# Unit 2.2 Methodologies and tools

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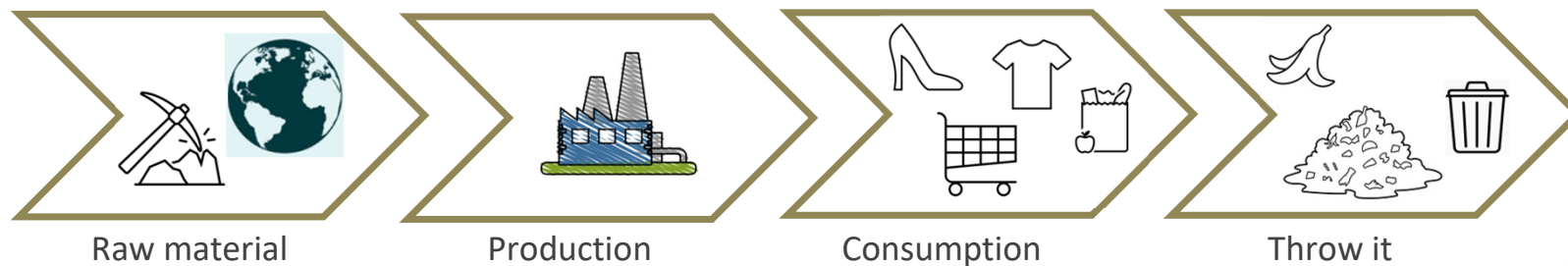
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## 2.2.1 Circular Economy (CE) concept

<u>Linear economy</u>

► To understand the CE concept, first it is important to understand our current economical system:

► Linear economy is a simple one-directional system[1]:

