



Economia Circular: indicadors i metodologies

8 Nov 2022

El concepte



The circular economy is a model of production and consumption, that implies reducing waste, resource efficiency and where the life cycle of products is extended.

*Products, components and materials are kept within the economy and can be productively used again and again, **creating further value.***

Mesura de la circularitat

Circular economy monitoring framework

1 EU self-sufficiency for raw materials

The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

2 Green public procurement

The share of major public procurements in the EU that include environmental requirements

3a-c Waste generation

Generation of municipal waste per capita; total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

4 Food waste

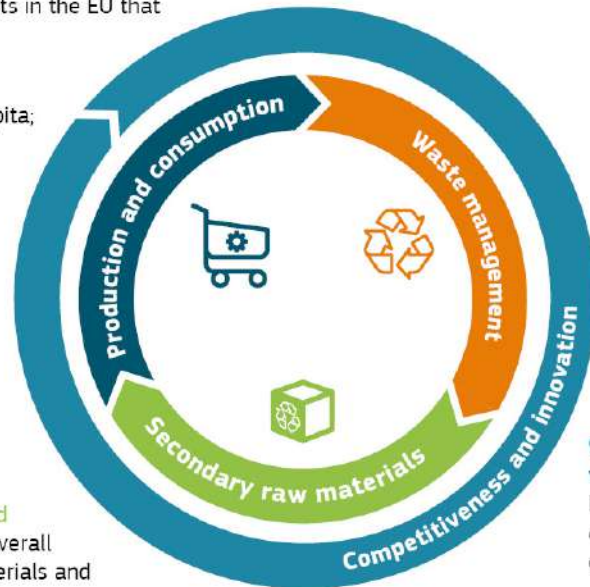
Amount of food waste generated

7a-b Contribution of recycled materials to raw materials demand

Secondary raw materials' share of overall materials demand - for specific materials and for the whole economy

8 Trade in recyclable raw materials

Imports and exports of selected recyclable raw materials



5a-b Overall recycling rates

Recycling rate of municipal waste and of all waste except major mineral waste

6a-f Recycling rates for specific waste streams

Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

9a-c Private investments, jobs and gross value added

Private investments, number of persons employed and gross value added in the circular economy sectors

10 Patents

Number of patents related to waste management and recycling

Circularitat mesurada en 4 pilars:

- Producció i consum
- Gestió de residus
- Matèries primeres secundaries
- Competitivitat i innovació

Metodologies i indicadors de circularitat



Circular Economy Toolkit
Resources for an Evolving World

The Circular Economy | Toolkit | Assessment Tool | Workshops | About





CIRCULARITY INDICATORS
AN APPROACH TO MEASURING CIRCULARITY

Material Circularity Indicator
Dynamic Modelling Tool

Drag the sliders to change input values and see how the MCI changes!



Circularity Check

How circular are the products and services your company puts on the market?

Click [here](#) to start the free Circularity Check for your product and/or service!





Circular material use rate
CALCULATION METHOD 2018 edition



MANUAL AND GUIDELINES **eurostat**



JRC TECHNICAL REPORTS

Suggestions for updating the Product Environmental Footprint (PEF) method

Zemper L. Part II


2024



CIRCULARITY TEST - CEIP SCORE

Instructions: Complete the general information section (1), then answer the questions in the Circularity Test (2) and finally, view the results (3). Answer on the yellow Score and Rating with the yellow arrow.

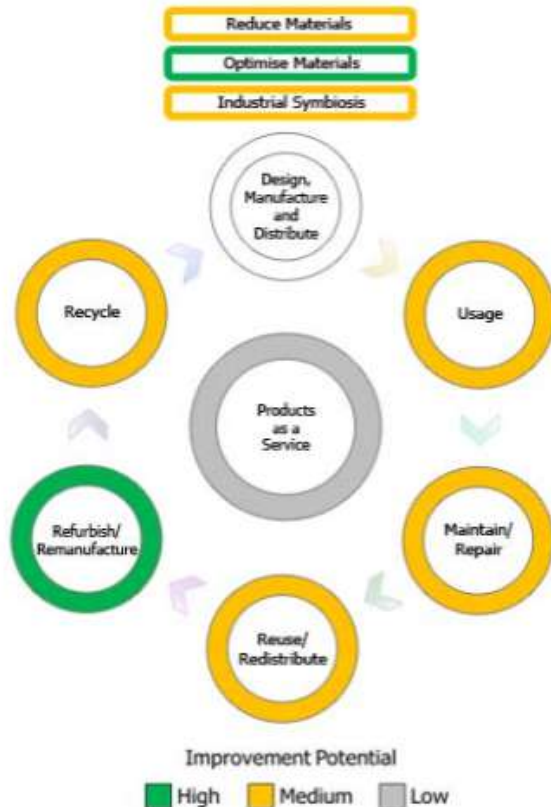
1 GENERAL INFORMATION		3 RESULTS	
Product Name	Catalytic Converter	Product Rating	Product Rating
MAT Code		Scored	Available
Manufacturer Code		42%	Good
Assessment date	November 2016	64	152
Assessor	Michael Salsner		
2 QUESTIONNAIRE		Lifecycle	
This questionnaire intends to measure to what degree the product follows the Circular Economy principles throughout its different lifecycle stages.		# Questions	Scored Available Rating Rating
To respond the questions click the link below		Design/Redesign	3 12 27 48% Good
		Manufacturing	3 7 22 28% Fair
		Commercialization	3 25 30 50% Good
		In Use	4 12 35 38% Fair
		End of Use	3 16 35 55% Good
		TOTAL	15 64 152 42% Good



