

KEY SUSTAINABILITY PRINCIPLES

How sustainable is your product from the circular bioeconomy?





KEY SUSTAINABILITY PRINCIPLES

These sustainability principles were created to guide companies at the start of their journey in understanding the relevant circular bioeconomy principles and trade-offs.

The principles are built around four key pillars:

1. Circular bioeconomy; 2. Environmental value; 3. Societal value; 4. Corporate & stakeholder value.

Each of these pillars is made of a list of critical and supporting factors that should form part of a holistic trade-off assessment. A sustainability assessment, such as a life cycle assessment, can help gather the required information to address the criteria. The evaluation should occur over the whole life cycle and possibly value chain and must include sustainability aspects such as material type (bio-based versus fossil-based), overall resource intensity, emissions, durability, reuse options, or human behavior, and also social aspects such as effects on employment, living conditions, and food availability.





Four key principles to ensure a superior sustainability and economic performance of products from the circular bioeconomy.

SUSTAINABILITY PRINCIPLES

PRINCIPLES

1. CIRCULAR BIOECONOMY

Biological resources are renewable, regenerated sustainably, reused, and recovered

Bio-based resources

 a) Use bio-based raw materials

Circular^a resources

- b) Ensure circularity of product
- c) Design waste out of the system
- d) Use resources at highest cascading level possible^b

2. ENVIRONMENTAL VALUE

Environmental services and values are maintained, conserved, and/or enhanced; negative environmental impacts are avoided, reduced, or restored

Energy and climate

- a) Emit less emissions (GHG emissions, air pollution) compared to alternatives
- b) Provide opportunities for carbon storage and sequestration

Nature

- c) Avoid, reduce, and restore any negative environmental externalities
- d) Maintain, conserve, and enhance biodiversity

Water

e) Improve water management practices compared to alternatives

3. SOCIETAL VALUE

Societal value is maintained or enhanced for employees, communities, customers, and consumers across the whole supply chain

Employees/Communities

- a) Respect workers' rights and well-being across the value chain
- b) Ensure safe employment conditions
- c) Provide equal and fair payment
- d) Ensure a diverse and inclusive workforce
- e) Support (impacted) communities

Consumers

- f) Safeguard consumer welfare
- g) Provide accurate product transparency

4. CORPORATE & STAKEHOLDER VALUE

Long-term economic viability is maintained or enhanced while providing value for corporate and societal stakeholders

Economic feasibility

- a) Assess the technical feasibility
- b) Ensure a positive business case
- c) Confirm support by existing and future policies/regulations

Stakeholder value

- d) Adhere to existing certifications or go beyond
- e) Create transparency, traceability, and establish required collaborations





1. CIRCULAR BIOECONOMY

Biological resources are renewable, regenerated sustainably, reused and recovered.

BIO-BASED RESOURCES

The vast majority of raw materials come

from sustainably managed, continuously

renewable agriculture, forestry, or aquatic

regenerated by natural systems at a rate

that is securing a constant, productive,

population and in line with the Planetary

Make use of secondary biomass where

and healthy stock of the raw material/

a) Use bio-based raw materials

All bio-based resources used are

sources

Boundaries

possible

b) Ensure circularity of product

Value chain/cycle

The product is designed in a way that makes it repairable, usable for long periods of time, reusable, renewable, refurbishable, remanufacturable, and recyclable or compostable at the end of its lifetime

The product cyclability is not destroyed or diminished at a later point in the value chain/cycle

During production of the product, closed resource loops for energy, water, and waste are ensured

The product life cycle is extended by repairing, reusing, upgrading, and reselling

The raw materials of the product are recovered, recycled, and/or composted at the end of the product's total life

Business model

Instead of ownership, paid product access is offered, allowing the company to retain the benefits of circular resource productivity or ownership to increase product use

Product users are connected to one another to encourage shared use, access, or ownership to increase product use

c) Design waste out of the system

Minimize waste (sourcing, production, use, end-of-life), ideally less waste is produced compared to non-bio-based substitutes (or similar levels)

Waste to landfill is minimized

CIRCULAR

RESOURCES

d) Use resources at highest cascading level possible

Resources are used at the highest cascading level possible (e.g., no downcycling/energy recovery of resources if not required; virgin material only used if there is no suitable secondary material alternative)

- Critical factors (as many of these as possible should be fulfilled)
- Supporting factors (some of these should be fulfilled)





2. ENVIRONMENTAL VALUE

Environmental services and values are maintained, conserved, and/or enhanced; negative environmental impacts are avoided, reduced or restored.

	ENERGY AND CLIMATE	• NAT	URE	
	a) Emit less emissions compared to alternatives	c) Avoid, reduce, and restore any negative environmental impacts	d) Maintain, conserve, and enhance biodiversity	
	Energy & GHG emissions	Land/Forest/Marine environment	Rare and threatened species are protected	
	Less scope 1 and 2 GHG emissions are released compared to non-bio-based alternatives (or similar levels) ¹	The land use does not compete with food production Deforestation in the supply chain is	High Conservation Value (HCV) areas are protected and/or restored	
	Less scope 3 GHG emissions are released across the supply chain compared to non-bio-based alternatives	rigorously traced and eliminated No natural forest/habitat is converted	No net biodiversity loss is secured on a regional basis	
	(or similar levels) ¹ Renewable energy sources are used	to other land uses (e.g., plantations/ grazing)	Biodiversity, including animal and plant species, wildlife habitats, and natural or ecological community types, is restored	
	as much as possible for energy consumption	Soil health and productivity is maintained or enhanced to prevent soil degradation	and improvements are measured and managed	
	GHG emissions are recycled or captured Air	Marine environments are protected	•—— WATER ——•	
	Less air emissions (non-GHG) and nanoparticles are released compared to non-bio-based alternatives (or similar levels)	Chemicals Use of sustainable chemicals as share of overall chemicals use is maximized Use of fossil-based chemicals is minimized	e) Improve water management practices compared to alternatives Less water is consumed compared to non-bio-based substitutes (or similar levels)	
	b) Provide opportunities for carbon storage and sequestration Use of natural climate solutions—i.e., restoration and creation of carbon-	Use of toxic chemical inputs is eliminated	Discharged water is cleaner compared to non-bio-based substitutes (or similar levels) as wastewater treatment is implemented	
	storing environments such as forests, mangrove swamps, peat bogs, salt marshes, and seagrass beds—is maximized		The risk of chemical runoffs is minimized	 Critical factors (as many of these as possible should be fulfilled) Supporting factors (some of these should be fulfilled)
	Carbon storage is measured and maximized		A context-based water stewardship approach is applied that conserves and protects groundwater and surface- water resources	BOSTON CONSULTING
				CONSULTING

