



## Do circular economy business models capture environmental value propositions?

A framework for evaluating the environmental value propositions of circular economy business models

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# Capitalising on Invisible Value - User-driven Business Models in the Emerging Circular Economy (AARRE) – project.

## AARRE

- aims to develop business models and new consumer practices to aid companies in accelerating their new collaboration in transforming a value chain into **the value circle**
- aims to develop **a holistic evaluation framework** for assessing the overall performance of business models
- additionally aims to understand how **the major shifts in technology** (e.g. IoT) can be used so as to accelerate the transition to the CE.

## Research question and aim of the study

- The research question is: **“How to verify the environmental value propositions of CE business models?”**
- The aim of the study is **to outline a framework** for evaluating the environmental value propositions of CE business models.

# Principles of circular economy

## OUTLINE OF A CIRCULAR ECONOMY

### PRINCIPLE

1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows  
ReSOLVE levers: regenerate, virtualise, exchange



Regenerate      Substitute materials      Virtualise      Restore

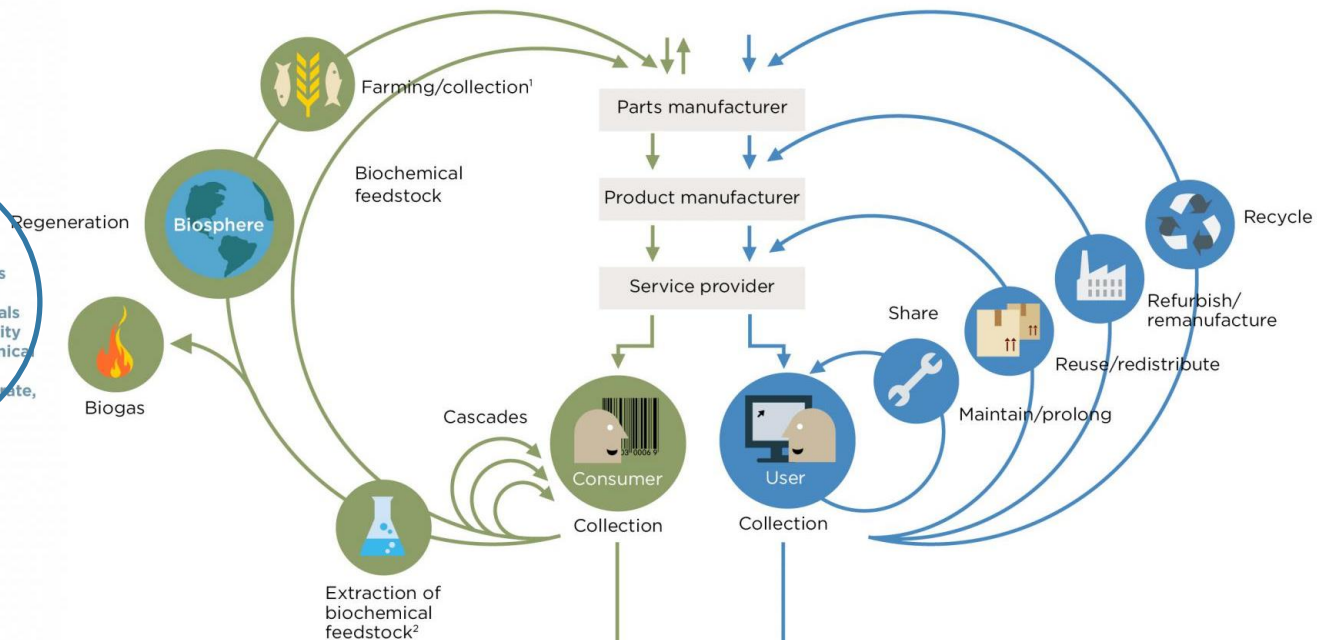
Renewables flow management

Stock management

### PRINCIPLE

2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles  
ReSOLVE levers: regenerate, share, optimise, loop



Minimise systematic leakage and negative externalities

### PRINCIPLE

3

Foster system effectiveness by revealing and designing out negative externalities  
All ReSOLVE levers

1. Hunting and fishing  
2. Can take both post-harvest and post-consumer waste as an input

Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, *Cradle to Cradle* (2002)

# Table of environmental value propositions

Circular economy principles	Environmental value propositions	Circular economy business model categories					
		Regenerate	Share	Optimise	Loop	Virtualise	Exchange
<p><b>Principle 1:</b> Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows.</p> <p><b>Principle 2:</b> Optimise resource yields by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles.</p> <p><b>Principle 3:</b> Foster system effectiveness by revealing and designing out negative externalities.</p>	Minimised and optimised exploitation of raw materials, while delivering more value from fewer resources		x	x		x	(x)
	Reduced resource consumption						(x)
	Efficient use of resources						(x)
	Minimised environmental impacts						(x)
	Non-toxic materials within sustainable levels						(x)
	Increased share of recyclable and recycled materials that can replace the use of virgin materials	(x)					(x)
	Closure of material loops	x			x		
	Sustainably sourced raw materials						(x)
	Reduced emissions throughout the full material cycle through the use of less raw material and sustainable sourcing						(x)
	Less pollution through clean material cycles						(x)
	Build-up of waste minimised						(x)
	Incineration and landfill limited to a minimum		x			x	(x)
	Reclaim, retain, and restore health of ecosystems	x					(x)

