

This project is co-funded by the European Union and the Republic of Türkiye

**Technical Assistance for Assessment of Türkiye's Potential on**

**Transition to Circular Economy**

**EuropeAid/140562/IH/SER/TR**

**EU Good Practices on Material Valorisation**

Freek van Eijk – Holland Circular Hotspot  
[freek.vaneijk@hollandcircularhotspot.nl](mailto:freek.vaneijk@hollandcircularhotspot.nl)

Activity 3.2.3 Training of Trainers on Integrated Waste Management in Line with Circular Economy

16-19 September 2024

Sakarya / Türkiye



# Mr. Freek van Eijk

CEO Holland Circular Hotspot



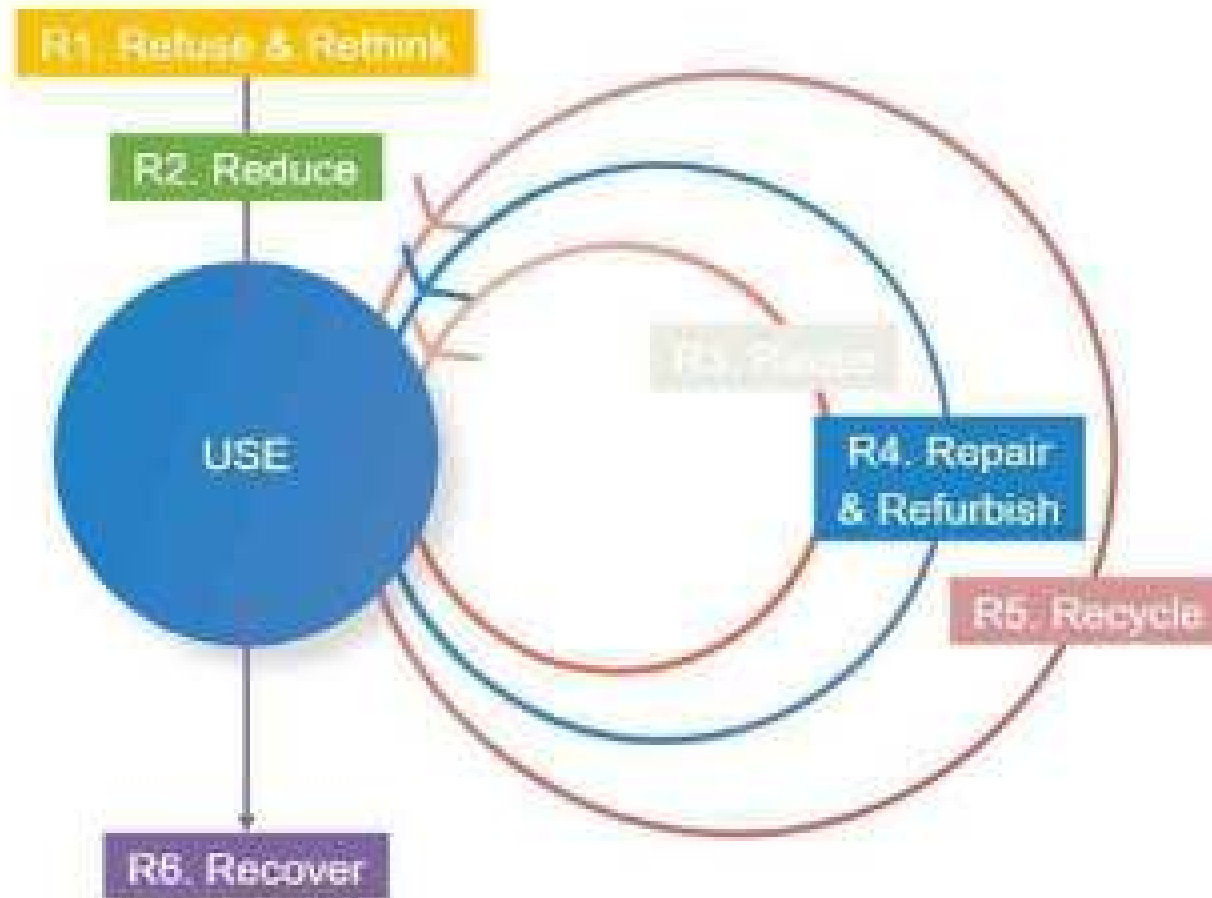
# PROGRAMME

- 1.Short Intro
- 2.Good Practices in Manufacturing
- 3.Good Practices in the Built Environment
- 4.Good Practices in Agrofood and Biomass



