STEUNPUNT CIRCULAIRE ECONOMIE

CIRCULAR ECONOMY: HOW TO MEASURE WHEN WE HAVE NO MEASURE?

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March, 2020

DEPARTEMENT ECONOMIE WETENSCHAP & INNOVATIE

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OUTLINE

- 1. Circular Economy Policy Research Centre
- 2. CE indicators: what do they measure? Proposal for a classification framework

STEUNPUNT CIRCULAIRE ECONOMIE

1. CIRCULAR ECONOMY POLICY RESERCH CENTRE

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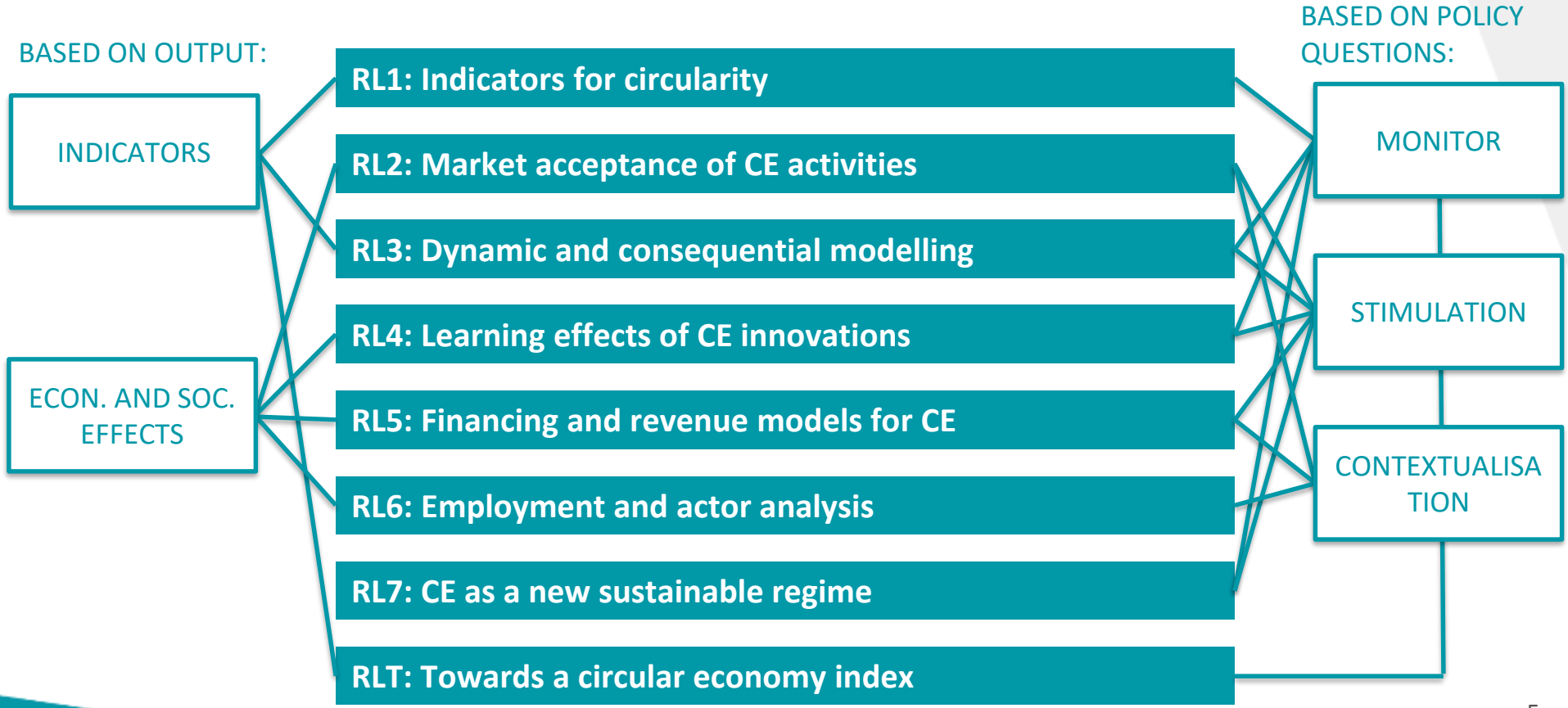
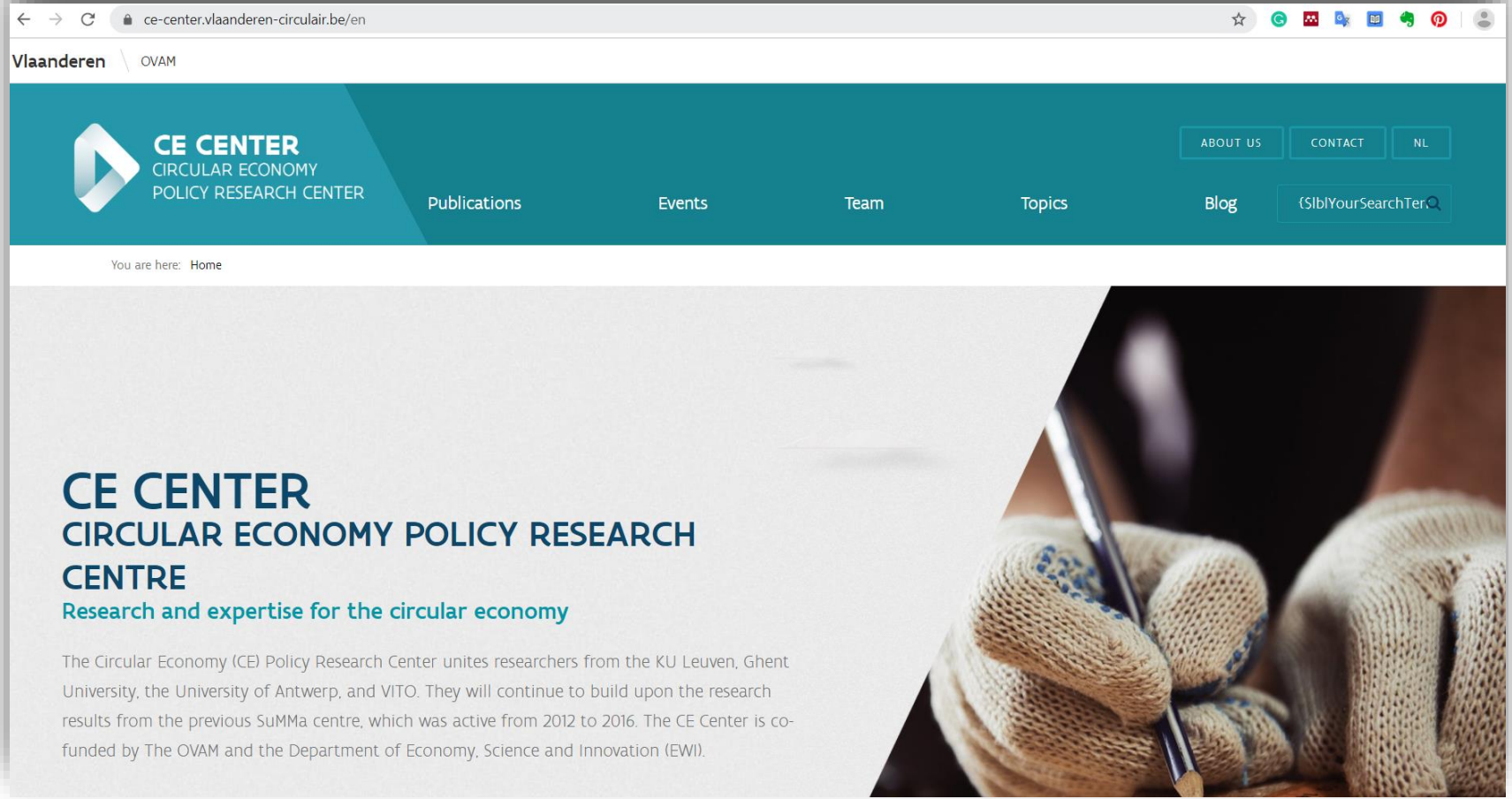
WHY A POLICY RESEARCH CENTRE?

