SUPPLY CHAIN
Resilience Hub

WMG
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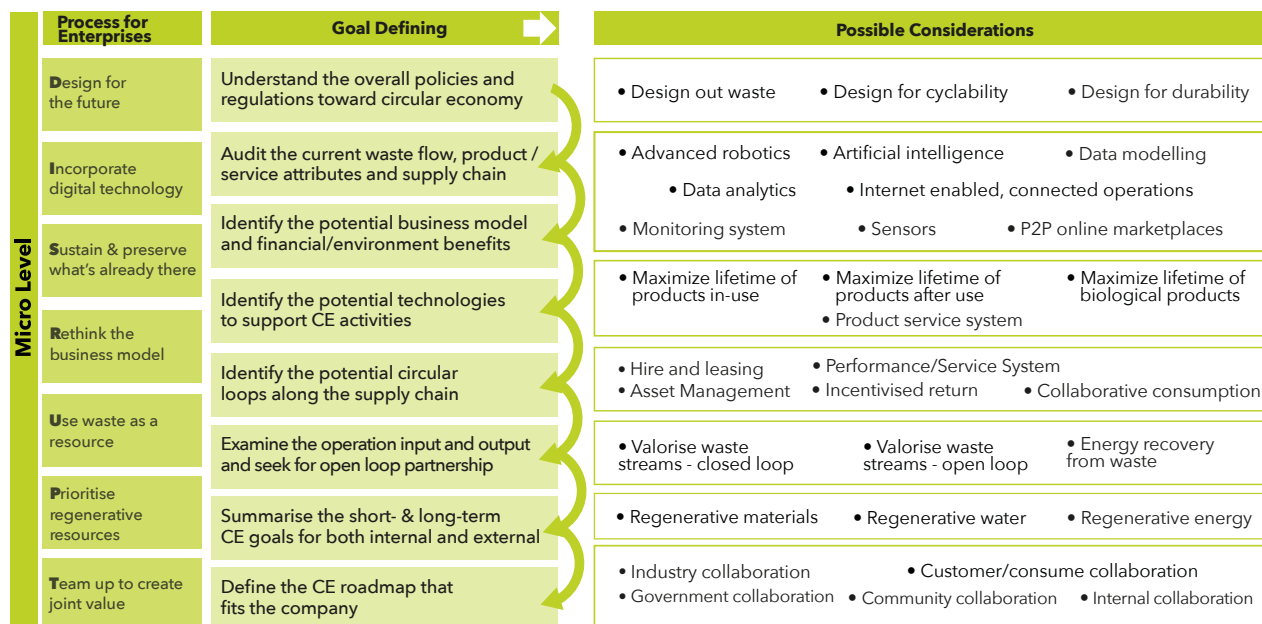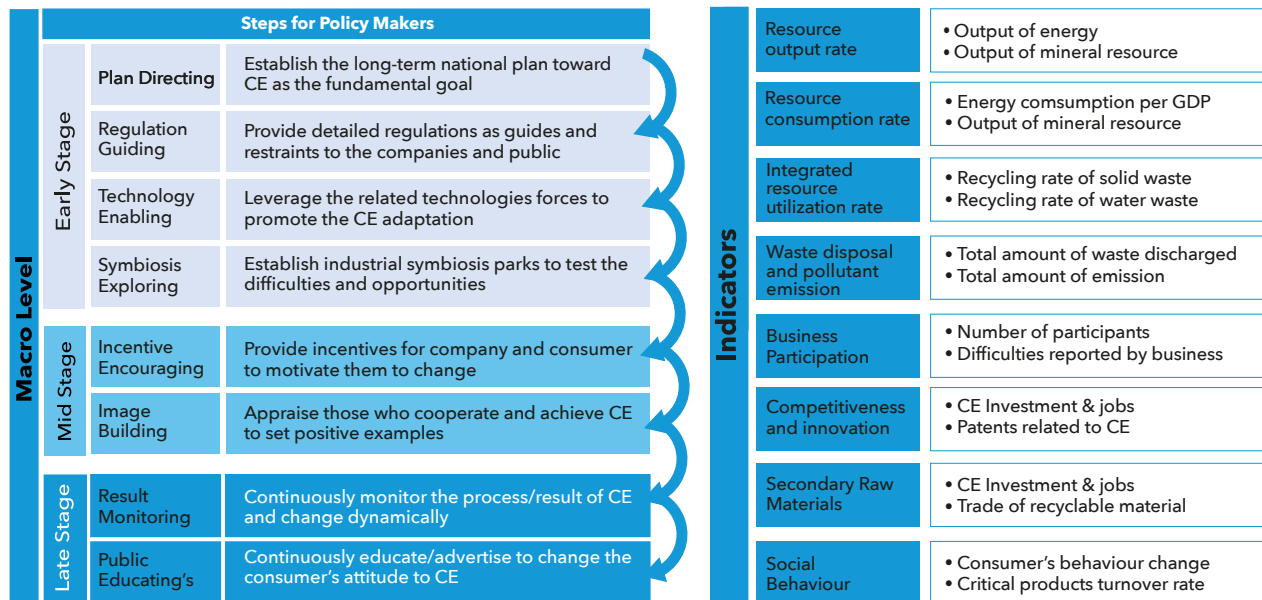
Circular Economy Methodology