# The **WHAT** of Circular Economy

R-ladder - 6 strategies to reduce use of new resources



# The WHO of Circular Economy

Necessity to connect the 4 key groups of stakeholders

‘This journey can only be fulfilled when all stakeholders are actively working together’

Dr. Jacqueline Cramer  
former Minister for the Environment of the Netherlands.

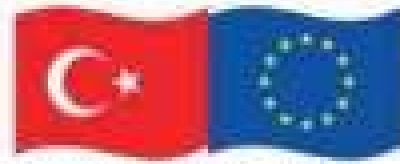


# Circular Economy: the X-curve

In parallel stimulating desired aspect and breaking down societal aspects that block transition



Figure: A Carbon example: The transition to a circular economy in The Netherlands (Bakker et al., 2018)



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## Technical Assistance for Assessment of Türkiye's Potential on Transition to Circular Economy

EuropeAid/140562/1H/SER/TR

EU Good Practices on Material Valorisation: **Manufacturing**

Freek van Eijk – Holland Circular Hotspot  
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# Manufacturing: the future is circular

- Transformation of industry towards climate-neutrality and long-term competitiveness
- The digital revolution, sustainability and COVID-19 are drivers
- Substantial material savings and value creation options

# Pressure on resources

- 110% > expected growth of natural resource [2015 to 2060]
- 43% > corresponding increase of GHG emissions
- 12x > Critical Raw Material growth by 2050 to answer needs of energy transition



# Growing waste streams

- 38% > expected growth of e-waste [2030]
- 17.4% > collected and recycled % e-waste [2019]