Flemish government: circular economy = transition priority (“Visie 2050”)
-> minimal use of materials, energy and space, and minimal environmental impact

- Three policy questions:
    - How to measure the progress of the circular economy?
        - monitor
    - Which policy instruments contribute best for this transition?
        - stimulate
    - Impact of novel trends (technological, economic, societal)
        - contextualise

RESEARCH LINES





website: www.ce-centre.be

STEUNPUNT CIRCULAIRE ECONOMIE

2. CIRCULAR ECONOMY INDICATORS: WHAT DO THEY MEASURE?

Gustavo Moraga; Sophie Huysveld; Fabrice Mathieux; Gian Andrea Blengini; Luc Alaerts; Karel Van Acker; Steven de Meester; Jo Dewulf

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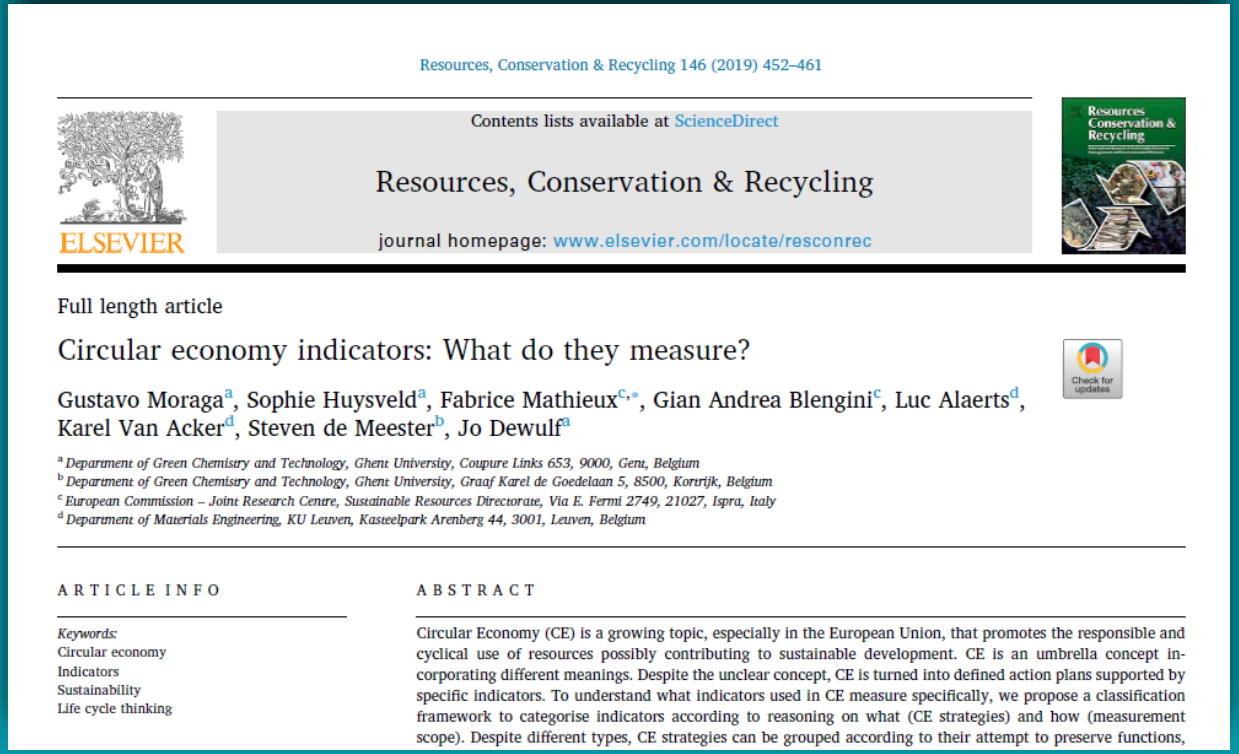

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journal homepage: www.elsevier.com/locate/resconrec

Full length article

Circular economy indicators: What do they measure?

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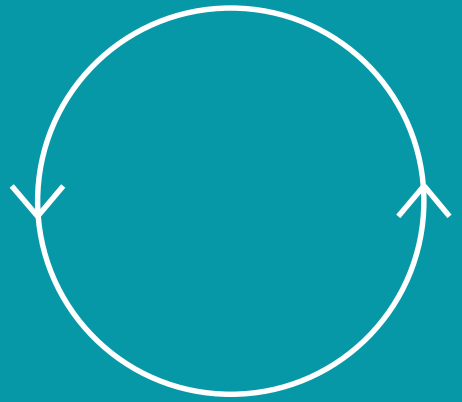
ABSTRACT

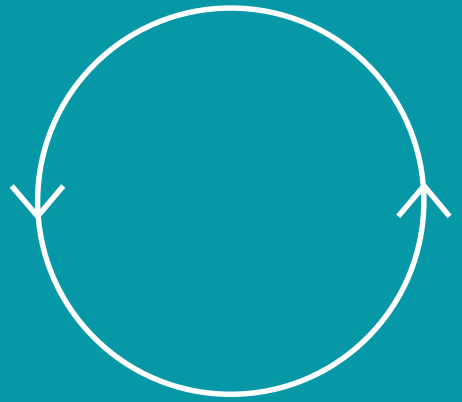
Circular Economy (CE) is a growing topic, especially in the European Union, that promotes the responsible and cyclical use of resources possibly contributing to sustainable development. CE is an umbrella concept incorporating different meanings. Despite the unclear concept, CE is turned into defined action plans supported by specific indicators. To understand what indicators used in CE measure specifically, we propose a classification framework to categorise indicators according to reasoning on what (CE strategies) and how (measurement scope). Despite different types, CE strategies can be grouped according to their attempt to preserve functions,

PRC COLLABORATION WITH THE JOINT RESEARCH CENTRE

Moraga, G., Huysveld, S., Mathieux, F., Blengini, G.A., Alaerts, L., Van Acker, K., de Meester, S., Dewulf, J., 2019. **Circular economy indicators: What do they measure?** Resour. Conserv. Recycl. 146, 452–461. https://doi.org/10.1016/j.resconrec.2019.03.045



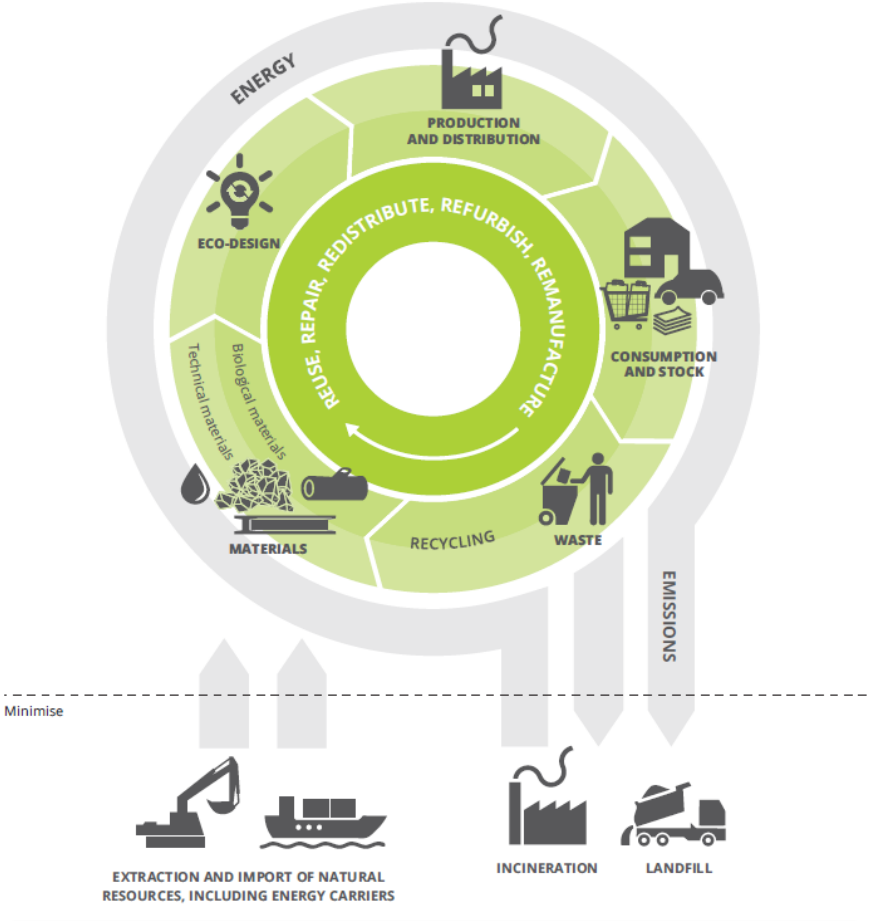
WHAT IS CIRCULAR ECONOMY?