Introduction

The circular economy (CE) is gaining recognition as a solution to current environmental challenges. This system seeks to reduce waste and pollution by promoting reuse, repurpose, and recycling of resources. It represents a departure from the traditional linear economy model of take-make-dispose to a more sustainable and regenerative model that maximises the use of resources and minimises the extraction and use of finite resources. By adopting CE principles, businesses can reduce waste, increase resource efficiency, and create new business opportunities while promoting social and economic inclusion. The CE model can also help create a more sustainable and resilient economy and reduce the environmental impact of industrial production.

This report provides an overview of the CE methodology, its principles, and its potential benefits for businesses and society. It also examines the challenges and opportunities associated with transitioning to a CE model and highlights examples of CE practices suitable for various industries. By embracing this model, businesses and society can create more sustainable and regenerative economic systems.
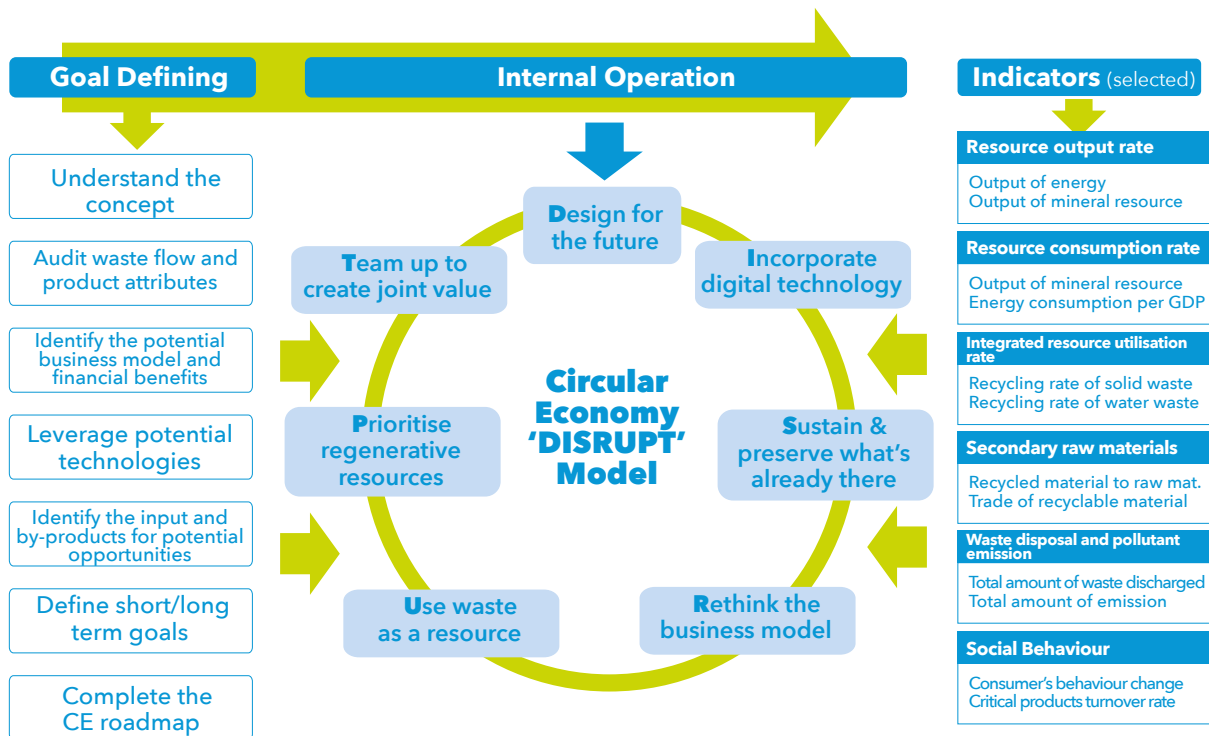
Overall Framework