   ► Produce

   ► Consume

   ► Throw away
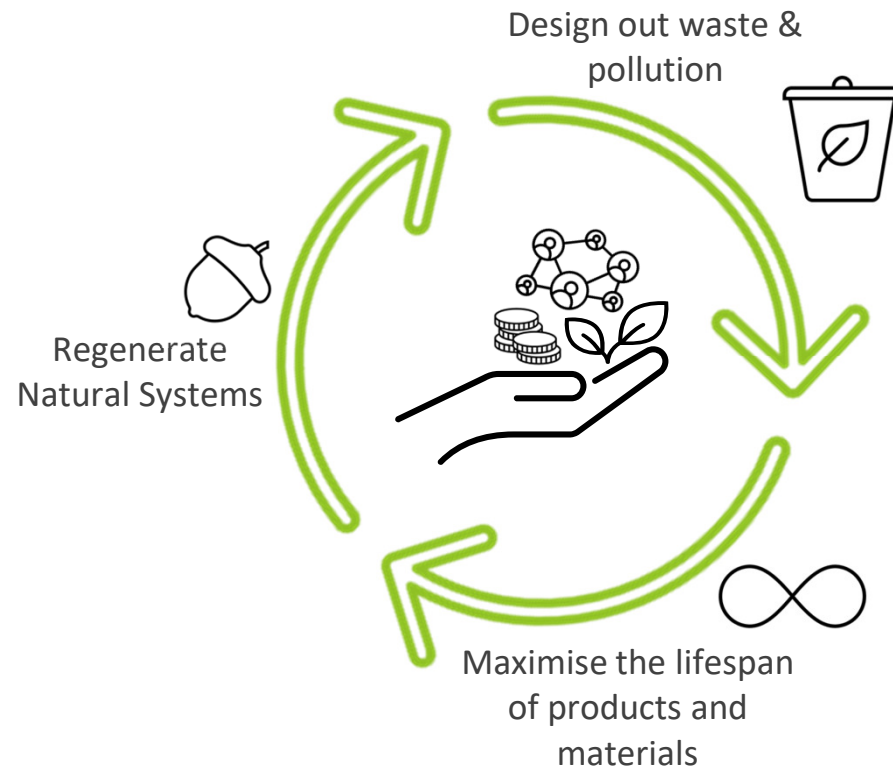


| Raw material | Production | Consumption | Throw it |

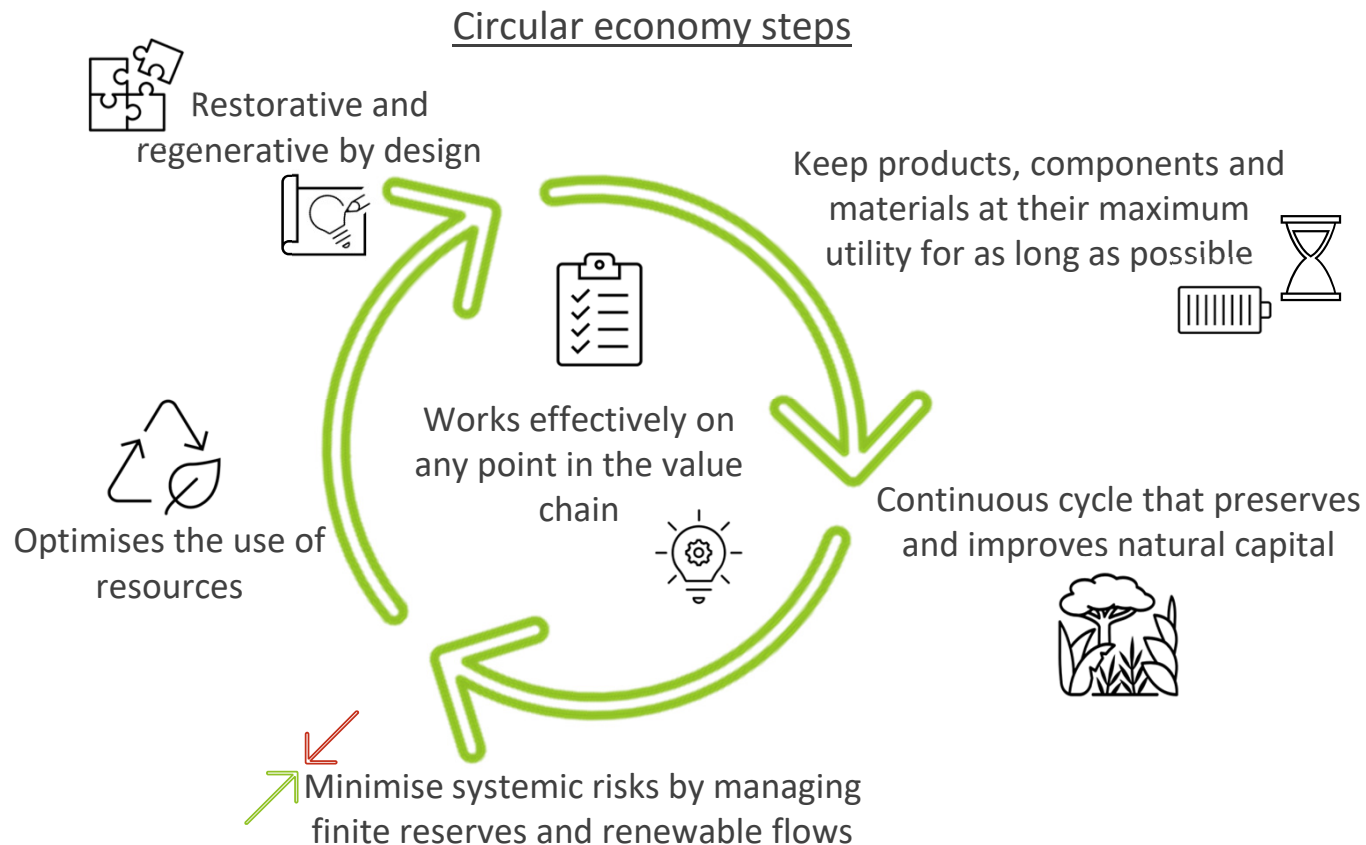## 2.2.1 Circular Economy (CE) concept

### Circular economy

► CE is a new system that allows to design, make, and use things respectfully within the planetary boundaries[2]

► CE is based on three principles[2]:

- Eliminate

- Circulate

- Regenerate

Design out waste & pollution

Regenerate Natural Systems

Maximise the lifespan of products and materials

# 2.2.1 Circular Economy (CE) concept

Circular economy steps



Restorative and regenerative by design

Keep products, components and materials at their maximum utility for as long as possible