Metodologia de circularitat



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Answer the questions below to find potential improvements in your organisation:

* Company type:

* Product type:

* Use: Just playing Serious

Design, Manufacture and Distribute

No material is used in excess, product is totally dematerialised High waste of material, could be reduced through redesign

- ✓ Disseny, Fabricació i distribució
- ✓ Ús
- ✓ Reparació/Manteniment
- ✓ Reutilització
- ✓ Remanufactura
- ✓ Reciclatge



Indicadors de circularitat: CMU




The CMU rate is defined as the ratio of the *circular use of materials (U)* to an indicator of the *overall material use (M)*:

$$CMU = \frac{U}{M} \quad \text{(Equation 1)}$$

A higher CMU rate value means that more secondary materials substitute for primary raw materials thus reducing the environmental impacts of extracting primary material.


Indicadors de circularitat: MCI



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Drag the sliders to change input values and see how the MCI changes!




MCI = 0,46


	Feedstock	Destination after use
Reused	<input type="range"/> 0%	<input type="range"/> 0%
Recycled	<input type="range"/> 33%	<input type="range"/> 50%
Recycling efficiency	<input type="range"/> 95%	<input type="range"/> 95%
Lifespan	<input type="range"/> 1,0 x industry average	
Functional units	<input type="range"/> 1,0 x industry average	



ELLEN MACARTHUR FOUNDATION



GRANTA
MATERIAL INTELLIGENCE



Indicadors de circularitat: CFF

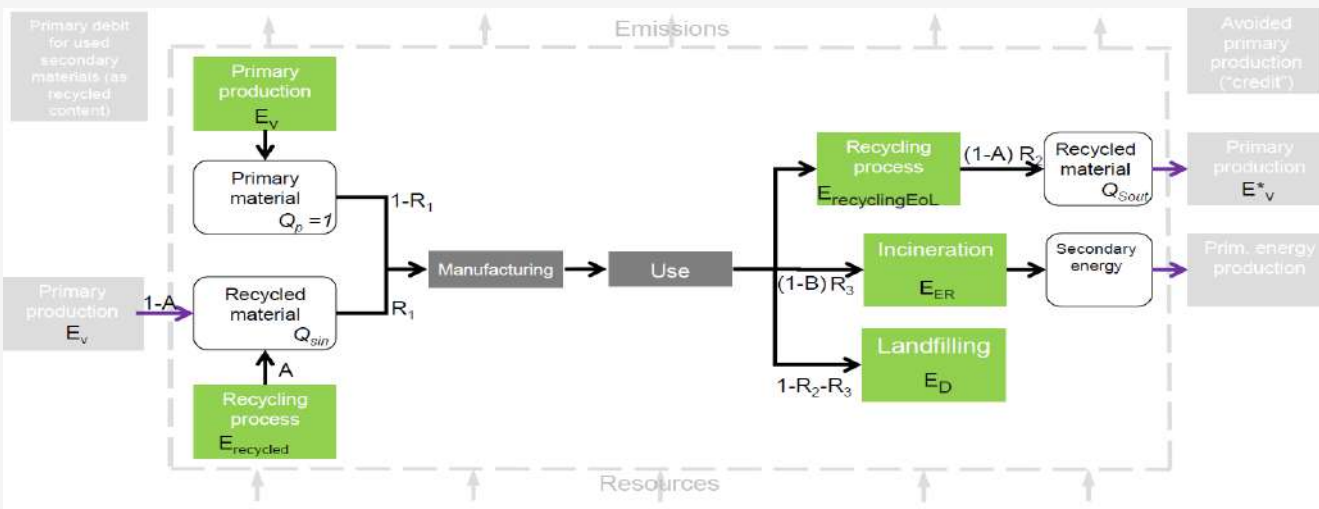
La circularitat també té un impacte:



Single Market for Green Products Initiative



CFF: circular footprint formula



Material

$$(1 - R_1)E_V + R_1 \times \left(AE_{recycled} + (1 - A)E_V \times \frac{Q_{Sin}}{Q_P} \right) + (1 - A)R_2 \times \left(E_{recyclingEoL} - E_V^* \times \frac{Q_{Sout}}{Q_P} \right)$$

Energy

$$(1 - B)R_3 \times (E_{ER} - LHV \times X_{ER,heat} \times E_{SE,heat} - LHV \times X_{ER,elec} \times E_{SE,elec})$$

Disposal

$$(1 - R_2 - R_3) \times E_D$$

Metodologies i indicadors de circularitat

La realitat és que:

- **No** hi ha una **manera comú i consensuada** de mesurar indicadors de circularitat a escala micro (indústria)
- **Falten indicadors** específics- sectorials

S'han d'adaptar les metodologies i indicadors existents a cada producte o organització concreta

De què mesurem la circularitat?

Procés?



Producte?



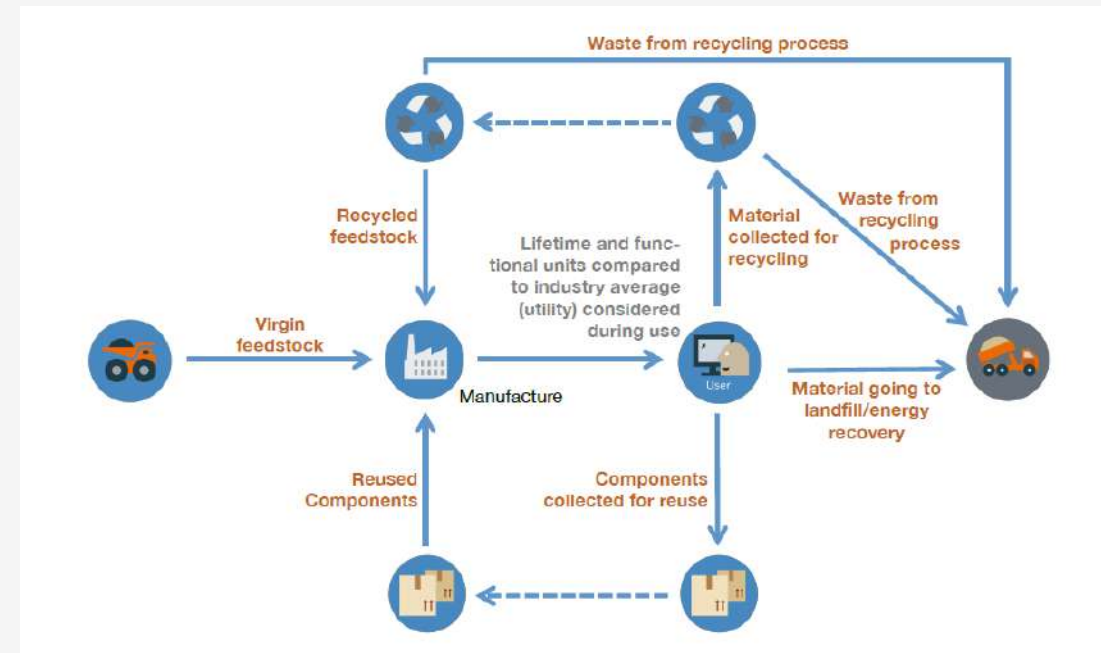
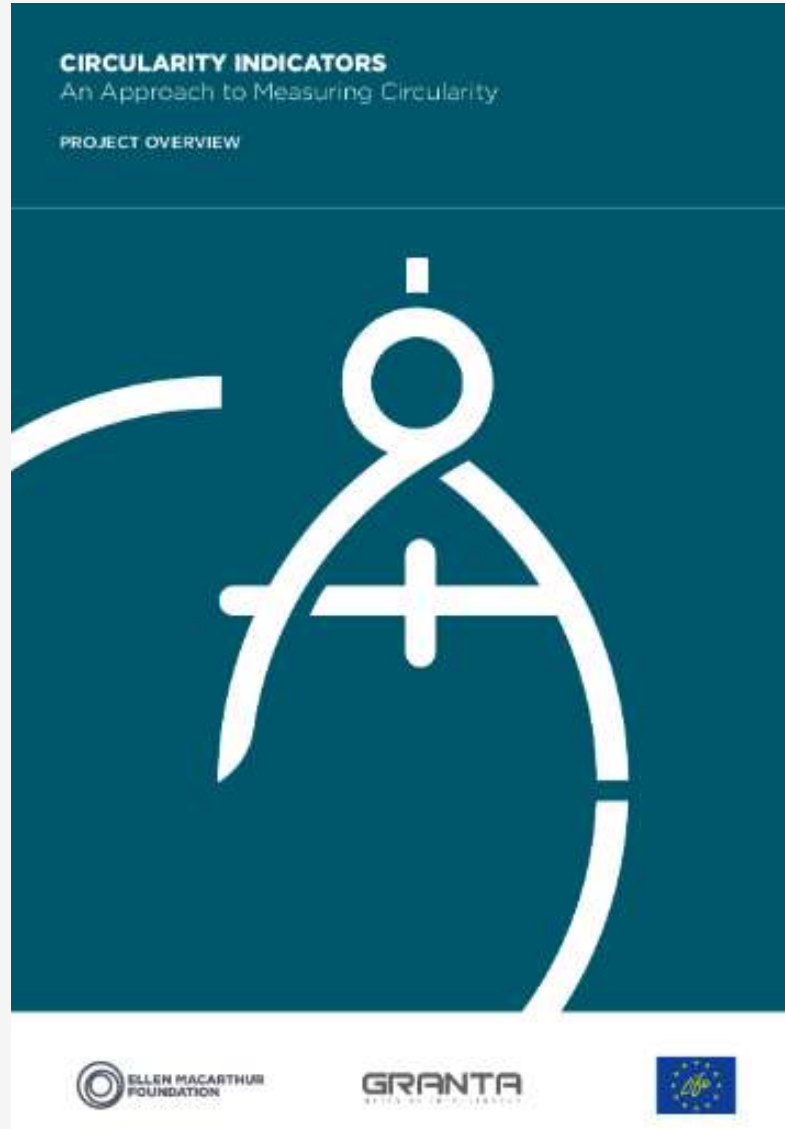
Organització?