Circular economy principles  
by Ellen MacArthur  
Foundation

ReSOLVE actions by Ellen  
MacArthur  
Foundation

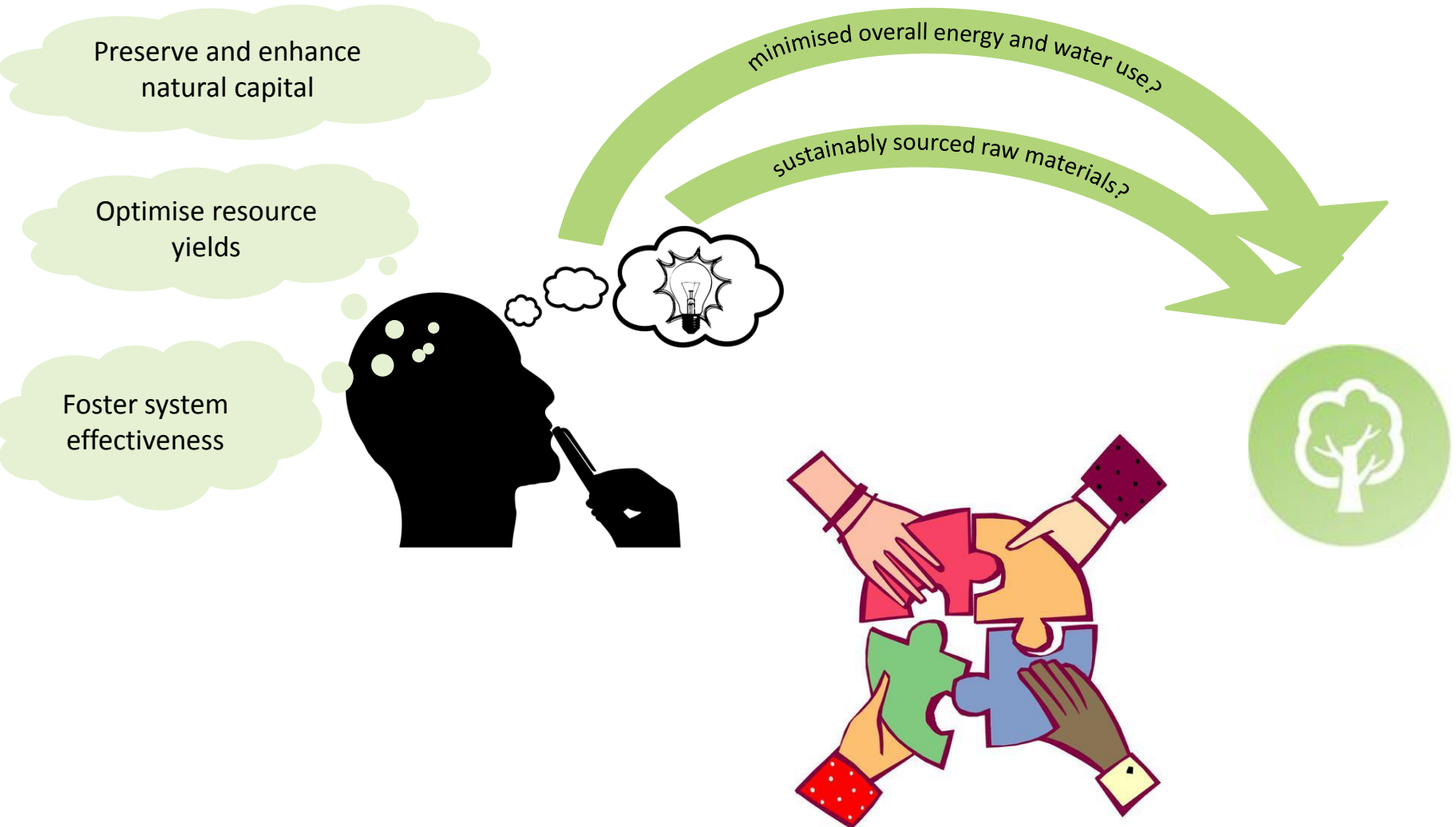
Key characteristics of CE  
defined by EEA

## References

Circular economy principles and ReSOLVE actions: <https://www.ellenmacarthurfoundation.org/circular-economy/overview/principles>

