

# Circular economy

## History, concepts and consequences

Hans Stegeman



# Outline

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1. Circular economy: (history of) the concept
2. Circular economy: three layers in the concept
  - Circular business models
  - Circular value chains
  - Circular economy
3. Macro economics of Circular Economy

# Circular economy

(History of) the concept

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# From circular to linear

## (history of) the concept

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- Before the Industrial Revolution, cyclicity was the (natural) way of organizing society
- The origins of linearity can be traced back to the Enlightenment (Turgot, 1750): progress, as measured by an increase in material wellbeing, technological advance and better life conditions became the new normal
- Adam Smith (1776): Economic growth as the central tenet of neoclassical economics
- Central measure (since 1930s): Gross Domestic Product (Kuznets, 1934).
- GDP is the ultimate linear measure: measurement of value added of production
- Standard economics: Growth model (Solow, 1957), endogenous growth (Romer, 1994)

# Critics

## (history of) the concept

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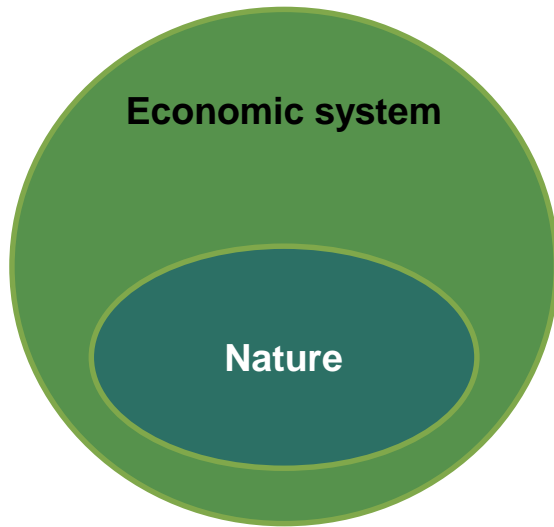
- **Critics on linear economy:**
- Classical: Malthus (1798): 'perpetual struggle for room and food' linear environment and exponential growth population
- Starting from 60s: Boulding (1966) Club of Rome (1972), Daly (1977):
  - Main claim: Economy is not isolated from environment and the economy reaches limits
  - Industrial ecology
  - Environmental economics
- **Critics on the concept GDP**
- (among others): Coyle (2014), Fioramonti (2013)
  - Main claim: GDP is not the right way to describe economic development, let alone wellbeing
  - Alternative measures for welfare (Stegeman, 2016, 2017)
  - Amendments of GDP (OECD, 2014)

# From linear to circular

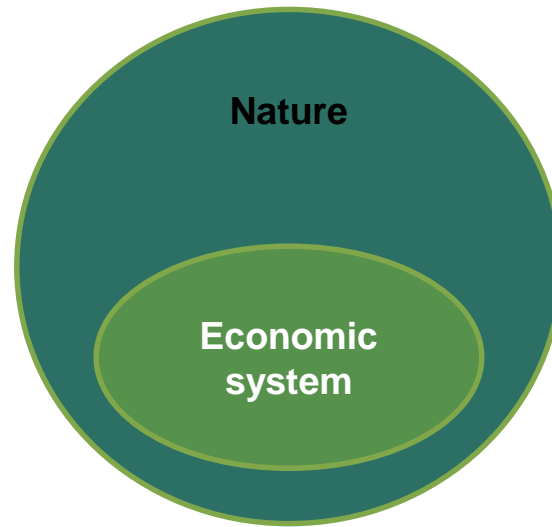
(history of) the concept

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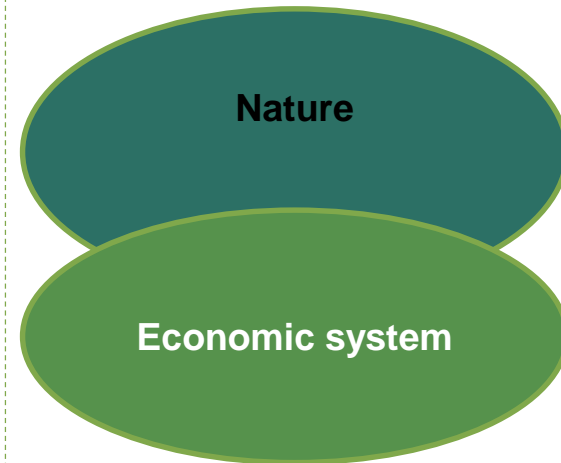
**Mainstream economy**  
Neoclassical (endogenous)  
growth theory



**Ecological Economy**  
(Czech & Daly 2004)



**Circular economy**  
(Pin and Hutaot, 2007)





# Definitions

(history of) the concept

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'A circular economy has benefits that are operational as well as strategic, on both a micro and macroeconomic level. This is a trillion-dollar opportunity, with huge potential for innovation, job creation and economic growth.' (EC, 2015)

