



Calculation of the circularity indicator CEPI S.p.A.

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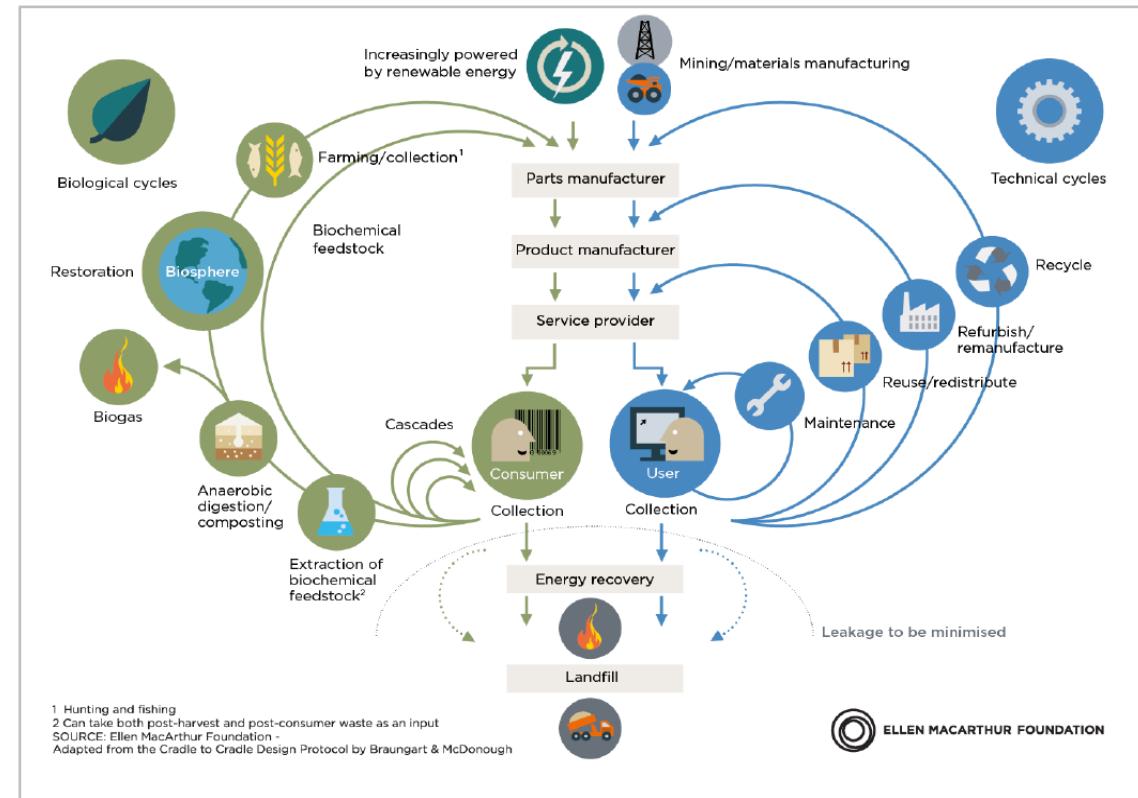


Introduction

Circular economy

The **circular economy model** is rapidly establishing itself, both in international policies and in consumption models, as an **essential element in the transition towards sustainable development** and beyond the linear economic model.

Circular economy aims to promote the recycling and re-use of materials and products, in order to reduce resource consumption.



Introduction

Circular economy

The implementation of a circular economy model is based on three principles:

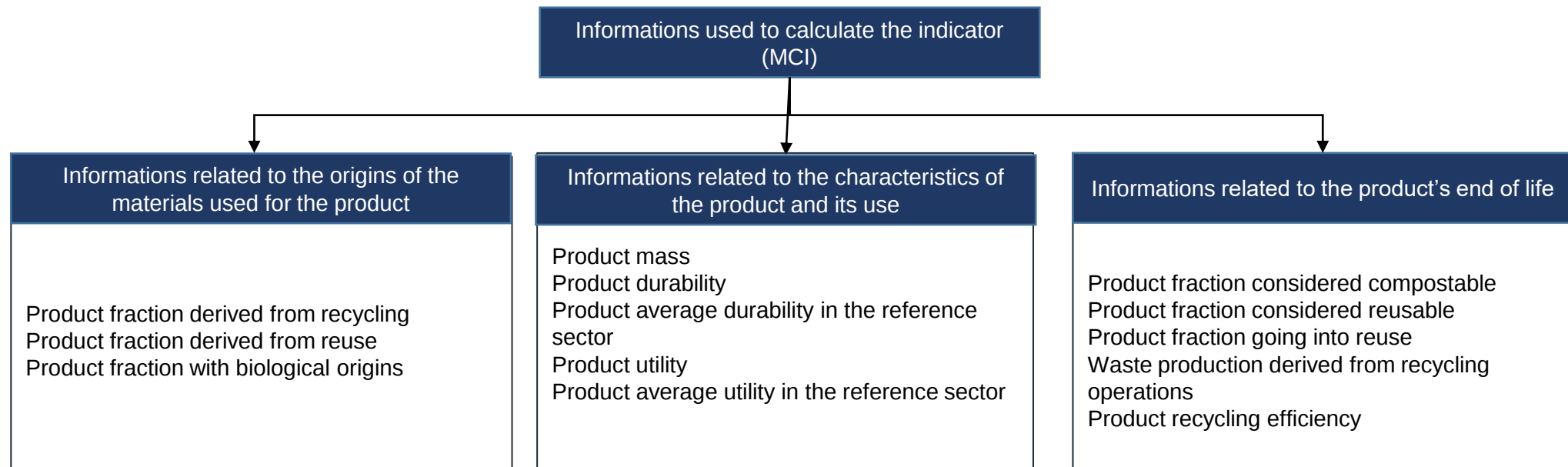
1. **Use of renewable resources:** circular economy favours the use of renewable materials, focusing on their sustainable origin and guaranteeing that their generation does not occur through the overexploitation of natural resources.
2. **Maintenance of products and materials in use:** circular economy favours activities which preserve value in the form of energy, work, and materials. This implies the necessity to design with the aim of increasing duration, reuse, re-manufacturing and recycling to keep products, components and materials in circulation within the production system. Circular systems effectively use bio-based materials, encouraging many different uses before the nutritional substances are returned to natural systems.
3. **Reduction of waste:** circular economy favours reducing the production of waste through design that focuses on the end of life of products and packaging.