Own elaboration based on Kristensen, H.S. & Mosgaard M.A. (2020)

La tendència es mesurar circularitat associada a processos de reutilització, reciclat...

Seguint un enfoc de producte

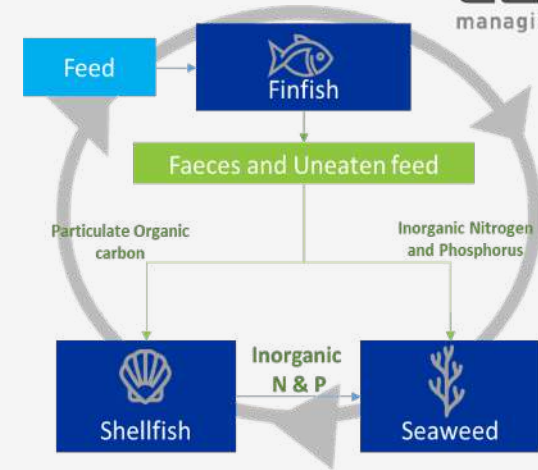


- ✓ Life Cycle Thinking
- ✓ Focus on product, material, component
- ✗ Only for technological cycles

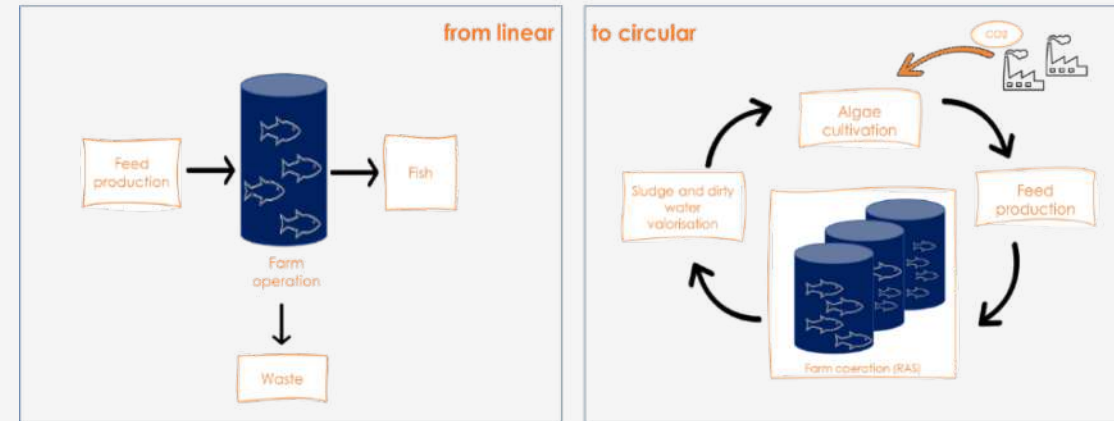
Exemple: Circularitat a l'aqüicultura



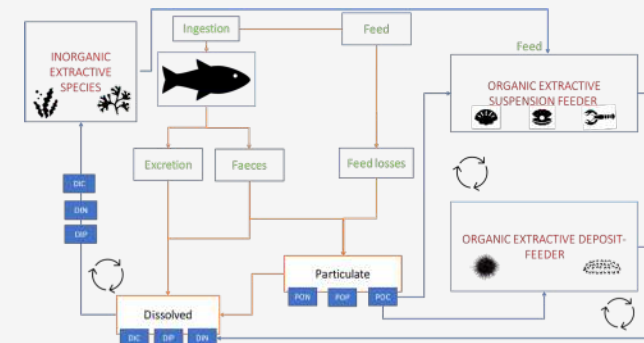
Circular business framework for IMTA Systems



Development of a circularity methodology to assess new innovative feeds and aquaculture production systems

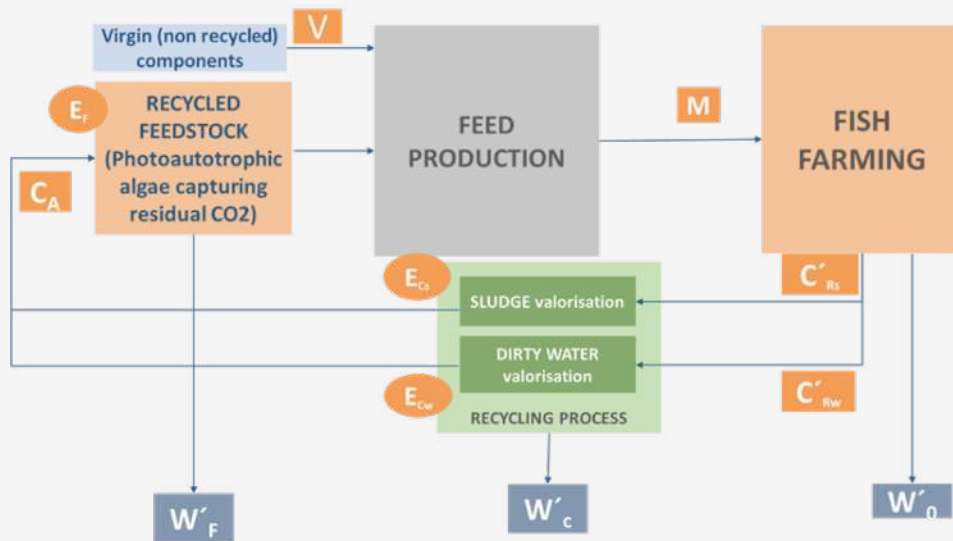


Assessment of circularity of IMTA at different levels (infrastructure, bioremediation, feeding systems)



Definició d'una metodologia per avaluar la circularitat