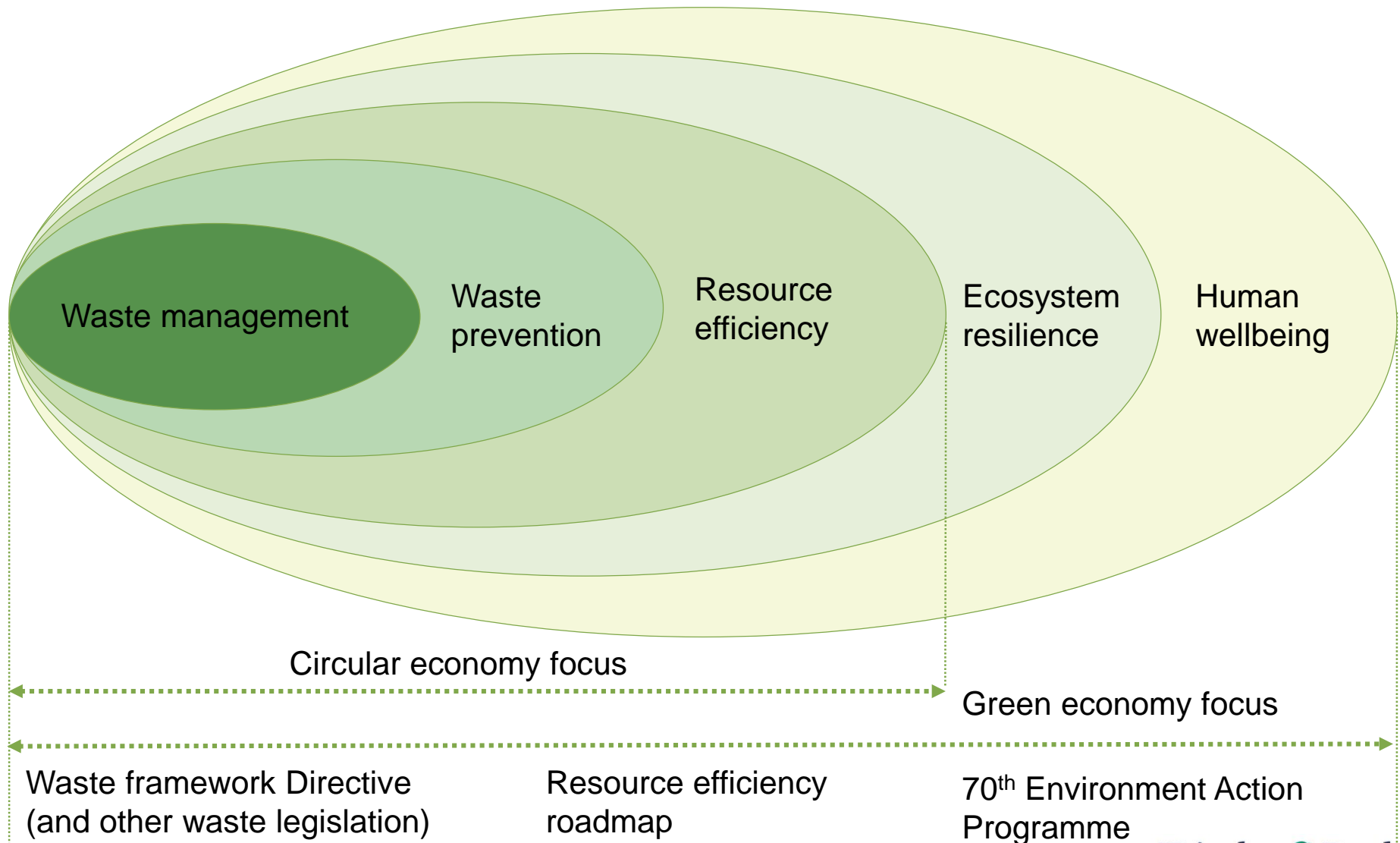
'...tackling climate change and the environment while boosting job creation, economic growth, investment and social fairness' (EC, 2015)

'The Circular Economy as a model in which resource input and leakage are minimized' (Lieder et al 2016).  
'a solution for harmonizing ambitions of economic growth and environmental protection' (Lieder et al 2016).

'An economy based on a spiral-loop system that minimizes matter, energy-flow and environmental deterioration without restricting economic growth or technological progress'. (Stahel, 1982)  
'...can be achieved through repair, reuse, and recycling'

# Circular economy, green economy and policy

(history of) the concept





# Theoretical background: a masterblend

(history of) the concept

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Performance economics  
Stahel (1984)

Blue economy  
(Pauli, 2014)

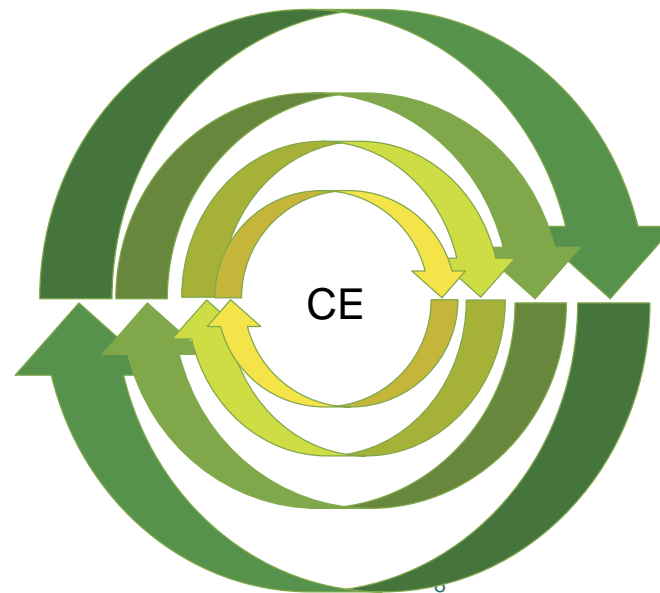
Industrial ecology  
(Erkman,  
1997; Ayres, 1989)

Biomimicry  
(Benyus, 2002)

Ecological economics  
(Daly, 1977; Jackson, 2015)

Cradle to cradle  
(Braungart and  
McDonough, 2003)

Environmental economics  
Pearce and Turner (1989)



# Definitions

(history of) the concept

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- Definition we use: The CE is based on the idea of a (re-)design of **production systems at various levels** with a central focus on value preservation in closed loops throughout the lifespan of (raw) materials and goods (Jonker et al. 2017)
- This means: analyzing CE at three levels:
  - Individual organizations: Circular Business Models
  - Industries: circular Value Chains
  - Society: a circular macro economy