Circularity indicator

Methodological approach

The **Ellen Mac Arthur Foundation** is one of the most authoritative international organizations in the field of circular economy and has developed various tools to measure it. The indicator it created aims to measure a product's **level of circularity**, assessing the following informations:



Circularity indicator

Methodological approach

The **Material Circularity Indicator (MCI)** is influenced by all the informations reported above and defines how much the product, considering its entire life cycle, is **circular**.

The MCI's value varies between 0 and 1*, where:

- *MCI=1: fully circular product*
- *0<MCI<1: product of medium circularity*
- *MCI=0: non circular product*

*The circularity indicator's value cannot be express as a percentage



Application of the circularity indicator

CEPI

CEPI is a company that plans, builds and installs facilities for the stocking, transportation and dosing of raw materials for all food industry sectors at a global level. CEPI's mission goes beyond assembling facilities, offering personalized solutions fully tailored to clients' needs.

CEPI has always committed to producing **performing and sustainable technologies** with the objective of safeguarding the environment and contributing actively to the community's wellbeing.

In pursuing this objective, the company made steel (a material with a high reusability and recyclability potential at end of life) the main material in the construction of its facilities.

Moreover, all CEPI facilities are equipped with highly efficient technologies, designed to reduce to a minimum the **energy consumption** tied to their use.

One of CEPI's strengths is the capacity to grant **new life** to facilities which would otherwise be decommissioned, substituting, when needed, deteriorated components with new ones; this activity, known as **revamping**, allows to extend facilities' service lifetime indefinitely.



Application of the circularity indicator

CEPI

The object of the present study is the assessment of the *Material Circularity Indicator (MCI)* of a **representative facility** of CEPI's production, designed and built for the stocking of food products.

The analyzed facility is made mainly of steel and other metallic alloys (brass, cast-iron), in addition to aluminum, copper and minor components constituted of plastic polymers (PVC, polyurethane, polyester).

The reference unit used for the study is *a facility* produced by CEPI whose characteristics are detailed below.

The following slides report the informations gathered by the CEPI staff for the calculation of the circularity indicator.



Application of the circularity indicator

Data inventory – CEPI facility

- The facility is constituted of steel, aluminum and other metallic alloys for more than 99% of its weight and of other materials for less than 1%¹
- The **recycled content** present in the steel acquired by CEPI is **44%** while that in the aluminum is **30%**; the data inserted in the inventory is a weighted average of the two values²
- The **recycling operations efficiency** represents the recycling yield for the facilities producing secondary raw materials of ferrous metal, non-ferrous metals and polymers³

Category		Value
Functional unit used: 1 facility		14.141 kg
Materials	Steel	85%
	Aluminium	9%
	Cast-Iron	6%
	Other materials	<1%
Virgin fraction		60%
Recycled fraction		40%
Reusable fraction		83%
Recyclable fraction		15%
Recycling operations efficiency		84%
Durability and average sector duration		30 years
Utility		132.000 h

¹ Brass 0,48%, Copper 0,01%, Polyester <0,01%, Polyurethane <0,01%, PVC <0,01, Rubber <0,01%

  ² The *steel's* recycled content was obtained from mill tests received from CEPI and from literature (i.e. supplier's sustainability report). The *aluminum's* recycled content was obtained using an LCA database (Ecoinvent v3.8)