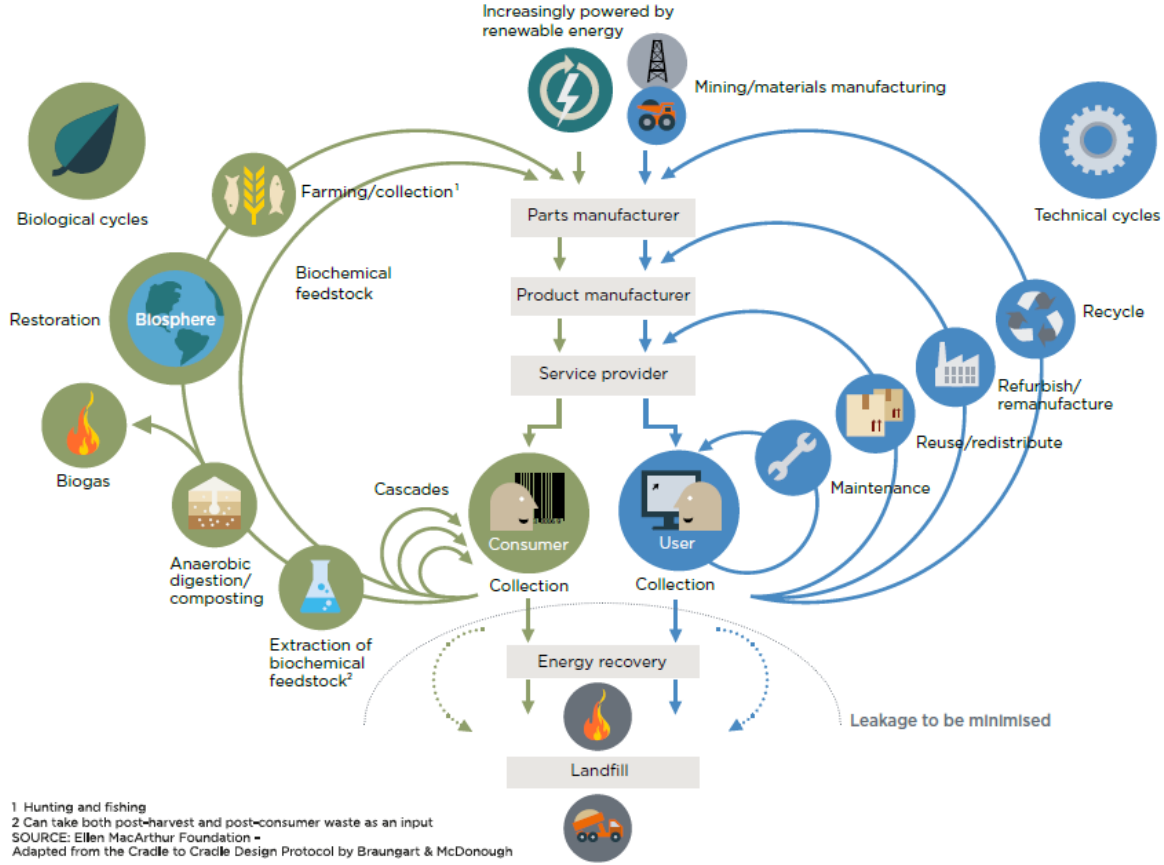
WHAT IS CIRCULAR ECONOMY?

It is an economy where '(…) **the value of products, materials and resources is maintained** (…) **for as long as possible,** and **the generation of waste minimised**'.

EC, 2015. Closing the loop - An EU action plan for the Circular Economy - COM(2015) 614 final, European Commission (EC). Brussels.



EEA, 2016. Circular economy in Europe - developing the knowledge base: report 2, European Environment Agency (EEA). https://doi.org/10.2800/51444

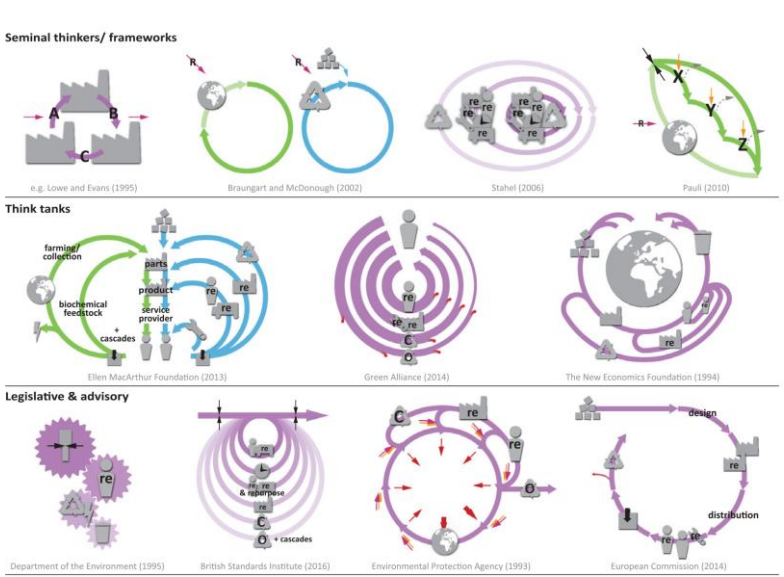


EMF - Ellen MacArthur Foundation, 2015. Circularity Indicators: An Approach To Measuring Circularity. Project Overview

CIRCULAR ECONOMY: MORE THAN 100 DEFINITIONS

Kirchherr J, Reike D, Hekkert M. Conceptualizing the circular economy: An analysis of 114 definitions. Resour Conserv Recycl 2017

IT IS NOT CLEAR WHAT CIRCULARITY SHOULD MEASURE



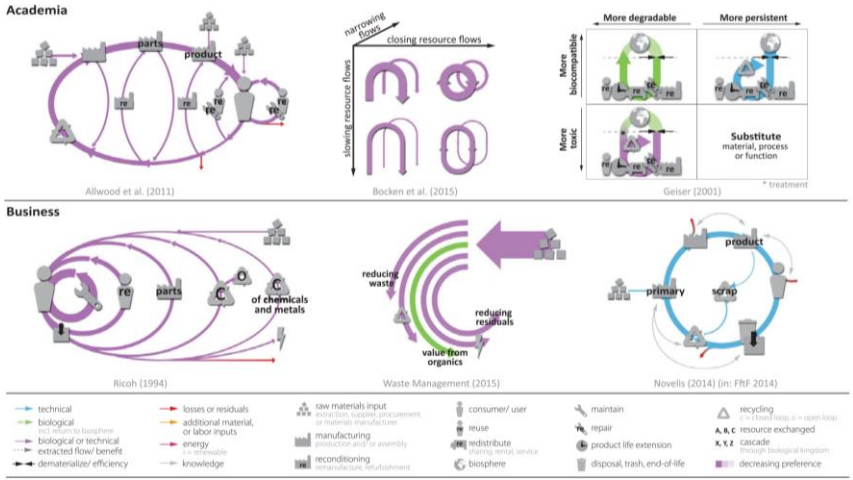
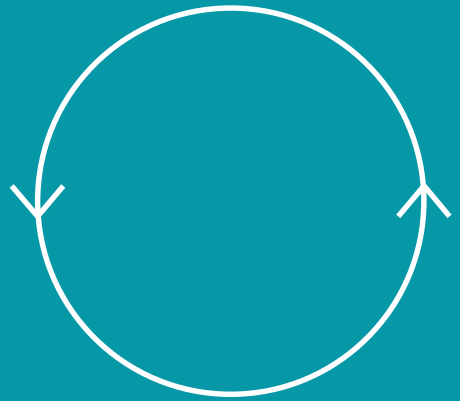


Image from Blomsma F, Brennan G. The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity. J Ind Ecol 2017