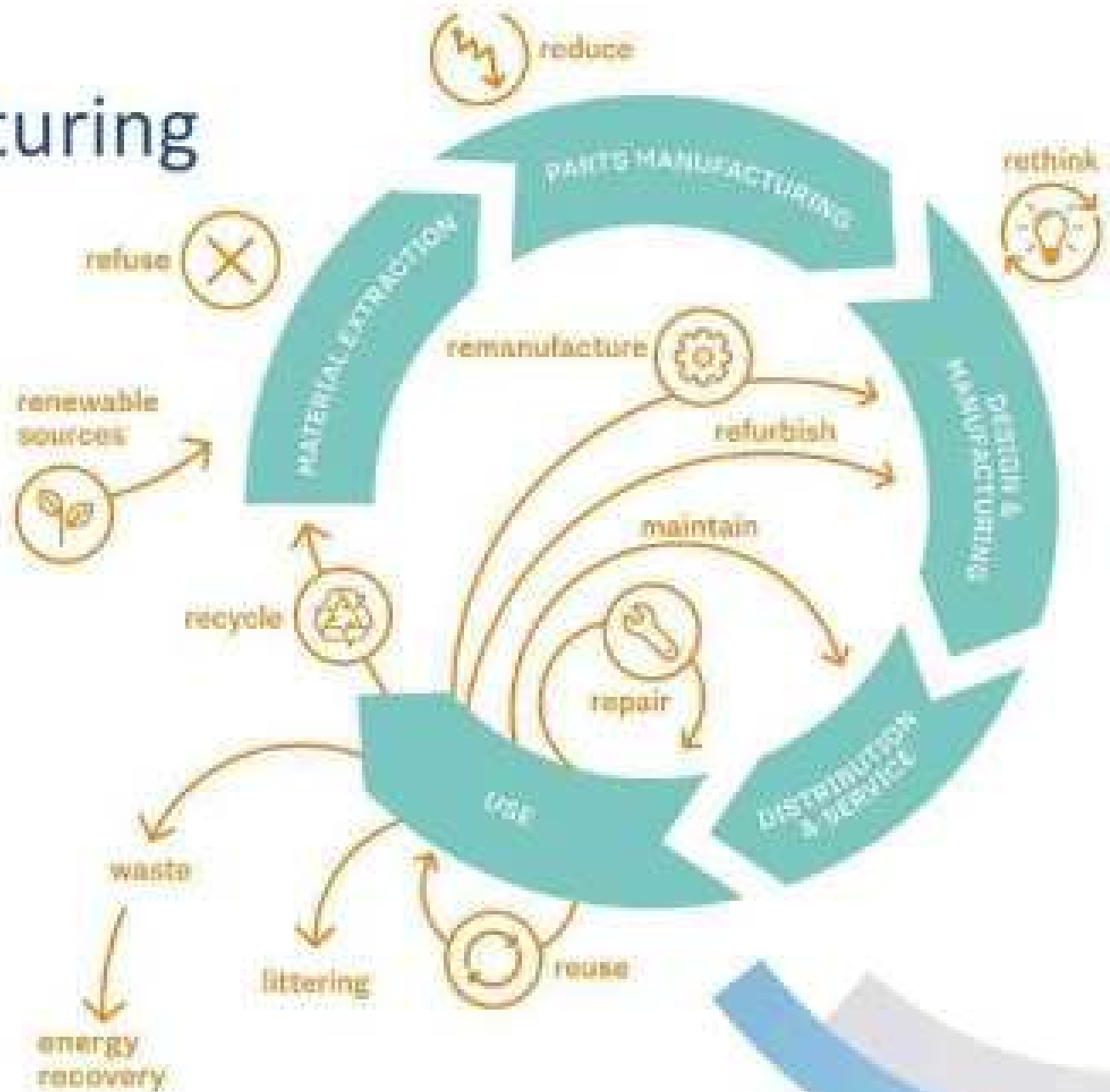
# Circular Economy

Value hill - importance of value retention



# Circular Manufacturing

- Design aims at an optimal lifespan with the end of life in mind
- Products can be kept in circulation as long as possible
- If there is no other option, materials can be recovered and recycled



# Circular design

Dutch Design and Circular Design go hand in hand



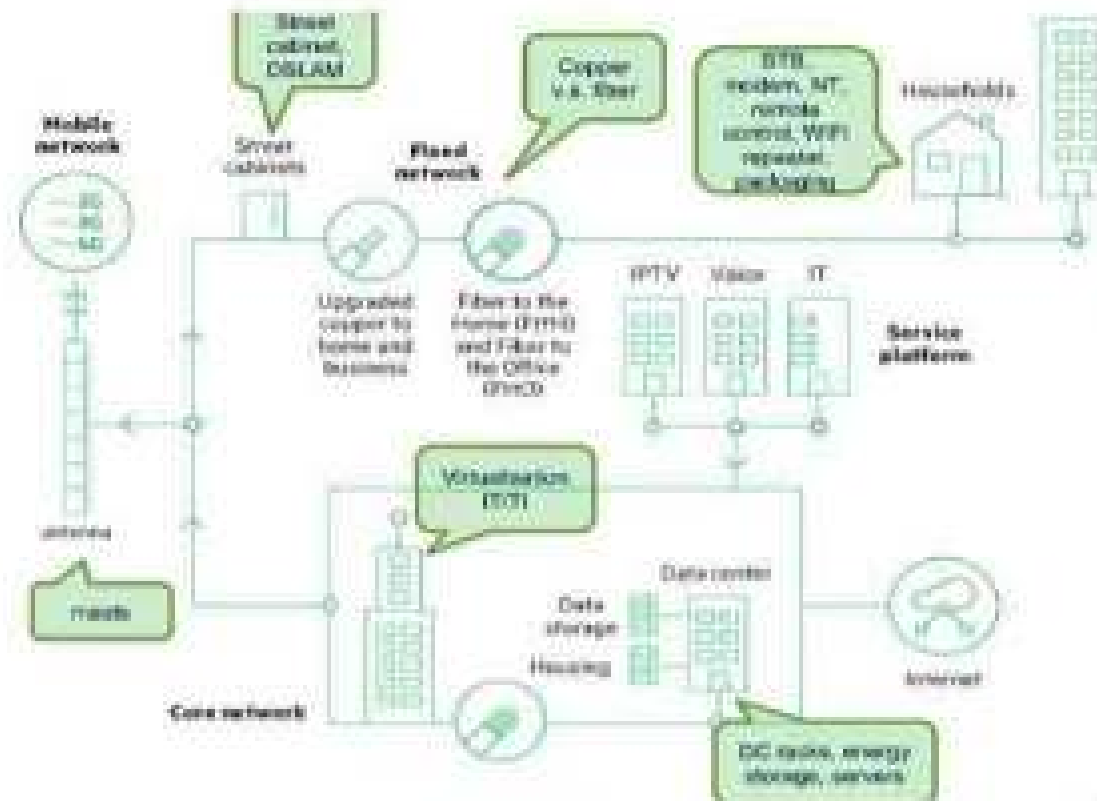
**Auping**  
Recyclable bedframes and 100% circular mattress