Works effectively on any point in the value chain

Optimises the use of resources

Continuous cycle that preserves and improves natural capital

Minimise systemic risks by managing finite reserves and renewable flows

## 2.2.1 Circular Economy (CE) concept

# RETHINK $\longrightarrow$
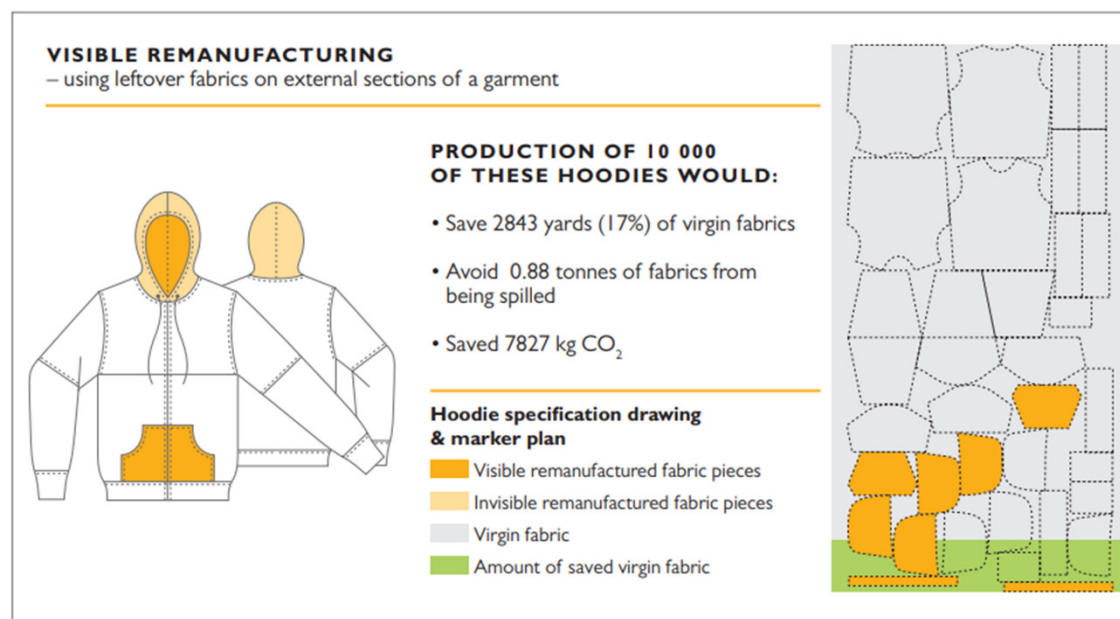


Click on the Picture to go to the video:
Re-think Progress

► Rethink materials and resources to avoid cost and scarcity risks

► Rethink waste → Create value

► Rethink how to break with the current economic model and turn the linear model into a circular model[3]

► Rethink to be:
  ► **Resilient**
  ► **Regenerative**
  ► **Relevant**

# 2.2.1 Circular Economy (CE) concept

▶ Example of Circularity analysis[4]



**VISIBLE REMANUFACTURING**
– using leftover fabrics on external sections of a garment

**PRODUCTION OF 10 000 OF THESE HOODIES WOULD:**

- Save 2843 yards (17%) of virgin fabrics
- Avoid 0.88 tonnes of fabrics from being spilled
- Saved 7827 kg $CO_2$

**Hoodie specification drawing & marker plan**

- Visible remanufactured fabric pieces
- Invisible remanufactured fabric pieces
- Virgin fabric
- Amount of saved virgin fabric