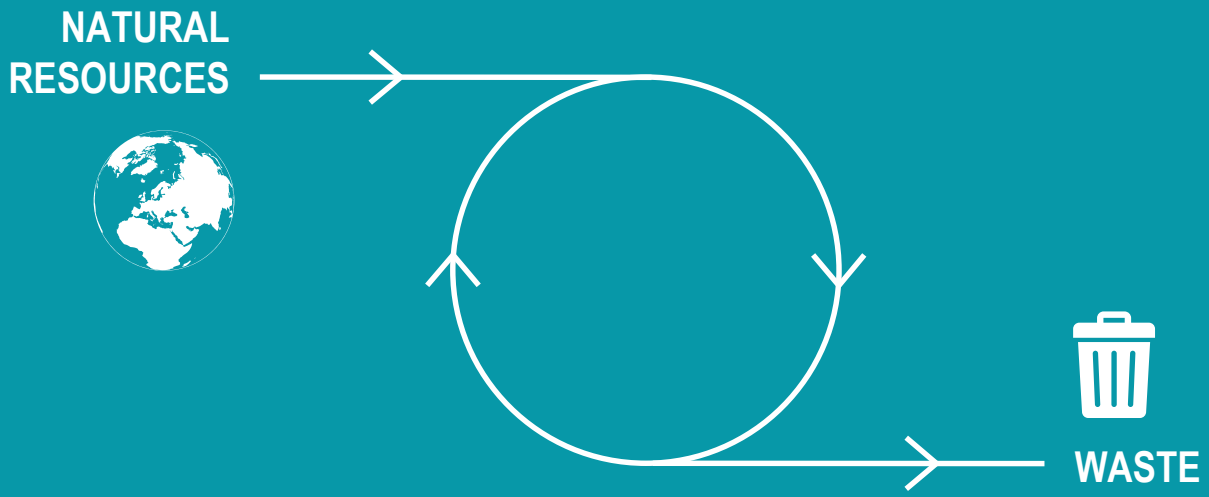
WHAT DO CIRCULAR ECONOMY INDICATORS MEASURE?

WHAT DO CE INDICATORS MEASURE SPECIFICALLY, AND HOW THEY DO SO?

- Proposal for a classification Framework
- Illustration with existing indicators
  - today: 10 indicators from the European Commission

ESTABLISHING THE CLASSIFICATION FRAMEWORK

WHAT IS THE MINIMUM MEASURE?



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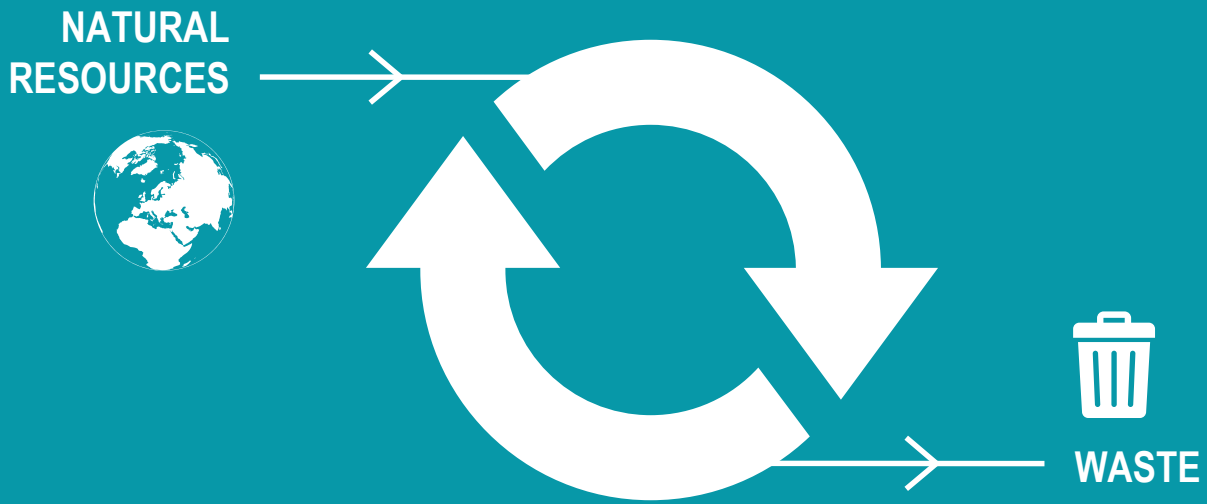

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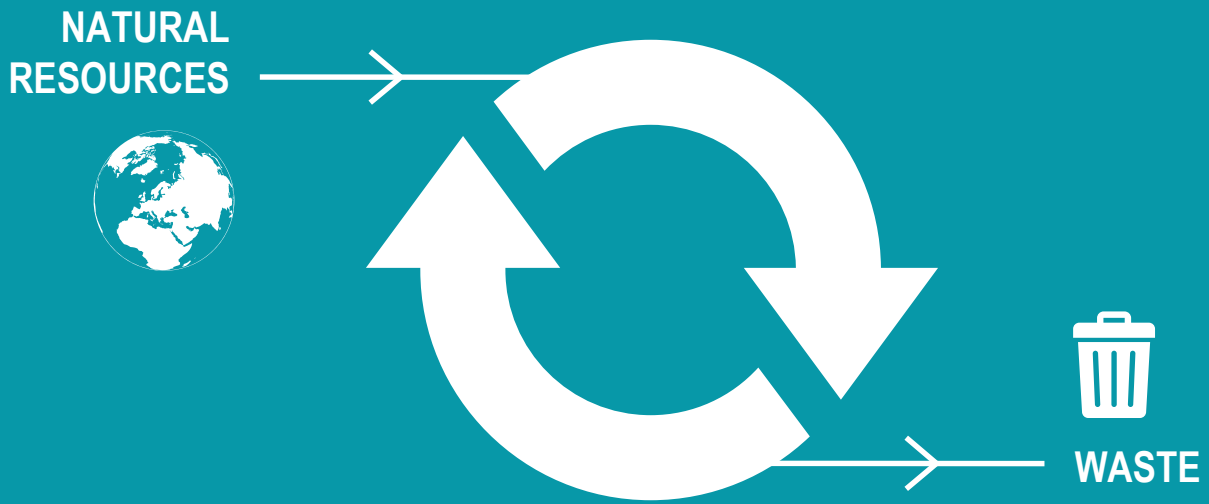


CE STRATEGY

WHAT ARE CE STRATEGIES?

WHAT ARE CE STRATEGIES?

PRODUCTS	COMPONENTS OR PARTS	MATERIALS	EMBODIED ENERGY

WHAT ARE CE STRATEGIES?

FUNCTIONS | PRODUCTS | COMPONENTS OR PARTS | MATERIALS | EMBODIED ENERGY

WHAT ARE CE STRATEGIES?