# Circular economy

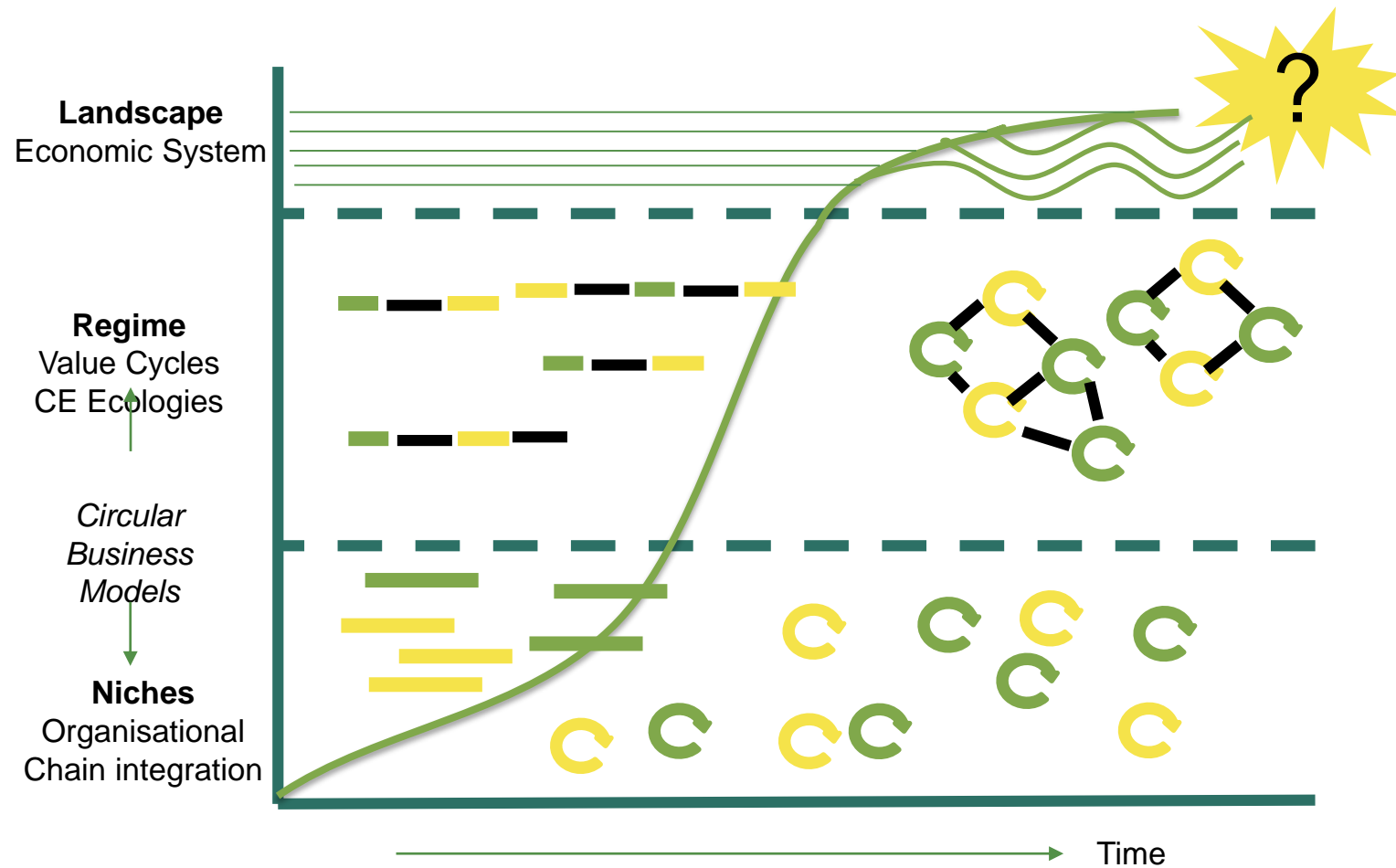
## Three layers of CE

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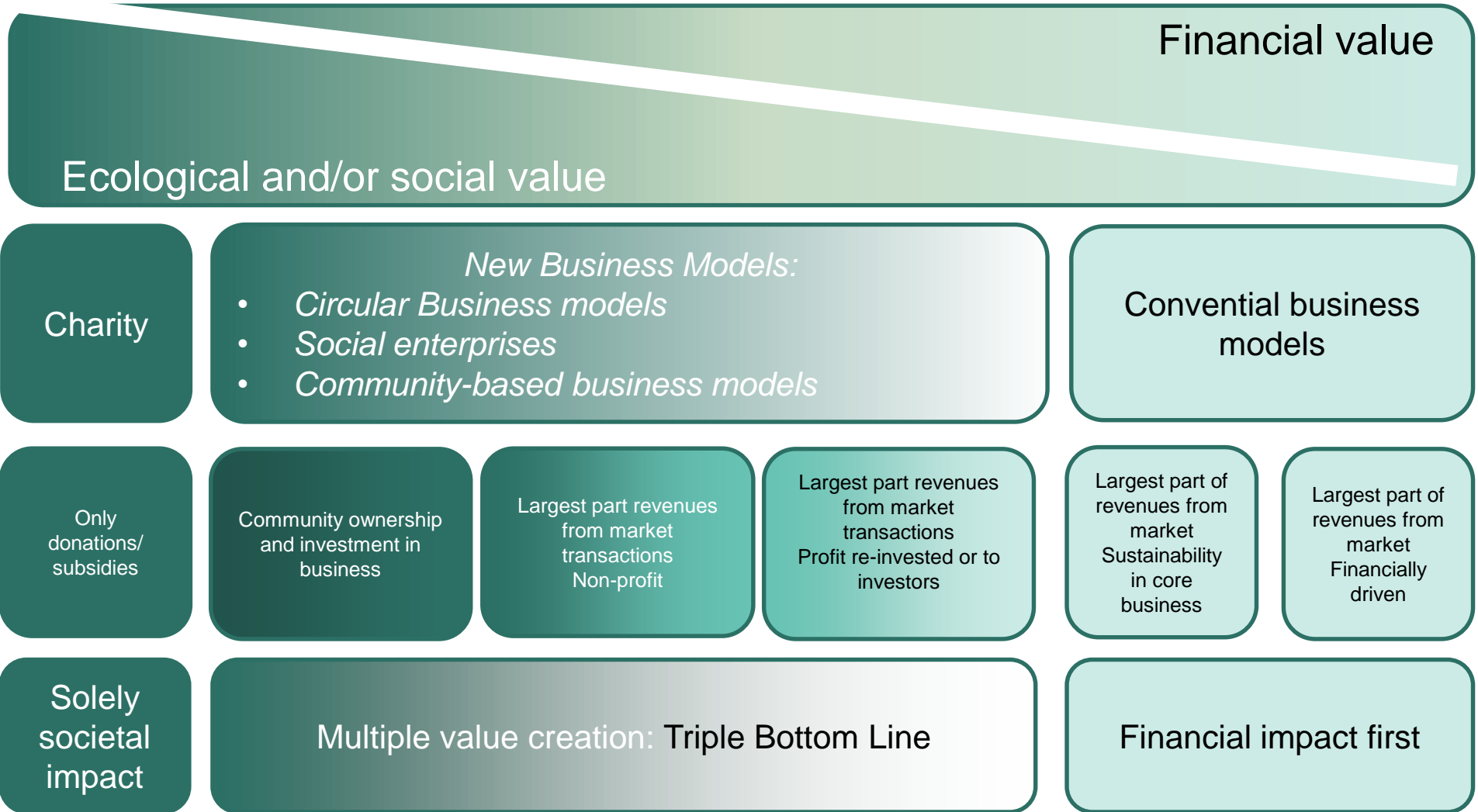
# From micro to macro