# 2.2.2 Main CE & LCA Methodologies

► How to apply the Circular Economy?
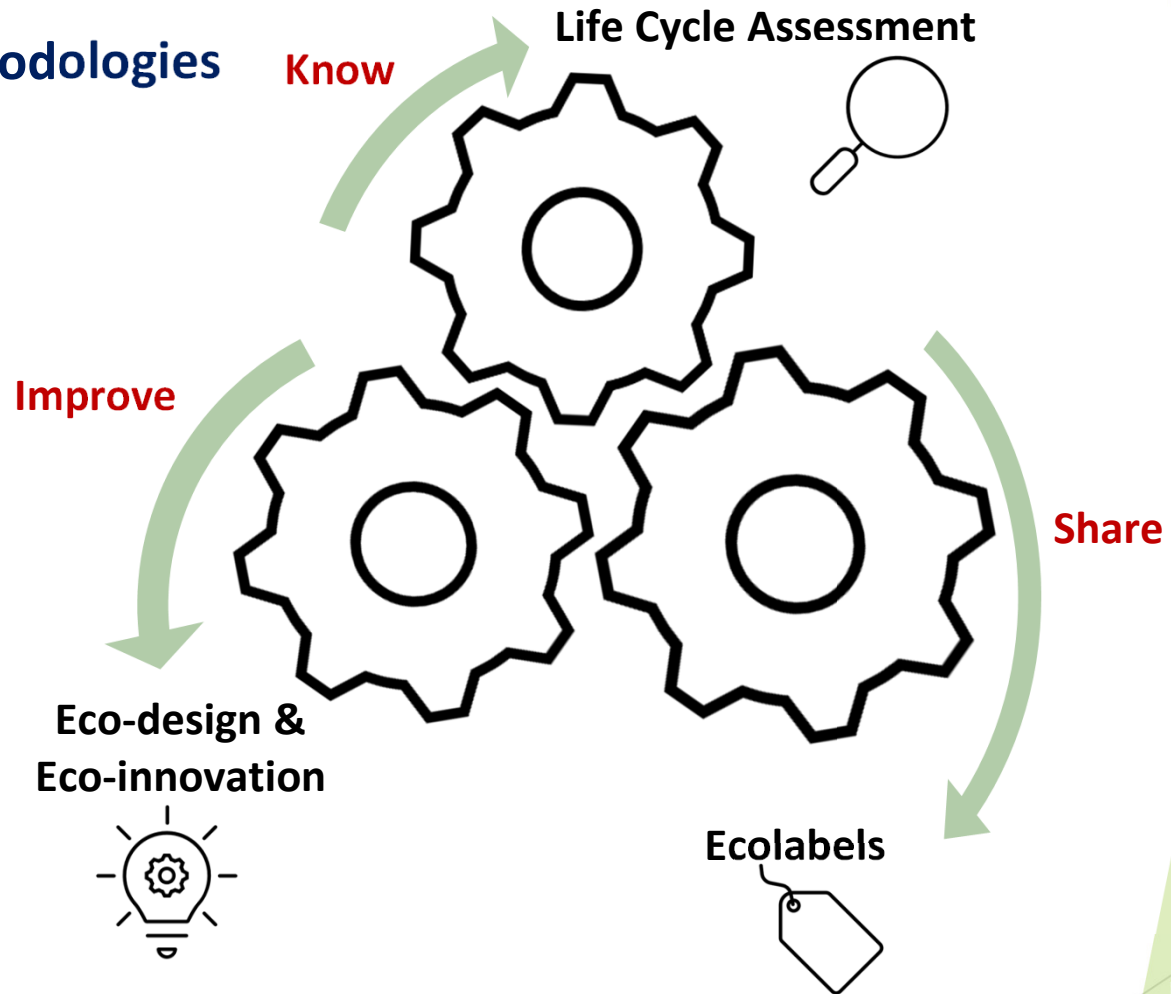