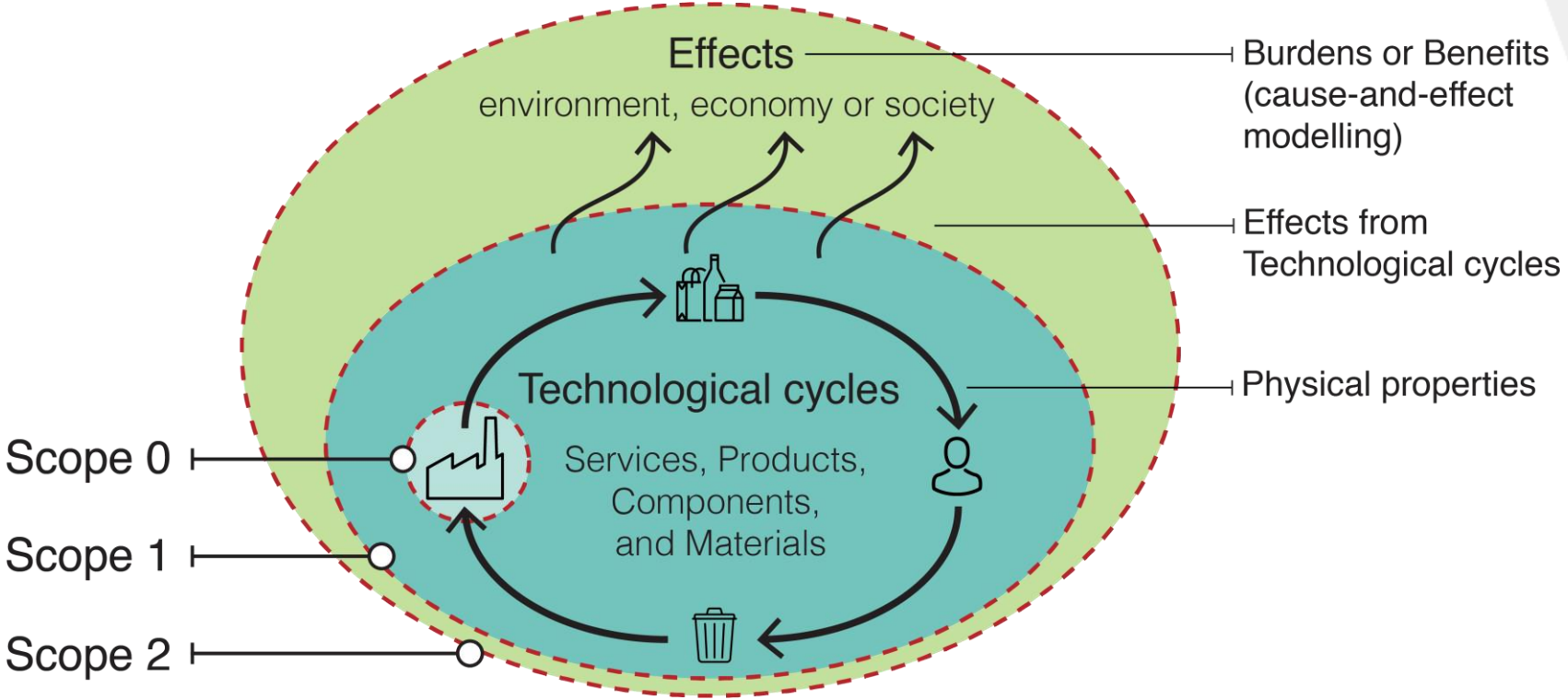
FUNCTIONS	PRODUCTS	COMPONENTS OR PARTS	MATERIALS	EMBODIED ENERGY	REFERENCE

WHAT ARE CE STRATEGIES?

UP TO 5 PRESERVATION CAPABILITIES AND 1 REFERENCE STATE

FUNCTIONS	PRODUCTS	COMPONENTS OR PARTS	MATERIALS	EMBODIED ENERGY	REFERENCE
1	2	3	4	5	
Rethink Sharing economy PSS	Reuse Remanufacture Refurbish	Reuse Repurpose	Recycle Downcycle	Energy recovery	Waste generation

HOW DO INDICATORS MEASURE?



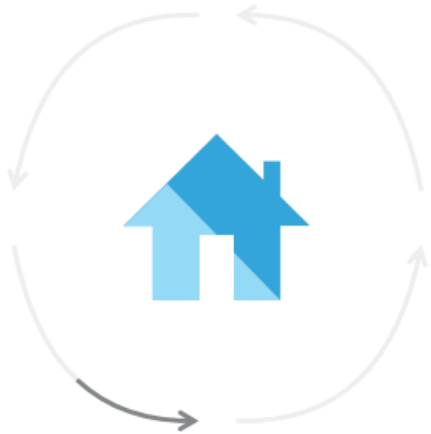
QUIZ
CE INDICATORS

FOR EXAMPLE:

Material accounting

amount of recycled debris in a house

Level 0	Level 1	Level 2
physical properties without aspects of supply chain	physical properties with aspects of supply chain	impacts with aspects of supply chain



Strategies

FOR EXAMPLE:

Material accounting

amount of recycled debris in a house

Level 0	Level 1	Level 2
physical properties without aspects of supply chain	physical properties with aspects of supply chain	impacts with aspects of supply chain

Strategies

FOR EXAMPLE:

Recycled content benefits from Ardente; Mathieux, 2014

net avoided impacts by recycling in overall impacts of product

Level 0	Level 1	Level 2
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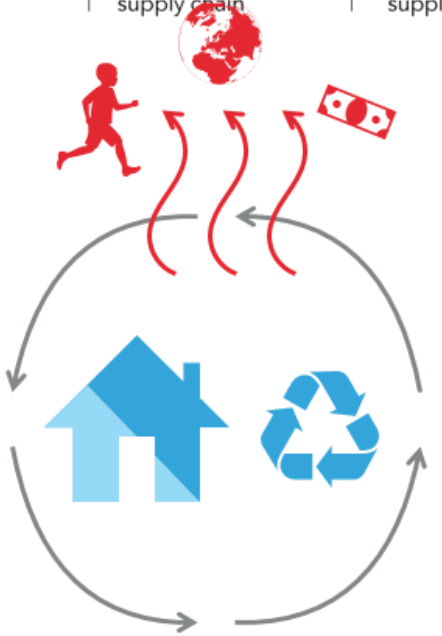

Prevention

1 e.g. refuse, rethink, reduce

2 e.g. reuse, refurbish, remanufacture

3

4 e.g. recycle, downcycle

Lower strategies

5 e.g. energy recovery, landfilling with energy recovery

6 e.g. landfilling without energy recovery

* component

FOR EXAMPLE:

Recycled content benefits from Ardente; Mathieux, 2014

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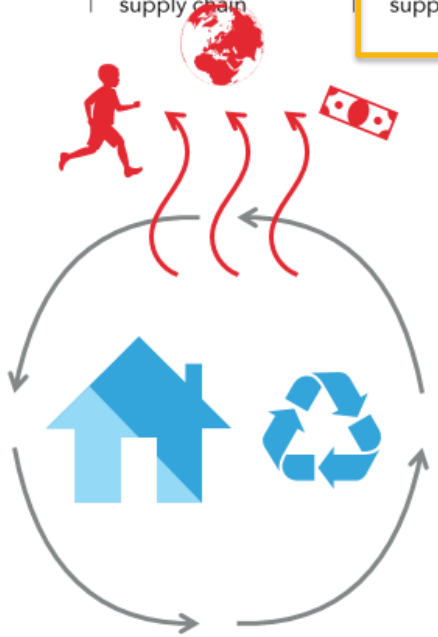


FOR EXAMPLE:

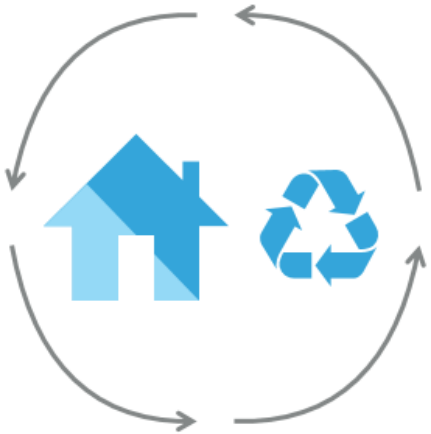
Linear Flow Index
from Ellen MacArthur Foundation, 2015

amount recycled material

and

amount of unrecoverable post-consumer debris of the house

Level 0	Level 1	Level 2
physical properties without aspects of supply chain	physical properties with aspects of supply chain	impacts with aspects of supply chain



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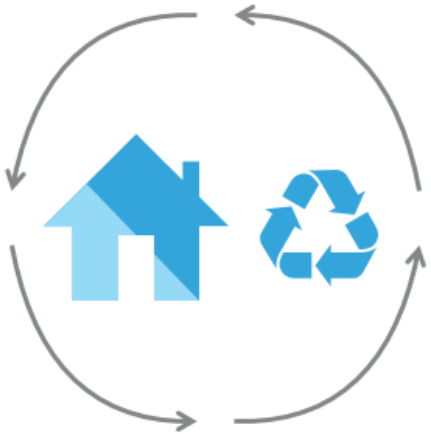
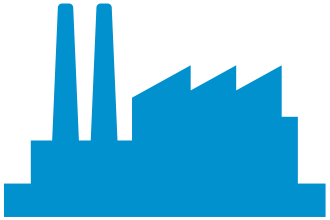


QUESTIONS?

EUROPEAN COMMISSION'S CIRCULAR ECONOMY MONITORING FRAMEWORK

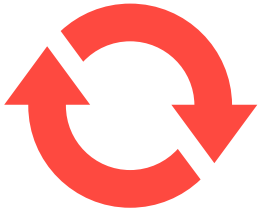
EC - European Commission, 2018. Measuring Progress Towards Circular Economy in the European Union – Key Indicators for a Monitoring Framework - SWD(2018) 17 Final. Strasbourg.