The overall framework contains more details and best practices for companies/policymakers to utilise to achieve a CE.

Macro Level

Steps for Policy Makers

Early Stage	Plan Directing	Establish the long-term national plan toward CE as the fundamental goal
	Regulation Guiding	Provide detailed regulations as guides and restraints to the companies and public
	Technology Enabling	Leverage the related technologies forces to promote the CE adaptation
	Symbiosis Exploring	Establish industrial symbiosis parks to test the difficulties and opportunities
Mid Stage	Incentive Encouraging	Provide incentives for company and consumer to motivate them to change
	Image Building	Appraise those who cooperate and achieve CE to set positive examples
Late Stage	Result Monitoring	Continuously monitor the process/result of CE and change dynamically
	Public Educating's	Continuously educate/advertise to change the consumer's attitude to CE

Indicators

Resource output rate	• Output of energy • Output of mineral resource
Resource consumption rate	• Energy comsumption per GDP • Output of mineral resource
Integrated resource utilization rate	• Recycling rate of solid waste • Recycling rate of water waste
Waste disposal and pollutant emission	• Total amount of waste discharged • Total amount of emission
Business Participation	• Number of participants • Difficulties reported by business
Competitiveness and innovation	• CE Investment & jobs • Patents related to CE
Secondary Raw Materials	• CE Investment & jobs • Trade of recyclable material
Social Behaviour	• Consumer's behaviour change • Critical products turnover rate

Micro Level

Process for Enterprises	Goal Defining	Possible Considerations
Design for the future	Understand the overall policies and regulations toward circular economy	• Design out waste • Design for cyclability • Design for durability
Incorporate digital technology	Audit the current waste flow, product / service attributes and supply chain	• Advanced robotics • Artificial intelligence • Data modelling • Data analytics • Internet enabled, connected operations • Monitoring system • Sensors • P2P online marketplaces
Sustain & preserve what's already there	Identify the potential business model and financial/environment benefits	• Maximize lifetime of products in-use • Maximize lifetime of products after use • Maximize lifetime of biological products • Product service system
Rethink the business model	Identify the potential technologies to support CE activities	
Use waste as a resource	Identify the potential circular loops along the supply chain	• Hire and leasing • Performance/Service System • Asset Management • Incentivised return • Collaborative consumption
Prioritise regenerative resources	Examine the operation input and output and seek for open loop partnership	• Valorise waste streams - closed loop • Valorise waste streams - open loop • Energy recovery from waste
Team up to create joint value	Summarise the short- & long-term CE goals for both internal and external	• Regenerative materials • Regenerative water • Regenerative energy
	Define the CE roadmap that fits the company	• Industry collaboration • Customer/consume collaboration • Government collaboration • Community collaboration • Internal collaboration

Circular Economy Methodology

As the CE methodology aims to guide business and society, it is separated into two parts: Micro Level and Macro Level.