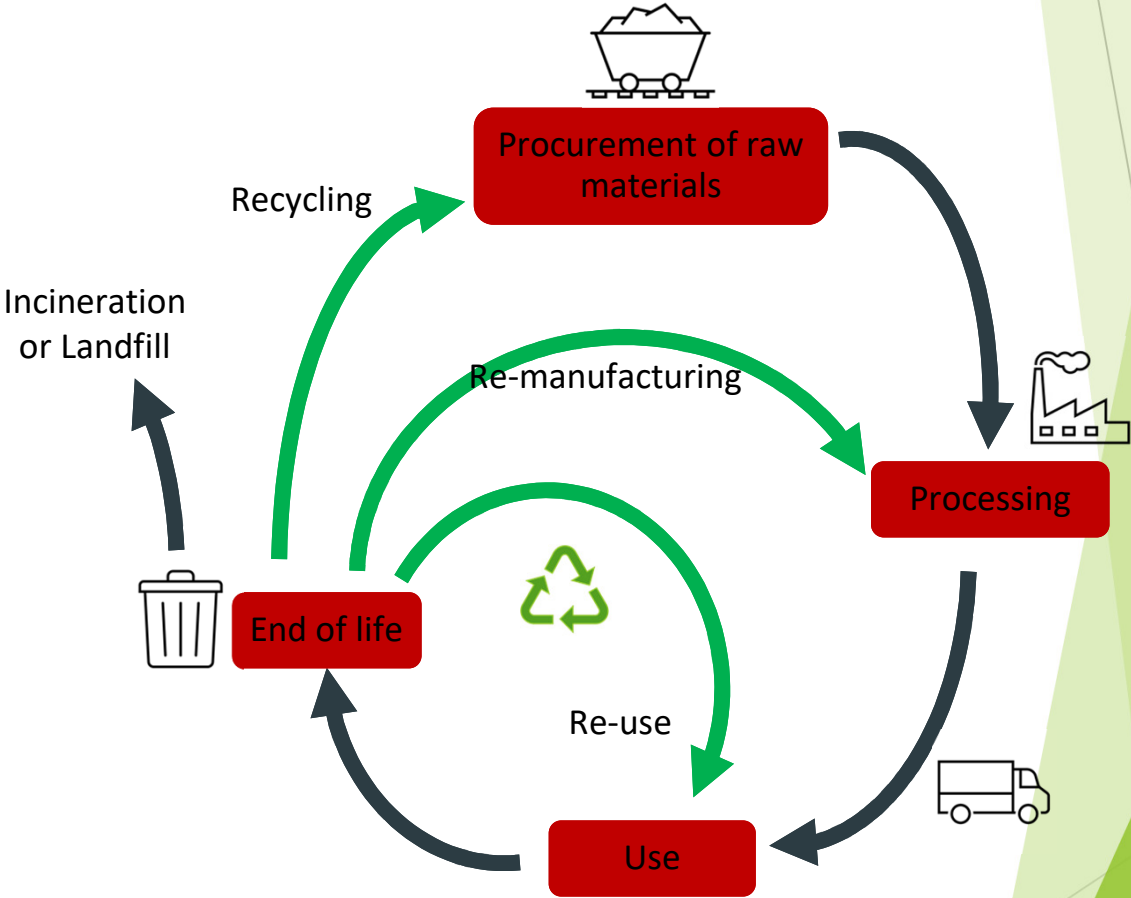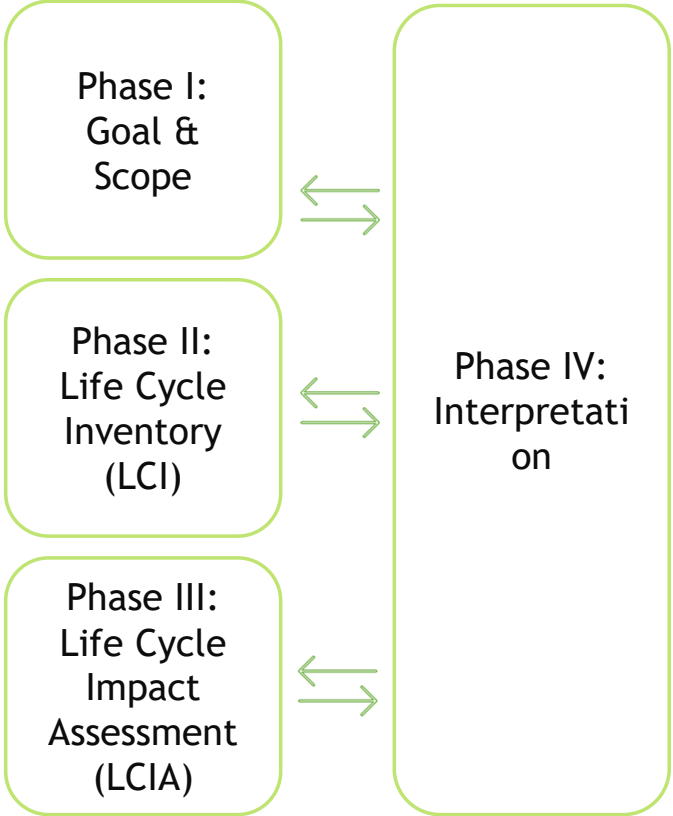
**Know** → **Life Cycle Assessment**