INDICATORS DIVIDED IN 4 THEMES



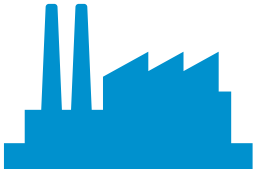
PRODUCTION AND CONSUMPTION

WASTE MANAGEMENT



SECONDARY RAW MATERIALS

COMPETITIVENESS AND INNOVATION

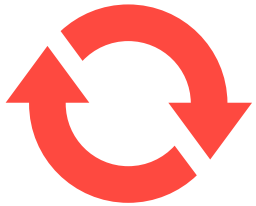


PRODUCTION AND CONSUMPTION

- 1. Self-sufficiency for raw materials
- 2. Green public procurement (under development)
- 3. Waste generation
  - 3.a Municipal waste per capita
  - 3.b Waste per GDP
  - 3.c Waste per DMC
- 4. Food waste (under development)

WASTE MANAGEMENT

- 5. Recycling rates (RR)
  - 5.a RR municipal waste
  - 5.b RR all waste
- 6. Recycling/recovery for specific waste streams
  - 6.a RR overall packaging waste
  - 6.b RR plastic packaging waste
  - 6.c RR wooden packaging waste
  - 6.d RR e-waste
  - 6.e Recycling of biowaste
  - 6.f RR C&D waste



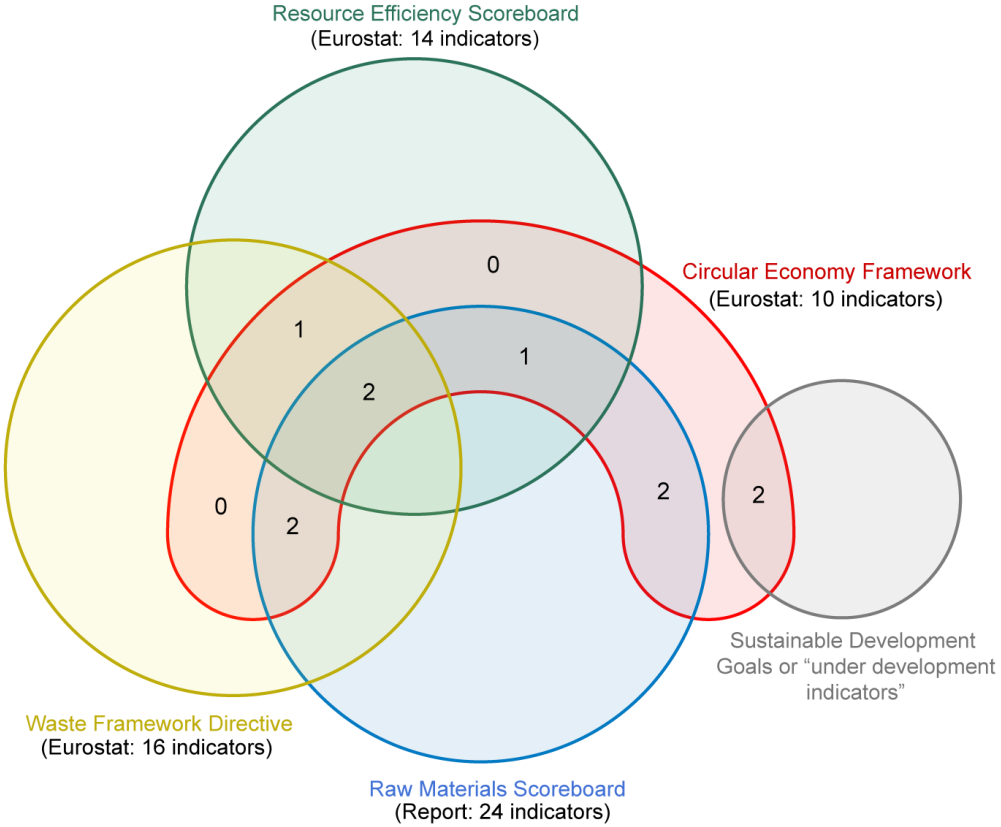
SECONDARY RAW MATERIALS

- 7. Contribution of recycled materials to raw materials demand
  - 7.a EOL recycling input rate
  - 7.b Circular material use rate
- 8. Trade in recyclable raw materials
  - Imports non-EU countries
  - Exports non-EU countries
  - Imports EU countries
  - Exports EU countries

COMPETITIVENESS AND INNOVATION

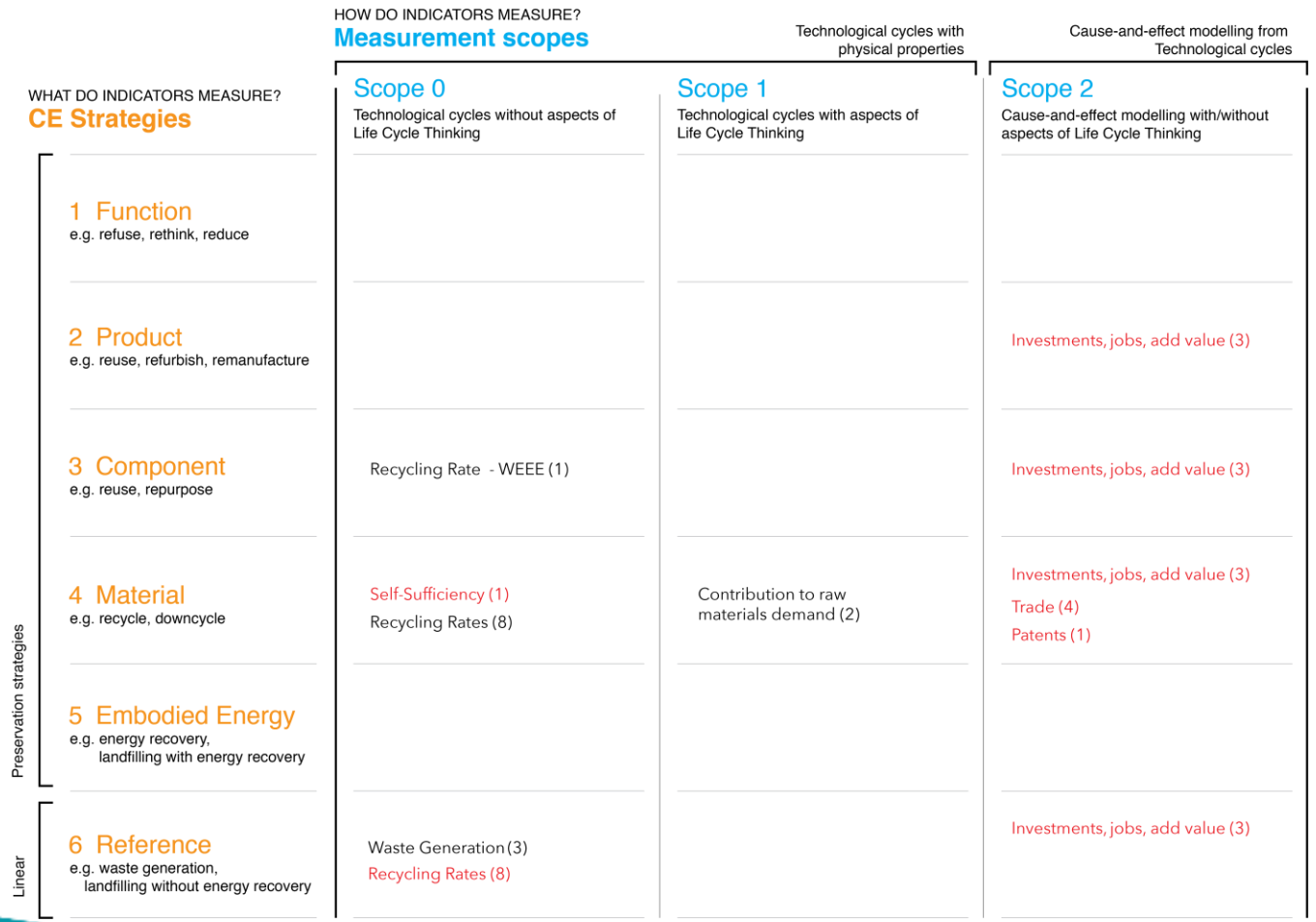
- 9. Private investments, jobs and gross value added related to circular economy sectors
  - 9.a Gross investment in tangible goods
  - 9.b Number of persons employed
  - 9.c Value added at factor cost
- 10. Number of patents related to recycling and secondary raw materials