Key characteristics by EEA: [http://www.eea.europa.eu/publications/circular-economy-in-europe/at\\_download/file](http://www.eea.europa.eu/publications/circular-economy-in-europe/at_download/file)

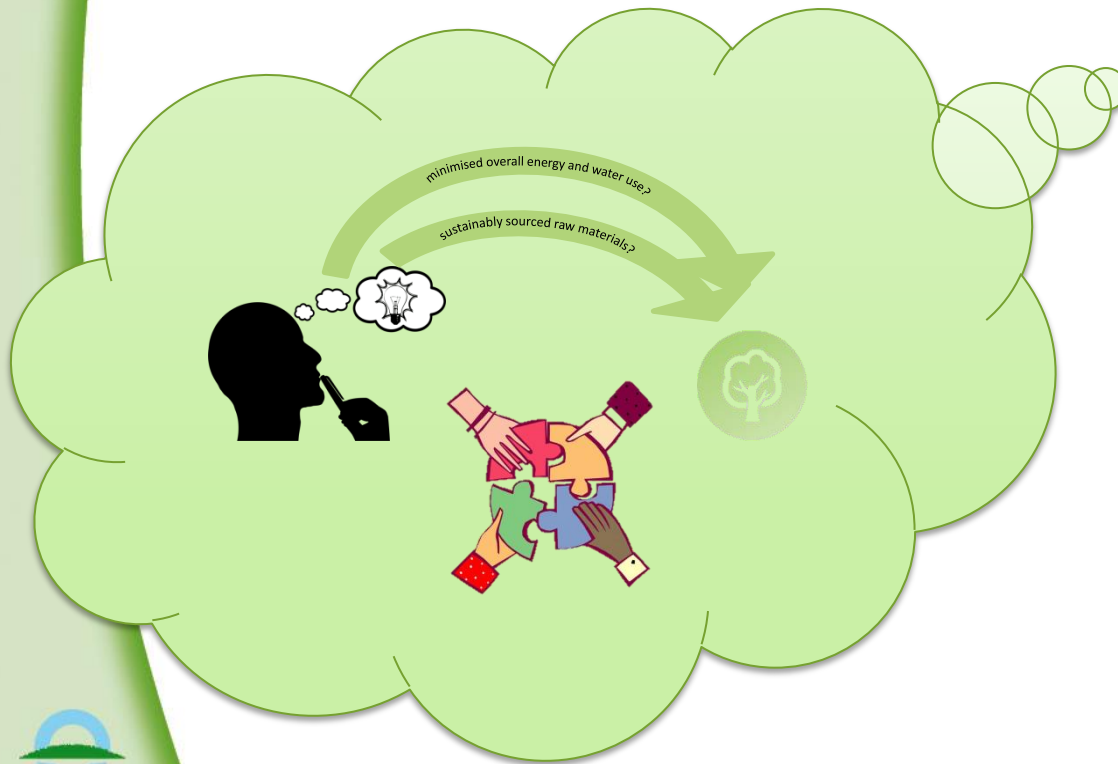
# Environmental value propositions of circular business models