**Improve**

**Share**

**Eco-design & Eco-innovation**

**Ecolabels**

# 2.2.3 LCA Methodology

Phase I: Goal & Scope

Phase II: Life Cycle Inventory (LCI)

Phase III: Life Cycle Impact Assessment (LCIA)

Phase IV: Interpretation

Procurement of raw materials

Recycling

Incineration or Landfill

Re-manufacturing

Processing

End of life

Re-use

Use

## 2.2.3 LCA Methodology

✓ Definition of scope
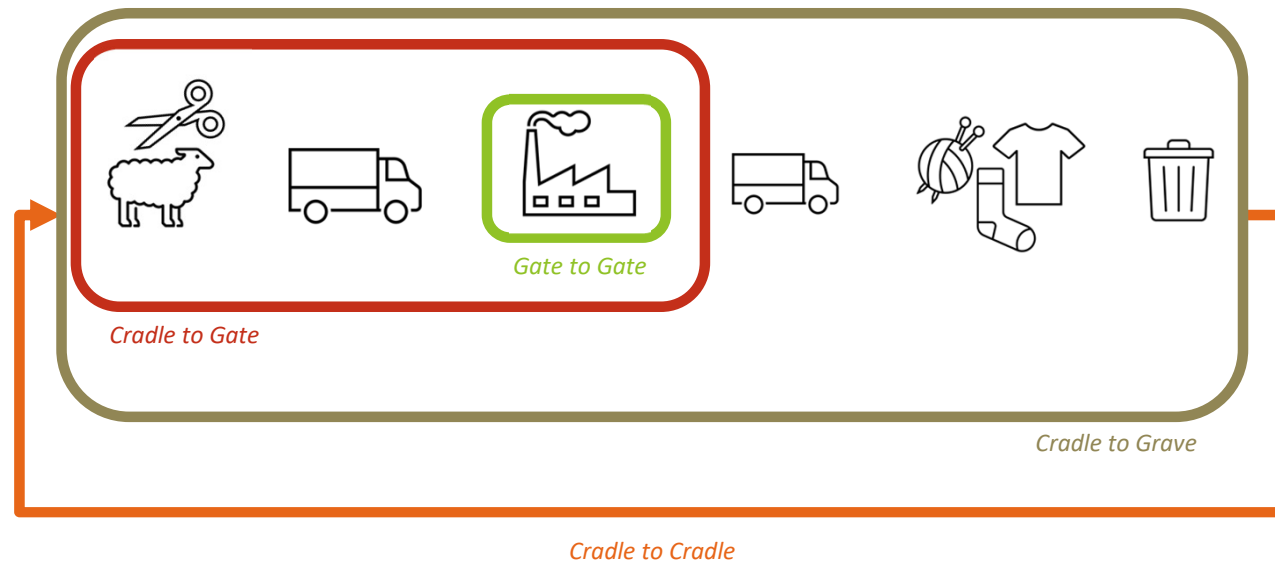
Environmental analysis
tools:

▶ Textile Overview[5]



*Cradle to Gate*

*Gate to Gate*

*Cradle to Grave*
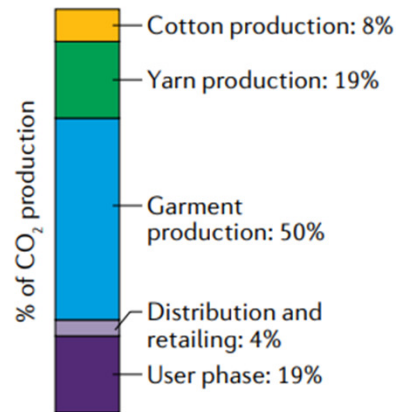
*Cradle to Cradle*

✓ Functional unit

## 2.2.3 LCA Methodology

► Example of LCA analysis[6]



**T-shirt**
kg $CO_2$ equivalent: 2.6

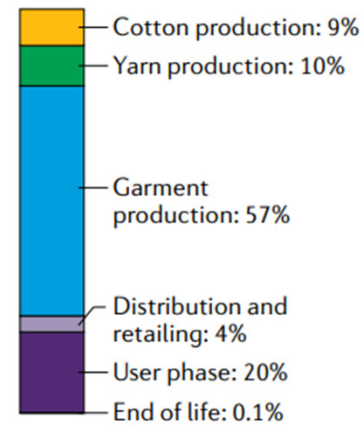12 m³ equivalent water scarcity (92%)