CE INDICATORS REFER TO EXISTING EUROPEAN FRAMEWORKS

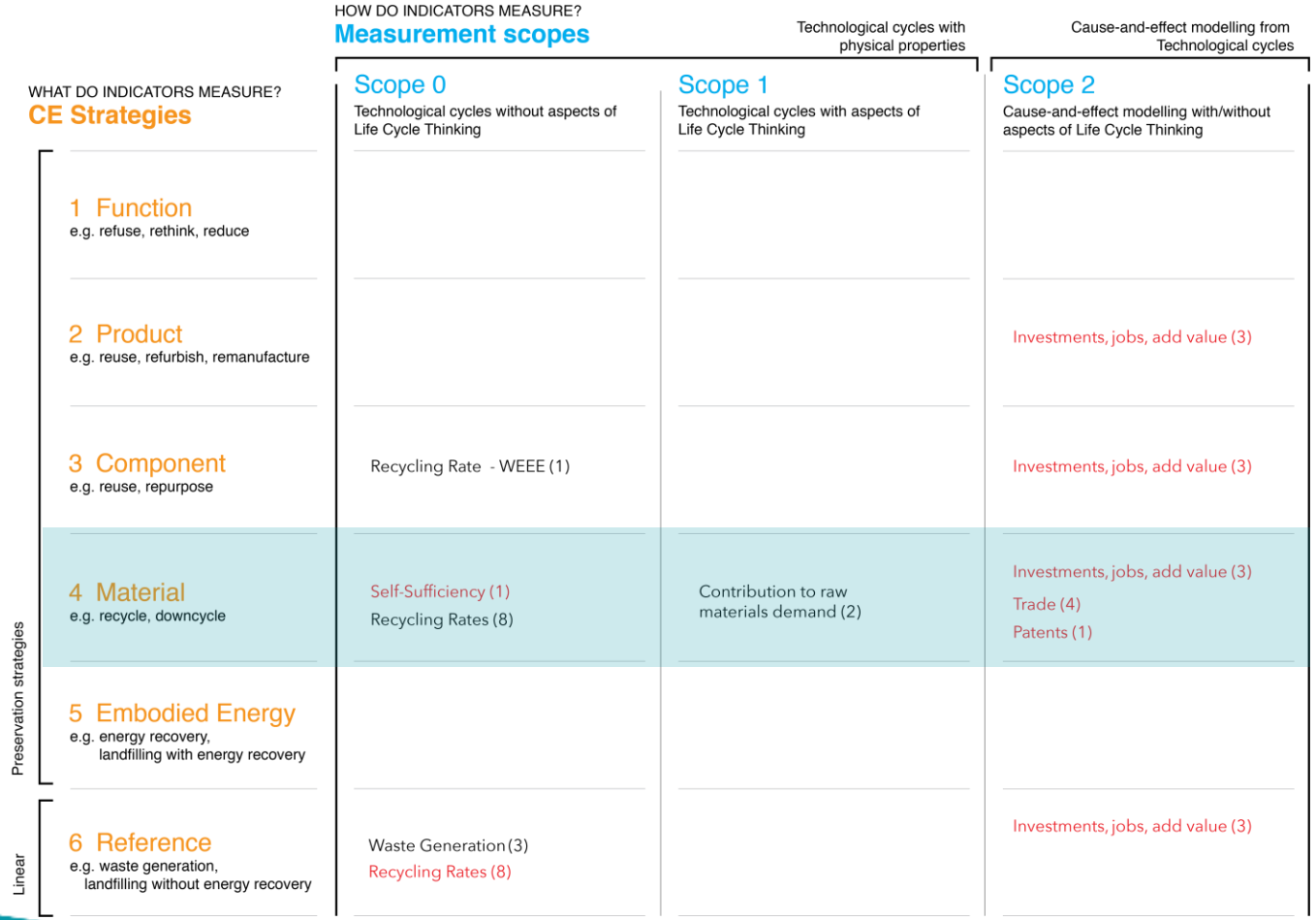


QUESTIONS?

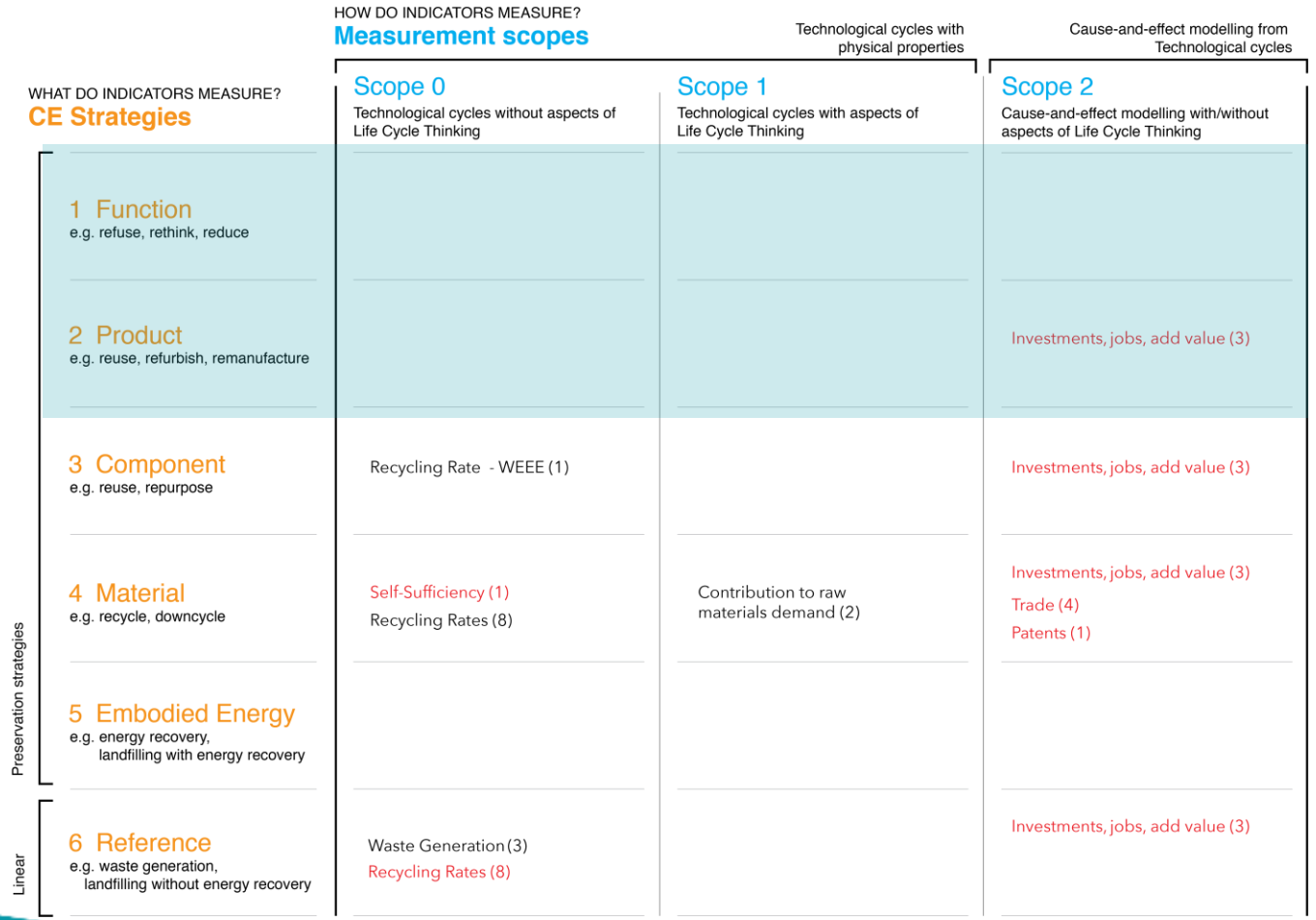
CLASSIFICATION FRAMEWORK ILLUSTRATION


HOW DO INDICATORS MEASURE?
Measurement scopes
Technological cycles with physical properties
Cause-and-effect modelling from Technological cycles
WHAT DO INDICATORS MEASURE?
CE Strategies
Scope 0
Technological cycles without aspects of Life Cycle Thinking
Scope 1
Technological cycles with aspects of Life Cycle Thinking
Scope 2
Cause-and-effect modelling with/without aspects of Life Cycle Thinking
Preservation strategies
Linear
1 Function
e.g. refuse, rethink, reduce
2 Product
e.g. reuse, refurbish, remanufacture
Investments, jobs, add value (3)
3 Component
e.g. reuse, repurpose
Recycling Rate - WEEE (1)
Investments, jobs, add value (3)
4 Material
e.g. recycle, downcycle
Self-Sufficiency (1)
Recycling Rates (8)
Contribution to raw materials demand (2)
Investments, jobs, add value (3)
Trade (4)
Patents (1)
5 Embodied Energy
e.g. energy recovery, landfilling with energy recovery
6 Reference
e.g. waste generation, landfilling without energy recovery
Waste Generation (3)
Recycling Rates (8)
Investments, jobs, add value (3)