³ Source: Studio Fieschi & soci

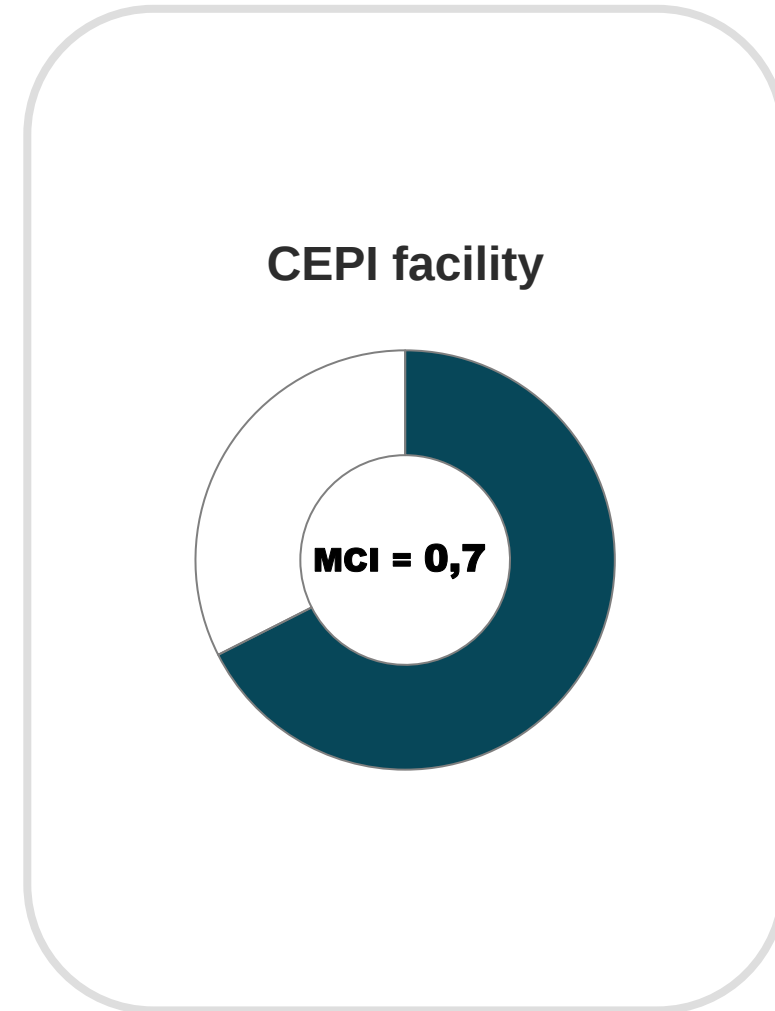
Application of the circularity indicator

Results – MCI

Main product characteristics

CEPI facilities:

- Recycled fraction 40%
- Virgin materials 60%
- Reusable fraction 83%
- Recyclable fraction 15%
- Fraction for disposal 2%
- Recycling efficiency 84%



Application of the circularity indicator

Conclusions

The circularity indicator MCI has been applied to a representative CEPI production facility in order to assess its circularity. The analysis shows the facility to be **of medium circularity**, having been assigned a **circularity value** equal to **0,7** (possible values range from 0 to 1).

The main factors contributing to the product's circularity are:

- The high quantity of **reusable materials** in relation to the facilities' revamping activity:
 - *specifically, nearly all the steel, representing 85% of the product's weight, is reused thanks to revamping activities.*
- The materials sent to **recycling** in the facility's demolition phase:
 - *specifically, the other metals used in the product's manufacturing are characterized by a high recyclability potential at end of life, and therefore they significantly contribute to the facility's circularity.*

On the other hand, the factor negatively influencing the product's circularity is represented by the **low recycled content** in the steel acquired by CEPI:

- *specifically, it is characterized by a percentage of recycled steel equal to 44%.*

The **circularity indicator's value** can improve through the acquisition of steel produced with a higher fraction of recycled steel.

Possible future developments

The results obtained through the application of the **circularity indicator** could be further explored by investigating more specifically the product's environmental impact, undertaking the following paths:

- a more comprehensive enhancement of the facilities' **environmental performances**, ever since the planning phase, in an ecodesign perspective, making use of the «*Life Cycle Assessment*» (*LCA*) analysis approach, which would allow to quantify the facilities' environmental impacts with specific indicators;
- extending the analysis to the whole product through **an in-depth LCA study** to be used for communication ends by obtaining an environmental certification (i.e. *Environmental Product Declaration*).



Attachments

- **Glossary**

Glossary

Feedstock: Anything used to produce a new product, including raw materials of any origins or parts and components of other products that are reused.

Virgin raw materials: Material that does not derive from reuse, recycling or that is not of biological sustainable origin.

Recycling: Material recovery processes aimed at re-introducing such materials in the productive process as raw materials. It does not include energy recovery.

Reuse: Reuse of a product for the original purposes following limited maintenance or cleaning.

Utility: Measure of how intensely and for how long a product is used compared to the average for similar products

Recycling efficiency: Efficiency of the material recycling process as a function of the type of recycling implemented

Durability/ average sector duration: Analyzed product's life, product's average life compared to the reference sector