**Ahrend**  
Modular office furniture, easy to repair and upgrade

# Develop supply chains for critical materials

Mitigating risks critical materials



KPN

Building resilient supply chains for critical materials



Fairphone

Durable, ethical and smart mobile phone

# Remanufacturing of products

by OEMs



Lely  
Remanufacturing milking robots worldwide



ASML  
Modular design enables upgrades during use



# New business models

Shift from ownership to use



Swapfiets  
Bicycle as a service stimulating circular design



Mitsubishi Elevators  
Selling performance resulting in low operations costs

## High Potential sectors for international cooperation

- Circular windfarms
  - Circular Design
  - Modular design, design for reuse
  - Remote monitoring
  - Recyclable wind blades
  - Ecological foundations



# Supporting tools

Impact assesment, design, procurement

- Risk assessment of resources in the value chain
- Workshop tracks to design circular products and business models
- Guidelines for circular passports



## CIRCO

creating business through circular design



# Read our publication!

- 20 business cases
- 6 High Potential Sectors
- 4 tools

More information on:

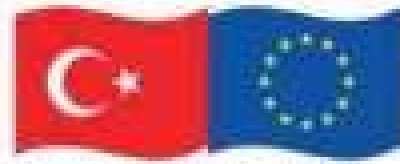
- Dutch Circular Manufacturing Program
- Platform for Accelerating Circular Economy
- Next actions for transition

## Manufacturing: the future is circular



NL

Netherlands



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# WE HAVE TO MAKE THE BUILT ENVIRONMENT MORE CIRCULAR!

...OR WE WILL NEVER REACH THE OBJECTIVES OF THE EU GREEN DEAL AND THE CIRCULAR ECONOMY PACKAGE

Based on a building's full lifecycle, the building sector is responsible for:



**1/2** of all extracted materials



**1/2** of the total energy consumption



**1/3** of water consumption



**1/3** of waste generation

> **1/3** of CO<sub>2</sub> emissions in EU

# CONSTRUCTION SECTOR AS A PRIORITY SECTOR

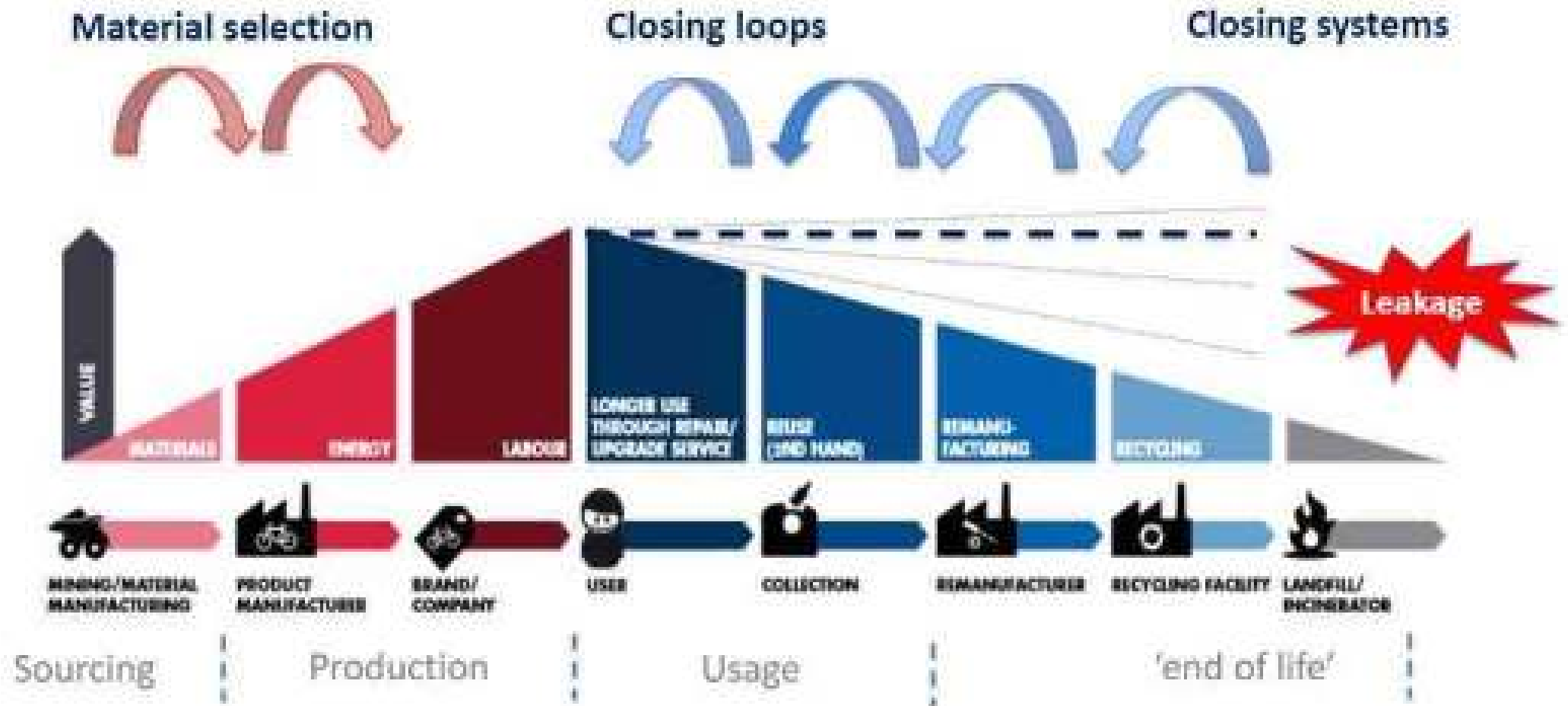
## CURRENT BUILDING DEVELOPMENT CYCLE IS WASTEFULL

- Build environment in NL using
  - 40% of energy
  - 40% of primary resources
- Approximately 250 million tons of sand, wood, concrete, steel a year
- 40% of all waste related to construction
  - 24 million tons / year