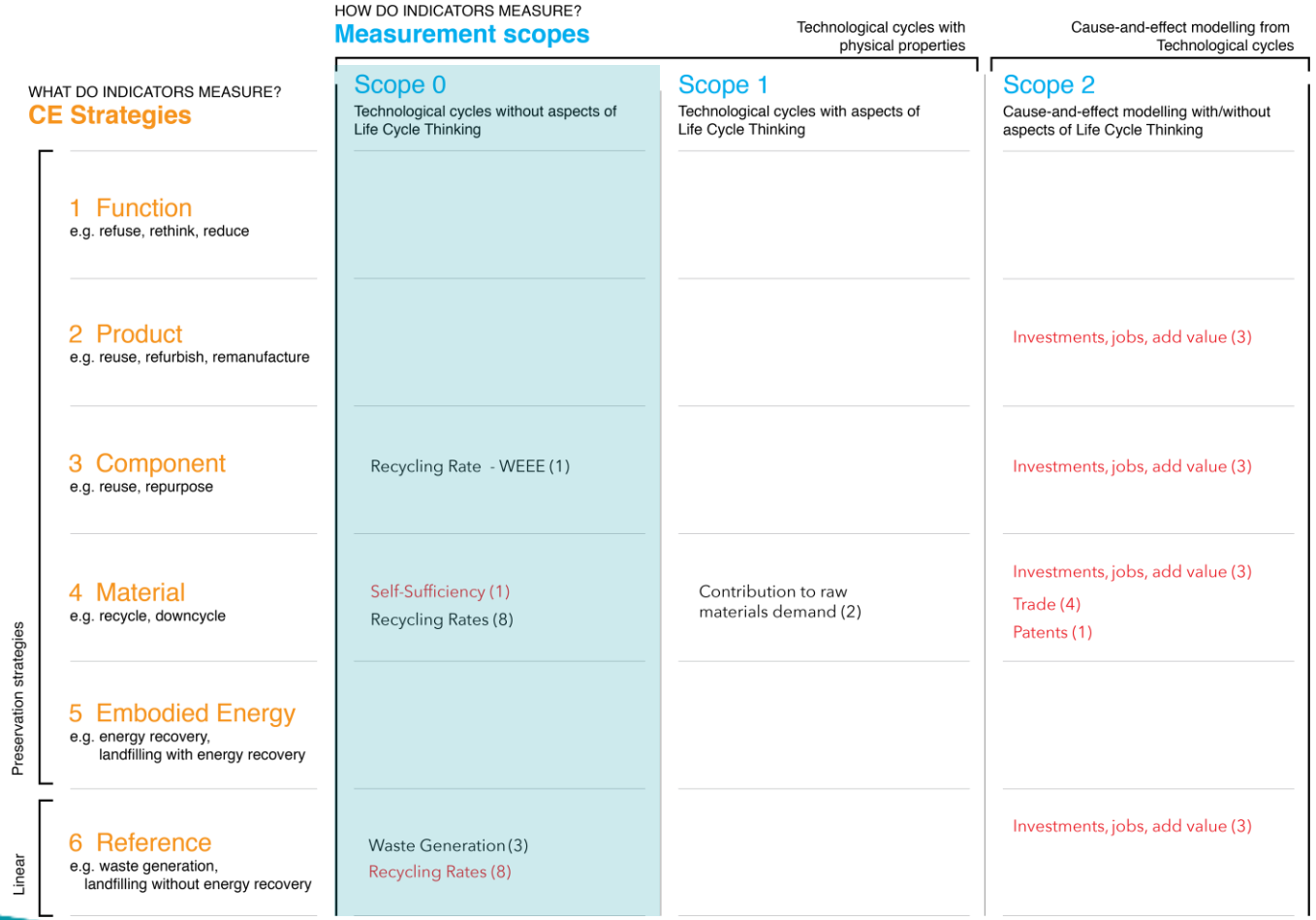
EU indicators: Strategy 4 groups the majority of the indicators



EU indicators: Functions and products not assessed by direct indicators



EU indicators: most of the direct indicators in Scope 0



EU indicators: only indirect indicators in Scope 2

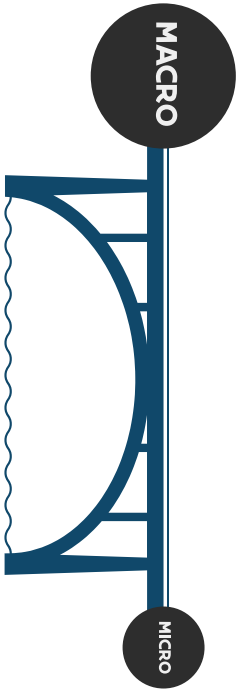
EU-CE INDICATORS:

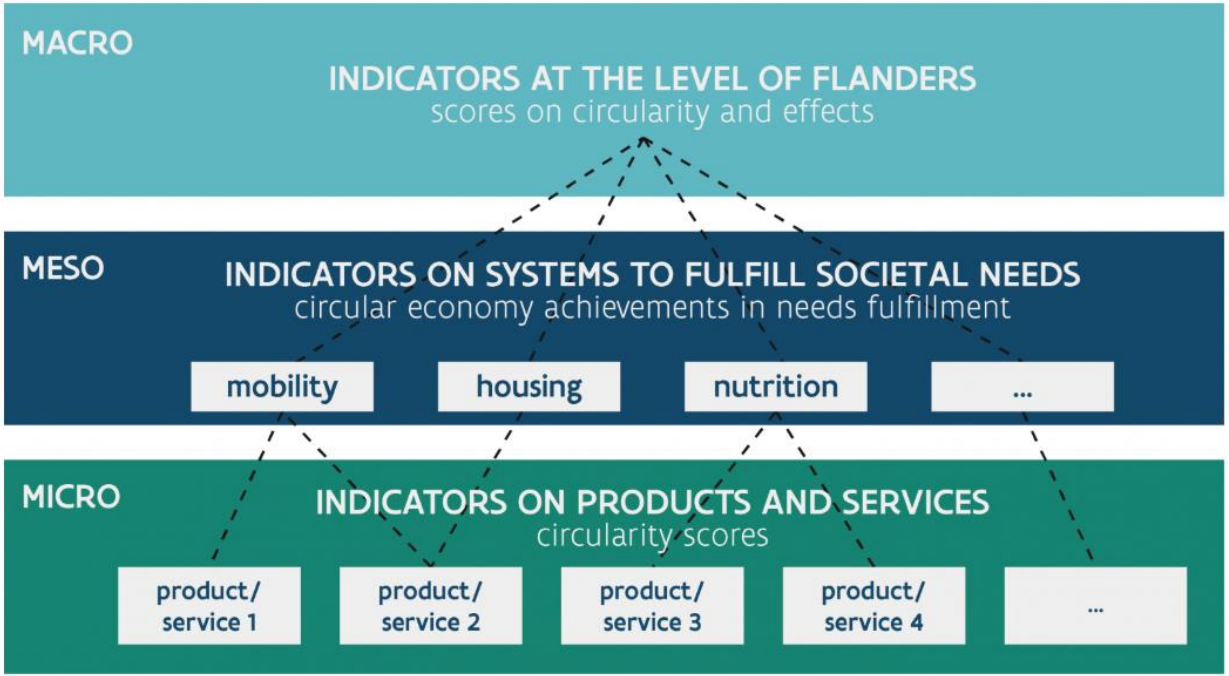
- Indicators build in from existing knowledge;
- Strong focus on materials, but promise for products/functions with indicators in development;
- Energy recovery is not relevant;
- Narrow life cycle perspective (scope 0).

CONCLUSION

- framework to classify output/outcome indicators;
- a single indicator might not be sufficient for CE.

OTHER PERSPECTIVES?





Alaerts, L., Van Acker, K., Rousseau, S., De Jaeger, S., Moraga, G., Dewulf, J., De Meester, S., Van Passel, S., Compernolle, T., Bachus, K., Vrancken, K., Eyckmans, J., 2019. **Towards a more direct policy feedback in circular economy monitoring via a societal needs perspective.** Resour. Conserv. Recycl. 149, 363–371. https://doi.org/10.1016/j.resconrec.2019.06.004

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THANK YOU

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QUESTIONS?

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