54 MJ energy consumption

% of $CO_2$ production
- Cotton production: 8%
- Yarn production: 19%
- Garment production: 50%
- Distribution and retailing: 4%
- User phase: 19%

**Jeans**
kg $CO_2$ equivalent: 11.5

55 m³ equivalent water scarcity (93%)

247 MJ energy consumption

- Cotton production: 9%
- Yarn production: 10%
- Garment production: 57%
- Distribution and retailing: 4%
- User phase: 20%
- End of life: 0.1%

## 2.2.4 Circularity Methodology

Environmental analysis tools:

▶ Material Circularity Indicator (MCI) $\longrightarrow$

"MCI allows to identify additional circular value from their production line (products and materials) and mitigate risks from material price volatility and material supply"[7]

It therefore focuses on the restoration of material flows at the product and service level and is based on the following six principles:

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| Sourcing biological materials from sustained sources | Using feedstock from reused or recycled sources | Keeping products in use longer. | Reusing components or recycling materials after the use of the product | Making more intensive use of products | Ensuring biological materials remain uncontaminated and biologically accessible |

## 2.2.4 Circularity Methodology

► How to calculate the MCI?[8]
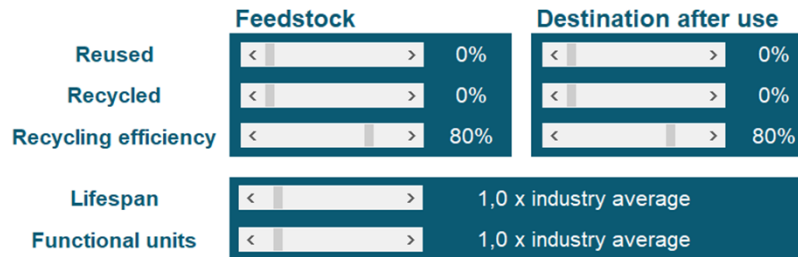
Computation of MCI:



| | |
|---|---|
| $V$ | 1,00 |
| $W_0$ | 1,00 |
| $W_F$ | 0,00 |
| $W_C$ | 0,00 |
| $W$ | 1,00 |
| $X$ | 1,00 |
| $f(X)$ | 0,90 |
| $LFI$ | 1,00 |
| $MCI$ | 0,10 |

# 2.2.5 EPD concept

▶ Environmental communication tools

## TYPE I - **ECOLABELS**[9]

- Unique logo
- Third party verified
- Multi-criteria



ISO 14024

## TYPE II - **Informative environmental self-declaration claims**[9]

- Mono-criteria
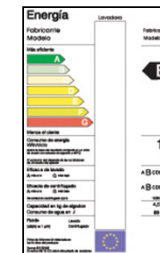- Labels with environmental information



ISO 14021

## TYPE III - **Environmental Product Declarations**[9]

- Facilitate objective and comparable reporting of environmental performance.
- Data from a Life Cycle Inventory, EPD.
- Third party verified



ISO 14025

# References

1. IGI Global, (2020), What is Linear Economy, https://www.igi-global.com/dictionary/operationalization-of-circular-economy/75076#:~:text=An%20economy%20based%20on%20'take,they%20are%20accumulated%20as%20waste, accessed Jan. 2022.

2. Ellen MacArthur Foundation, What is a circular economy?, https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview, accessed Jan. 2022.

3. Ellen MacArthur Foundation, Explaining the circular economy: Rethink progress, https://ellenmacarthurfoundation.org/videos/explaining-the-circular-economy-rethink-progress, accessed Jan. 2022.

4. Niinimaki, K., (2017), Sustainable Fashion in a Circular, Economy https://core.ac.uk/download/pdf/301138773.pdf, accessed Feb. 2022.

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7.  Ellen MacArthur Foundation, Material Circularity Indicator (MCI), https://ellenmacarthurfoundation.org/material-circularity-indicator, accessed Jan. 2022.

8.  Ellen MacArthur Foundation, (2019), Circularity Indicators, https://emf.thirdlight.com/link/3jtevhlkbukz-9of4s4/@/preview/1?o, accessed Fab 2022.

9.  GLOBAL ECOLABELLING NETWORK (GEN), (2004), Introduction to ecolabelling, https://globalecolabelling.net/assets/Uploads/intro-to-ecolabelling.pdf, accessed Jan. 2022.