## Three layers of CE



# Business models: What differentiates CBMs?

## Three layers of CE: CBM



# Building Blocks of Circular Business Models

## Three layers of CE: CBM

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Loops



Value creation



Strategy



Organisation

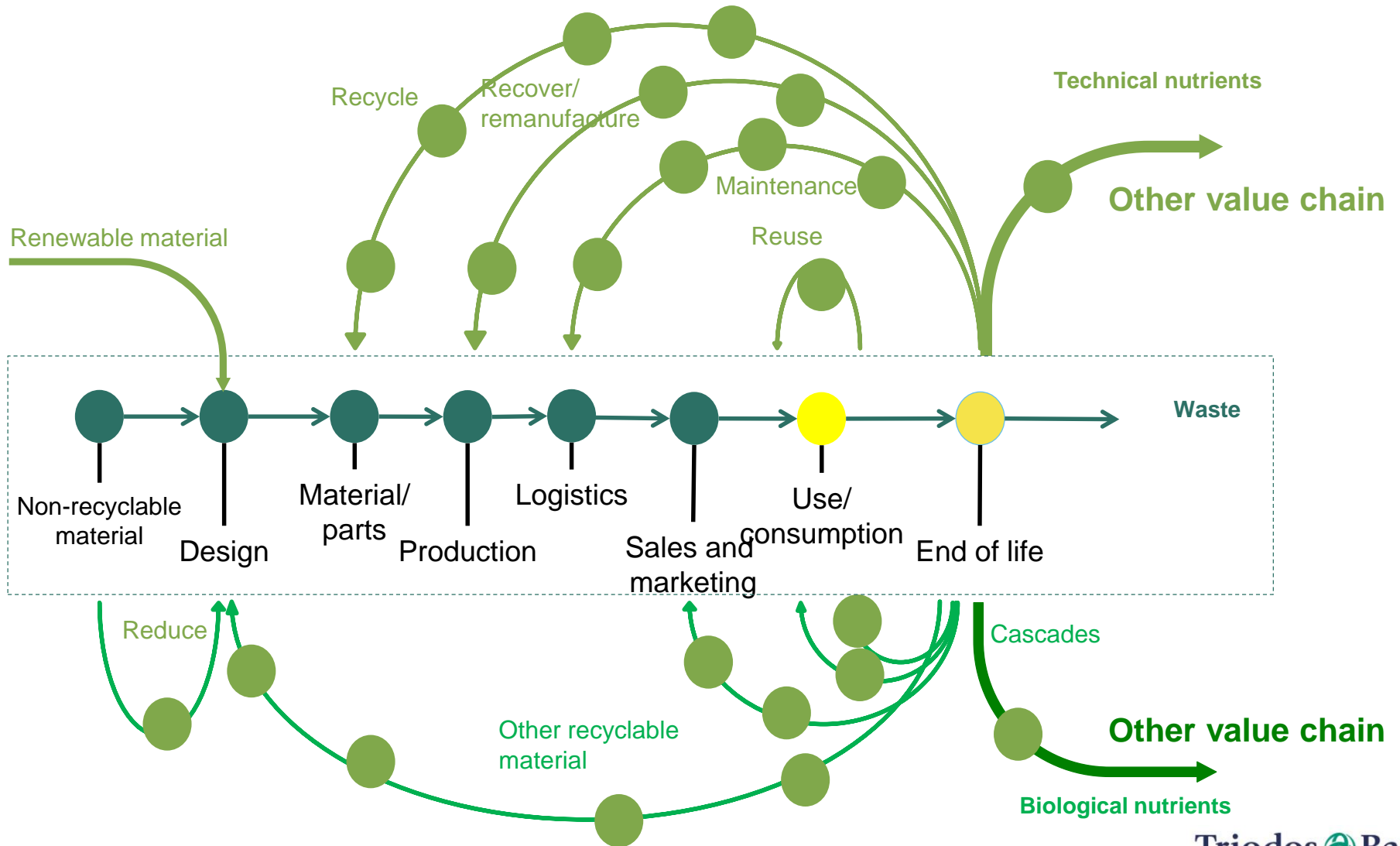


Earnings model



# Building Blocks (1): Loops

## Three layers of CE: CBM



## Building Blocks (2): Value creation

Three layers of CE: CBM

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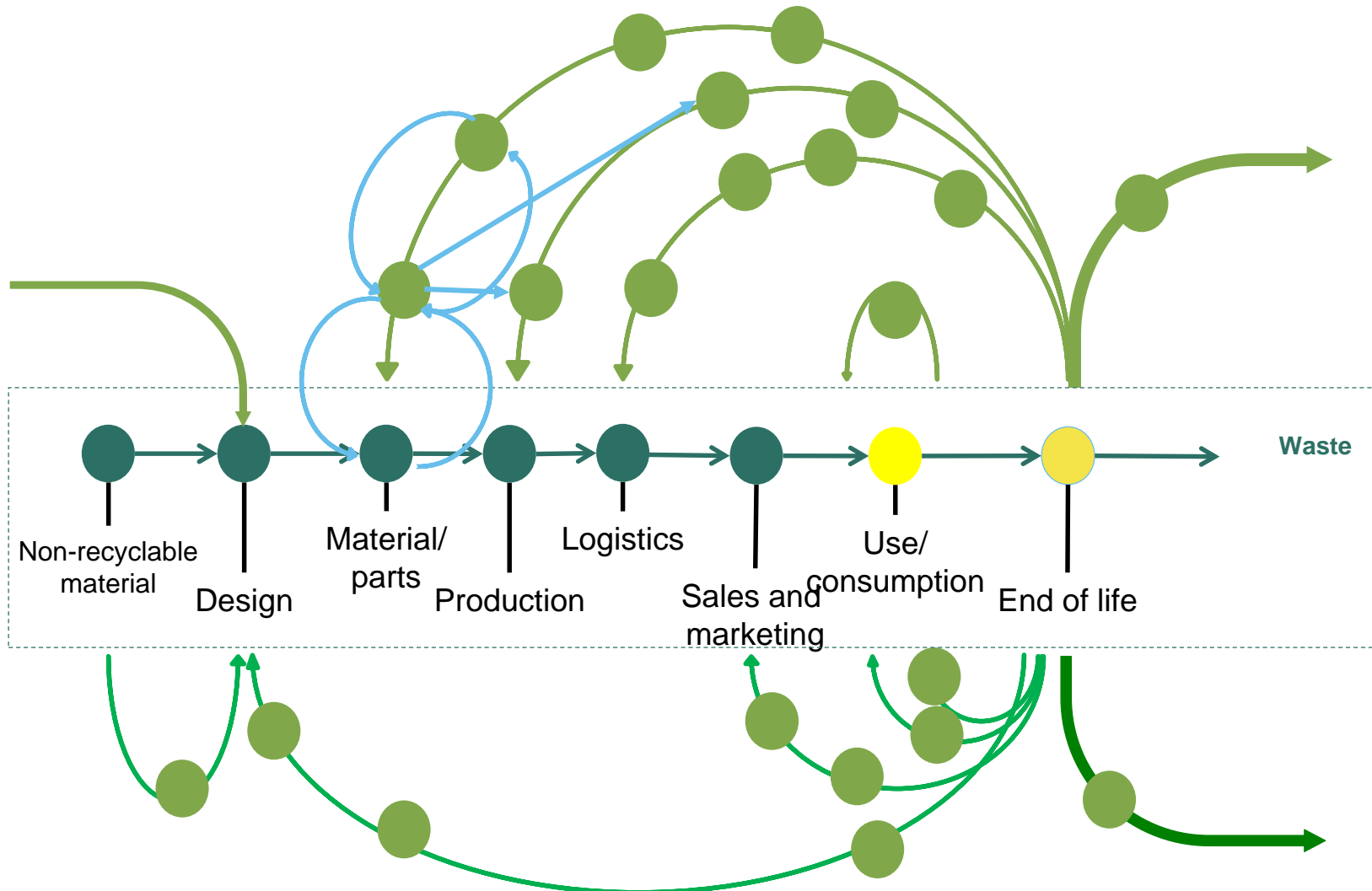
# Building Blocks (3): Strategy