Micro Level:

▶ The goal-defining process is a crucial first step towards achieving a CE. Start from understanding the CE concept. Then, investigate the current situation of the company, and identify how businesses and other stakeholders can establish a shared vision, create accountability, foster collaboration, encourage innovation, and drive progress towards a more sustainable and regenerative economic model. Remember to set clear and measurable goals.

▶ The DISRUPT Framework is beneficial for all stakeholders who wish to transition to CE. The prominence of the strategies inside the DISRUPT Framework might vary based on the product stakeholder's departmental priorities and the product's own characteristics. By including this variation, the framework may serve as a mechanism for connecting stakeholders and departments around circular initiatives.

▶ Unlike carbon emissions that can be quantified, the value generated by implementing initiatives underpinned by CE principles is difficult to measure. This CE methodology contains a list of indicators which can be used as monitoring points over the CE transition period. Those indicators can be adapted both at the micro (business) and macro (society) levels.

Macro Level:

Plan Directing:	Establish the long-term national plan towards CE as the fundamental goals.
Regulation Guiding:	Provide detailed regulations as guides and restraints to the companies and public.
Technology Enabling:	Leverage the related technologies forces to promote the CE adaptation.
Symbiosis Exploring:	Establish industrial symbiosis parks to test the difficulties and opportunities.
Incentive Encouraging:	Provide incentives for both company and consumer to motivate them to change.
Image Building:	Appraise those who cooperate and achieve CE to set positive examples.
Result Monitoring:	Continuously monitor the process/result of CE and change dynamically.
Public Educating:	Continuously educate/advertise to change the consumer's attitude to CE.

▶ In the early stage, policymakers must ensure the national and international regulations are underpinned by CE principles.

▶ Many companies believe technology adaptation is an enabler to achieving CE. By creating policies that support the use of sustainable technologies, policymakers can encourage businesses to shift towards circular business models, which can reduce waste and resource consumption while promoting economic growth.

▶ Explore different types of industrial symbiosis opportunities to reduce waste and then scale up successful examples of collaboration between different industries. Businesses lack success in industrial symbiosis stories and duplicate them. By testing and refining different types of symbiosis, businesses can optimise resource use, reduce waste, and create new opportunities for value creation.

- Policymakers should also consider rewarding early adopters. Incentives such as tax breaks, grants, and subsidies can encourage businesses to invest in circular solutions, while image-building campaigns can increase the awareness of a wider society and promote circular values.
- Continuously monitoring the result helps to measure progress towards CE goals and identify areas for improvement. It allows for the assessment of the environmental, social, and economic impacts and guides future decision-making and policy development that can support the scaling up of CE initiatives.
- As the CE also involves the participation of end consumers, public education is crucial for achieving a CE as it helps to raise awareness among consumers about the importance of resource efficiency and waste reduction. By educating consumers on the benefits of circular business models, such as product reuse, repair, and recycling, businesses can encourage consumers to make more sustainable choices.

Loughborough Business School is the natural choice for purpose-led people and organisations who want to align their success with the needs of communities and the planet.

We are sharing and shaping the newest ideas to help tackle some of the world's biggest problems.

By transforming theory into practice, and forging deep partnerships with purpose-driven organisations, our academics are pushing forward innovations that are changing business – and the world – for the better.

The Supply Chain Resilience Hub is part of WMG at the University of Warwick and supported by the WMG Centre High Value Manufacturing Catapult.

An academic department of the University of Warwick, WMG is a world leading research and education group.

WMG has internationally recognised facilities and expertise in supply chain operations and organisational transformation. Our supply chains research group applies customer responsive supply chain theory into practical solutions that generate both economic and societal value.

Collaborating with industrial partners, we seek to resolve complex business and organisational problems across agrochemcials, automotive, defence, consumer-packaged goods, retail and pharmaceuticals.

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Getting in touch:

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