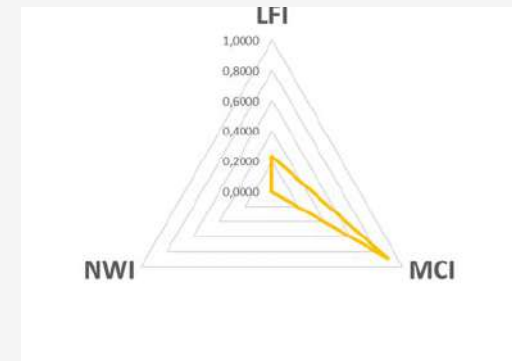
Anàlisi de la circularitat dels processos d'aqüicultura amb sistemes de *feeding* innovadors que incorporen ingredients procedents de la valorització de subproductes



Portion of raw materials input flow

Portion of restorative material flows (that comes from reused or recycled sources)

Utility of the product (assessed based on use intensity when compared new circular feeds against an industry average product)



Key parameters:

- V_ Virgin components
- E_ Efficiency of the recycling process
- W_ Generation of waste not recovered
- C_ Fraction collected for valorisation



Key Indicators:

- ✓ Linear flow (LFI)
- ✓ **Material circularity (assimilation efficiency) (MCI)**
- ✓ Nutrient waste (NWI)



Moltes gracies

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