycling.

[SOURCE: PAS 110:2014, **3.2**, modified]

2.3 assemble

bring components together and fit them into a specified configuration

[SOURCE: BS 8887-2:2009, **3.2**]

2.4 backcasting

working backwards from a desired future state of a process, product, service or organization (or aspects thereof) to determine both its feasibility and what actions need to be taken to reach that state

2.5 bill of materials

record of the component parts and materials used to make the product

NOTE 1 Bill of materials or BOM come in different formats (e.g. electronic or hand-written).

NOTE 2 A BOM would generally include some or all of the following details:

- *product description;*
- *unique parts and components including quantity;*
- *materials and substances (including substance names, weight and concentrations thereof) for each unique part and component;*
- *weight of each unique part and component; and*
- *total weight of product.*

NOTE 3 Where they exist, safety data sheets (though useful) are unlikely to provide complete materials information.

2.6 biodegradable

capable of undergoing biologically-mediated decomposition

NOTE 1 Biodegradation can be aerobic, if oxygen is present, or anaerobic, if oxygen is not present.

NOTE 2 Not all biodegradable products, materials or components are compostable.