The capacity of soils to hold water is

measured and improved



3. SOCIETAL VALUE

Societal value is maintained or enhanced for employees, communities, customers, and consumers across the whole supply chain.

EMPLOYEES/COMMUNITIES

a) Respect workers' rights and wellbeing across the value chain

Human & labor rights

Human, labor, land rights, and fundamental freedoms¹ of those affected by the product are respected, protected, and fulfilled

No child labor², forced labor, or human trafficking is practiced along the product's value cycle

Access to grievance resolution mechanisms is ensured for individuals affected by the product

Indigenous peoples' legal and customary rights of ownership, use, and management of land affected by the product are identified and upheld³

Labor associations and collective bargaining are allowed

Well-being

The social and economic well-being of workers and farmers is maintained or enhanced

Local skills of people producing the product are developed

b) Ensure safe employment conditions

Safe and healthy working conditions in line with the ILO conventions are ensured along the product's value cycle

c) Provide equal and fair payment

Salary across the product's supply chain is above the living wage adhering to geographical differences

Fair working hours are respected to produce product

Equal remuneration is ensured throughout the production process⁴

For the product, opportunities for economically disadvantaged individuals are created

d) Ensure a diverse and inclusive workforce

Discrimination on the basis of race, color, sex, religion, political opinion, and national extraction of social origin3 is eliminated

e) Support (impacted) communities

Adverse impacts on communities (from growing, producing, processing, or sales) are addressed through appropriate remediation processes

The social and economic well-being of local communities, including farmers, growers, and forest owners, is maintained or enhanced through the product

CONSUMERS

f) Safeguard consumer welfare

Consumer welfare is safeguarded and considered a top priority when designing, producing, and selling the product

g) Provide accurate product transparency

Product, processing, and raw material information is comprehensive, accessible, and understandable for consumers

- Critical factors (as many of these as possible should be fulfilled)
- Supporting factors (some of these should be fulfilled)





4. CORPORATE & STAKEHOLDER VALUE

Long term economic viability is maintained or enhanced, while providing value for corporate and societal stakeholders.

ECONOMIC FEASIBILITY

• STAKEHOLDER VALUE

a) Assess the technical feasibility

Analysis

The technical requirements for the production of the product are understood and can be realized sustainably (e.g., energy needs)

Production can be scaled up to fulfill expected demand (without overexploiting natural resources)

b) Ensure a positive business case

Market demand exists or is created through the new solution

A positive business case exists (e.g., based on one of the following points)

New markets and customer segments are entered

A competitive advantage can be established, e.g., through attracting and retaining talents and new customers

Regulatory, societal, and corporate risks (e.g., resource risks, supply chain risks, financial risks) can be mitigated

c) Confirm support by existing and future policies/regulations

Law compliance

The product complies with all applicable laws, regulations, and nationally-ratified international treaties, conventions, and agreements

Existing support

The product fulfills current standards (e.g., building material standards, fire standards), enabling potential users to switch

The product is supported by existing subsidies, tax breaks, etc.

Future support

The product will fulfill future likely regulations, reducing the user's risk to switch

Future regulations are likely to be implemented (e.g., alternative to product expected to be banned)

d) Adhere to existing third-party certifications or go beyond

Social: Raw material is certified by Fairtrade or a similar certification

Agriculture: Raw material is certified by the rainforest alliance, UTZ, RSPO, as organic or a similar certification

Forestry: Raw material is certified by FSC, PEFC, or a similar certification

Aquaculture: Raw material is certified by ASC, MSC, BAP, or a similar certification

Beyond: New product standards are actively supported and/or shaped

e) Create transparency, traceability, & establish required collaborations

Traceability/transparency of the product is guaranteed across the whole supply chain

Stakeholder dialogues concerning the product are organized

Partnerships established within supply chain

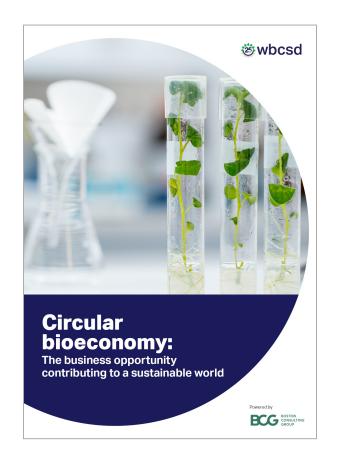
Partnerships established outside supply chain

- Critical factors (as many of these as possible should be fulfilled)
- Supporting factors (some of these should be fulfilled).





FOR MORE INFORMATION



Download the report <u>here</u>



...and start your journey!