# Environmental values of circular economy and business models

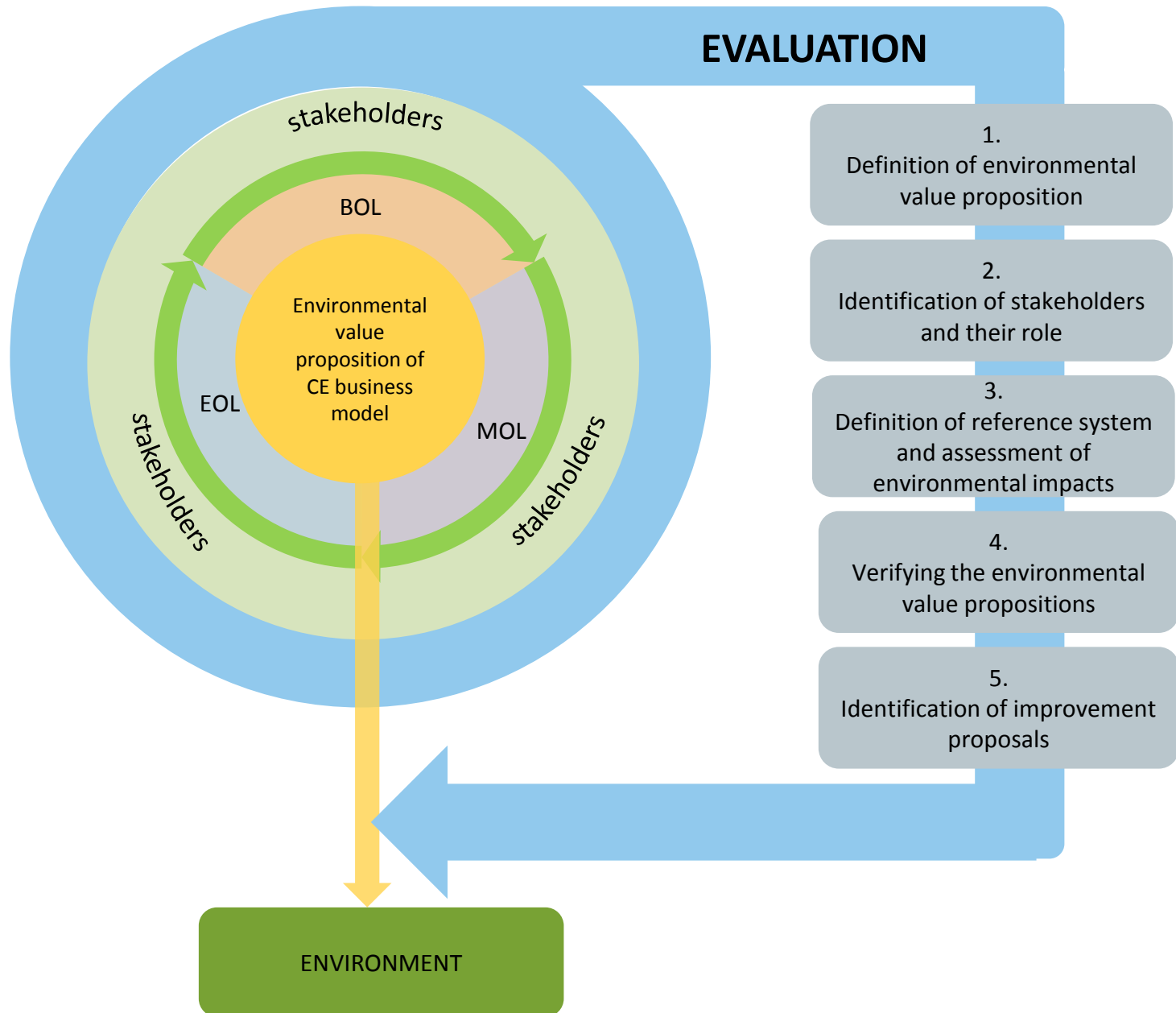
*Are the value propositions realised with the business model?*

*How can the realisation be verified?*





## Evaluation framework



## Results of the case Destaclean

- Produces wood stone, which is a recycled composite product, made of recycled construction waste wood, concrete and water.



## 1. Definition of environmental value proposition



1. Increased share of recyclable and recycled materials that can replace the use of virgin materials
2. Minimised and optimised exploitation of raw materials, while delivering more value from fewer materials
3. Incineration and landfill limited to a minimum
4. Reclaim, retain, and restore health of ecosystems

## 2. Identification of stakeholders and their role



Many stakeholders were defined. Examples:

- Customers, competitors, regional authorities, research institutes, universities

The role of stakeholders

- Many findings can be interpreted as improvement proposals (shown in step 5).

### 3. Definition of reference system and assessment of environmental impacts



- The first thought was to compare woodstone with concrete stone.
- However, Destaclean sees their operation as providing an alternative to the current construction wood waste management by recovering the wood as material instead of as energy.
- The operations also aim at prolonging the wood fibre life time.

## 4. Verifying the environmental value propositions



### **1. Increased share of recyclable and recycled materials that can replace the use of virgin materials**

- Use of wood fibre instead of sand and rock materials.

### **2. Minimised and optimised exploitation of raw materials, while delivering more value from fewer materials**

- Decreased use of primary raw materials.

### **3. Incineration and landfill limited to a minimum**

- Prolonging wood fibre life time as material instead of energy recovery.

### **4. Reclaim, retain, and restore health of ecosystems**

- Use of wood fibre instead of sand and rock materials leads to decreased problems at the gravel pits.

## 5. Identification of improvement proposals



### **Example findings from the step 2:**

- Better source separation of wood waste at construction site -> more high quality raw materials for wood stone production
- Regional authorities: more receiving areas for (wood) construction waste
- Legislation: policy instruments for the increased use of recycled materials
- Energy company: choose renewable electricity
- Product planning: substitute material for cement



## Conclusions

- So far, only little discussion on the realisation of the environmental value propositions of CE business models
- Companies can utilise the evaluation framework to
  - consider their own business from the environmental value proposition viewpoint (table of value propositions)
  - take into account all stakeholders and the entire life cycle of a product or service
  - plan and design new CE business models
  - verify intended environmental benefits.
- The most challenging point of evaluation is to define the boundaries and to identify the appropriate reference system
- Case Destaclean
  - Defining the business model category based on the value propositions is not unambiguous

*Thank you!*

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[www.vtt.fi/sites/AARRE/en](http://www.vtt.fi/sites/AARRE/en)



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