## Three layers of CE: CBM



# Building Blocks (4): Organization

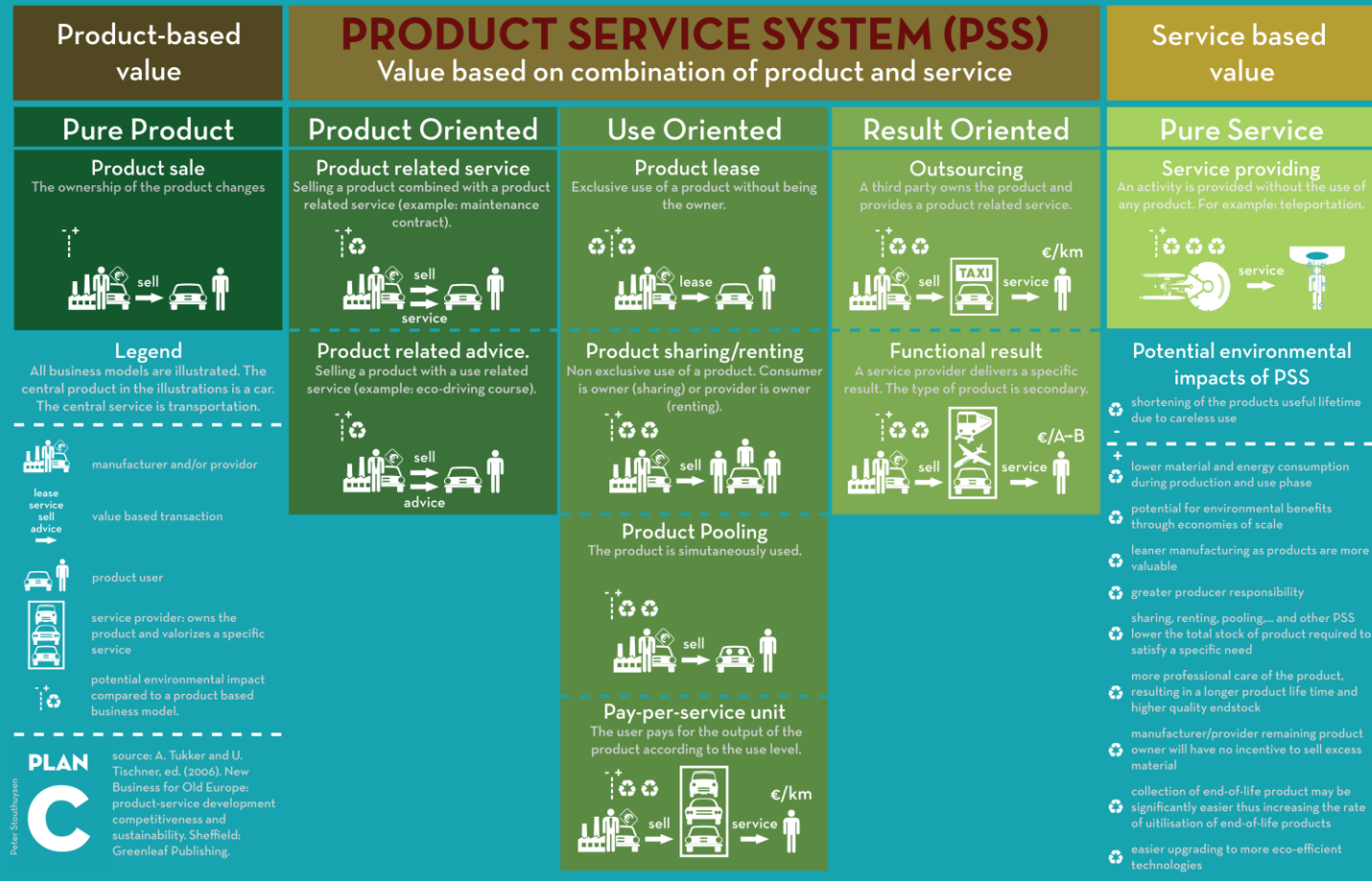
## Three layers of CE: CBM



# Building Blocks (5): Earnings model

## Three layers of CE: CBM

### PRODUCT SERVICE SYSTEMS: MAIN AND SUB-CATEGORIES



**PLAN C** source: A. Tukker and U. Tischner, ed. (2006), New Business for Old Europe: product-service development competitiveness and sustainability. Sheffield: Greenleaf Publishing.

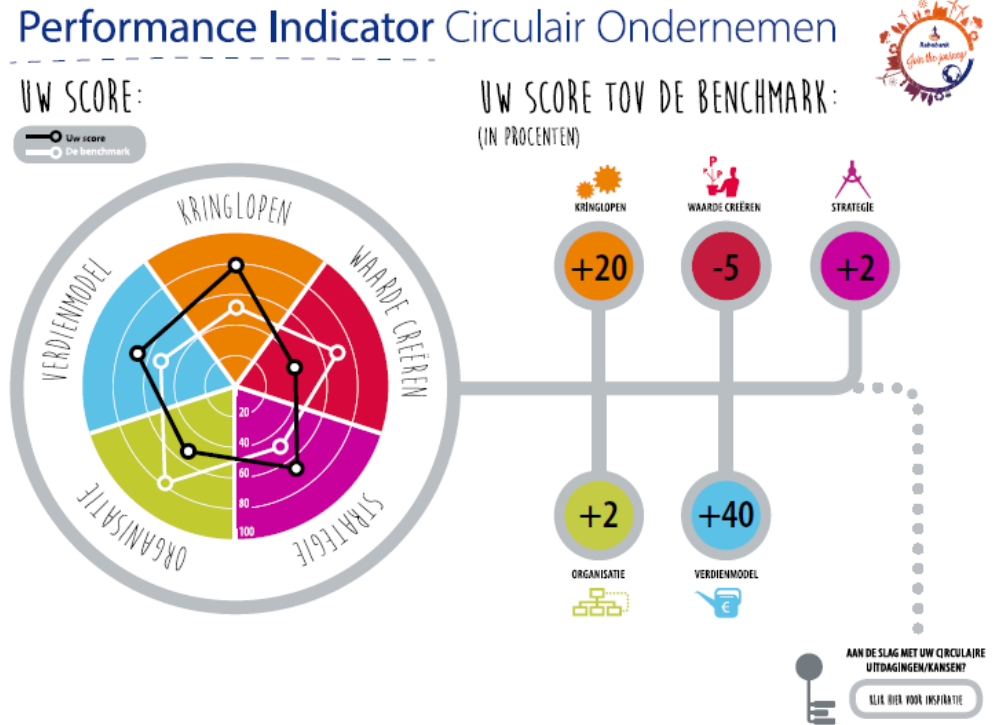
# Measuring building blocks

## Three layers of CE: CBM

Trying to discover CBMs in the Netherlands in large-scale survey

Preliminary results:

- Circular in linear environment
- Collaboration in value chain is only possible if there is alignment in objectives, intentions and trust
- Important barriers: clients, government and finance





# Macro economics of circular economy

## The third layer of CE

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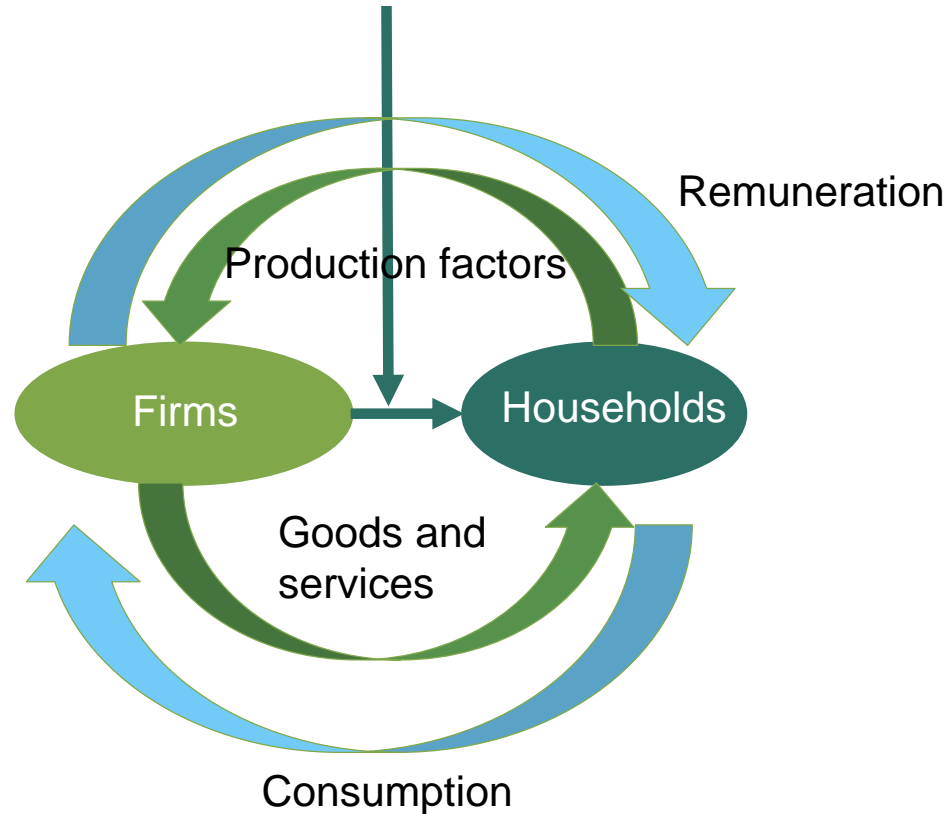


# Going from linear to circular (1): linear macro 101

## Macro economics of CE

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Economic growth: value added of market production of goods and services



# Going from linear to circular (2): Why a circular macro economy?

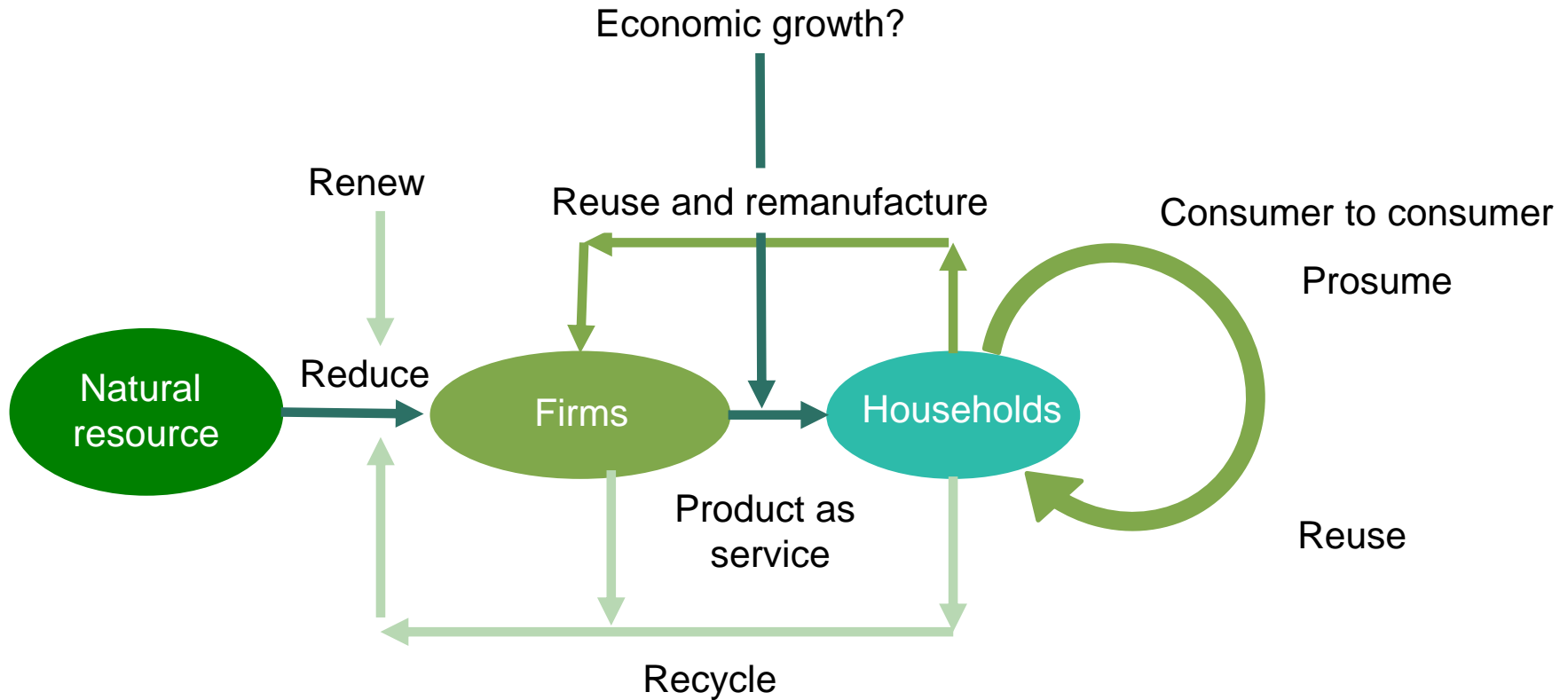
## Macroeconomics of CE

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- **Ecological perspective:** resource scarcity/sustainability (limits of earth's capacity)
- **Technological perspective:** innovation enables new business models (IoT, AI, 3D-printing, platform models)
- **Social perspective:** an affluent society needs has the luxury of creating more value by using less, and (sometimes) producing local
- **Economic perspective:** efficient global value chains and more efficient usage of all goods produced
- *Circular economy at macro level a means to reach goals such as sustainable development (Brundtland, 1987)*

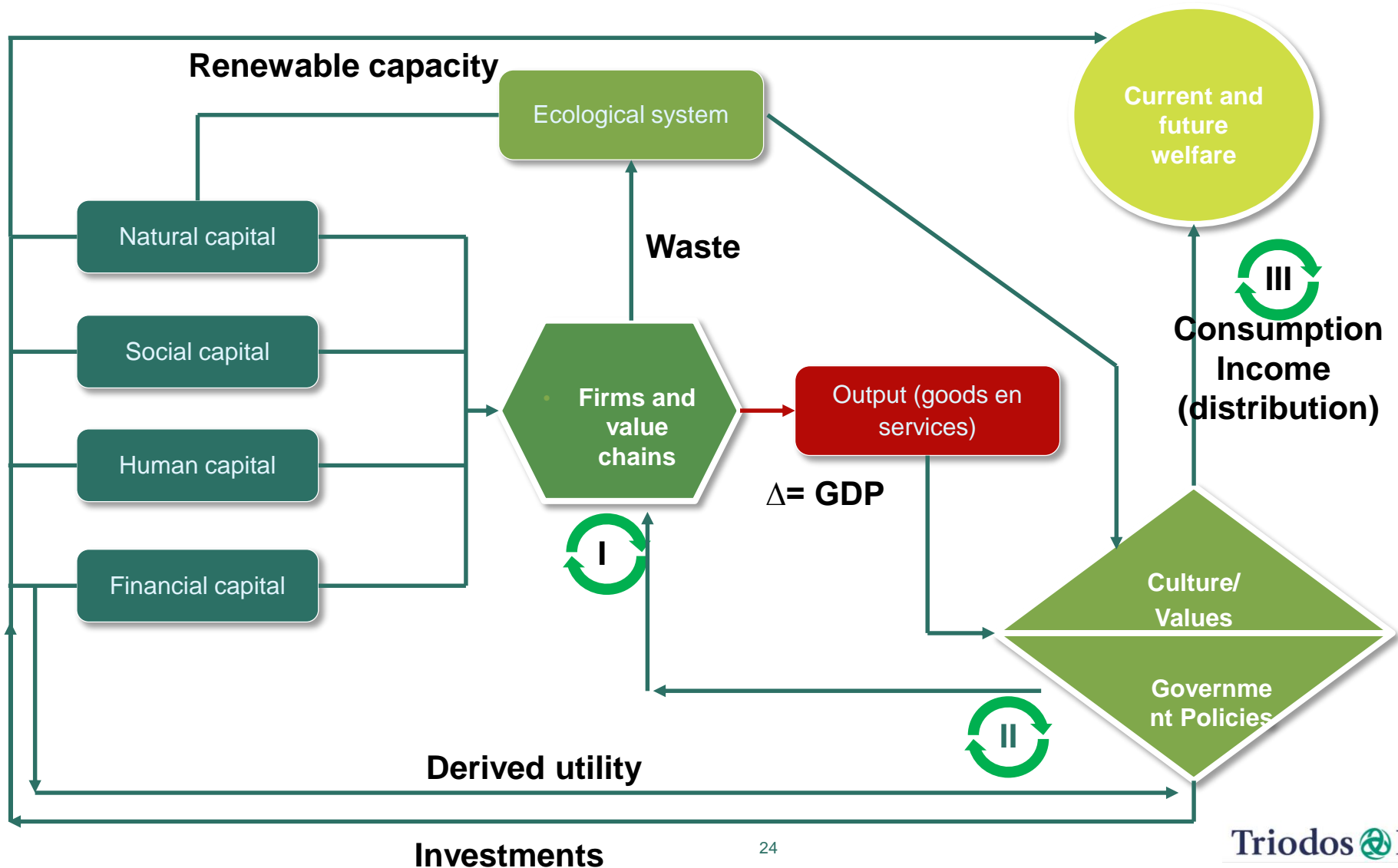
# Going from linear to circular (3): circular macro

## Macroeconomics of CE



# Going from linear to circular (3): circular macro elaborated

## Macroeconomics of CE



# Going from linear to circular (3): a few dilemmas

## Macroeconomics of CE

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- Will practices of CE lead to sustainable development?
  - Rebound effects?
  - Substitution effects?
  
- Who will be the losers of CE and what to do with them?
  
- What is the transition path?
  - Role of government policies
  - Role of consumers





“Economy is not  
baseball, where the  
game is always  
played by the same  
rules.”

— [Nate Silver, The Signal and the Noise:  
Why So Many Predictions Fail - But Some  
Don't](#)

**Triodos  Bank**