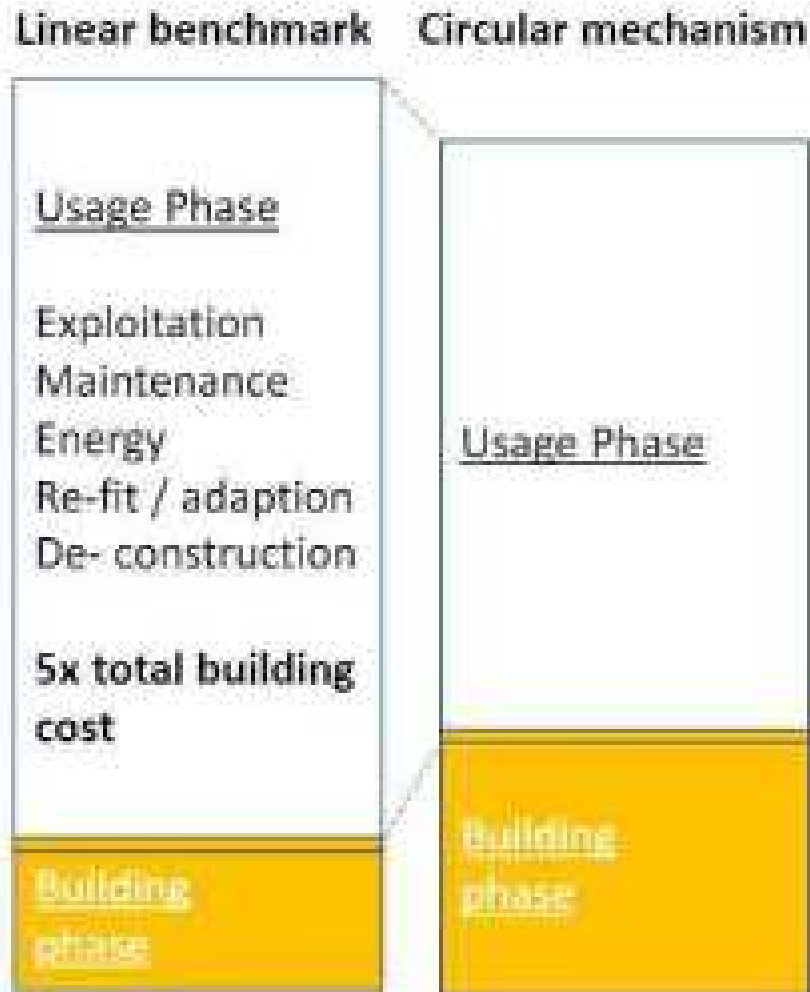


# CIRCULAR ECONOMY IS ABOUT VALUE PRESERVATION



# OPTIMIZING OVER TOTAL LIFETIME

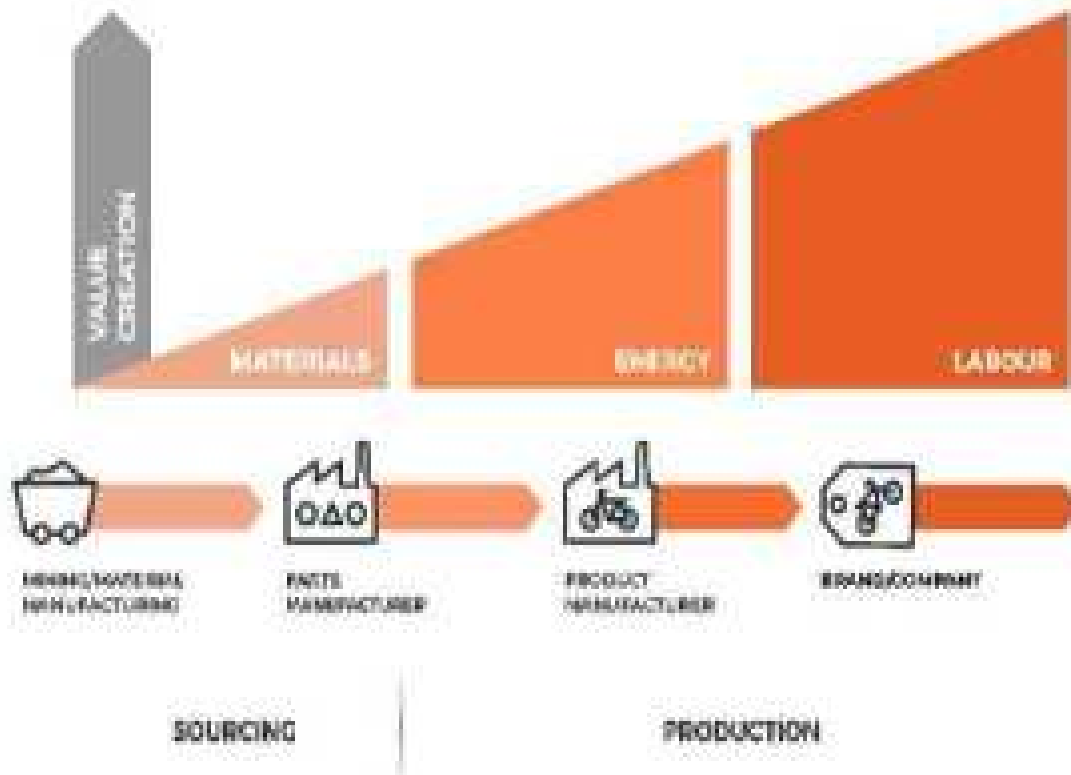
## FINANCIALLY



- Cost of Ownership dominantly determined after project delivery
- Design process optimized on total building cost in linear economy
- Circular mechanism
  - Capex (initial investment) 
  - Opex (cost of operation) 
- Total cost of ownership and carbon down

# OPTIMIZING OVER TOTAL LIFETIME

## DESIGN: SOURCING AND CONSTRUCTION

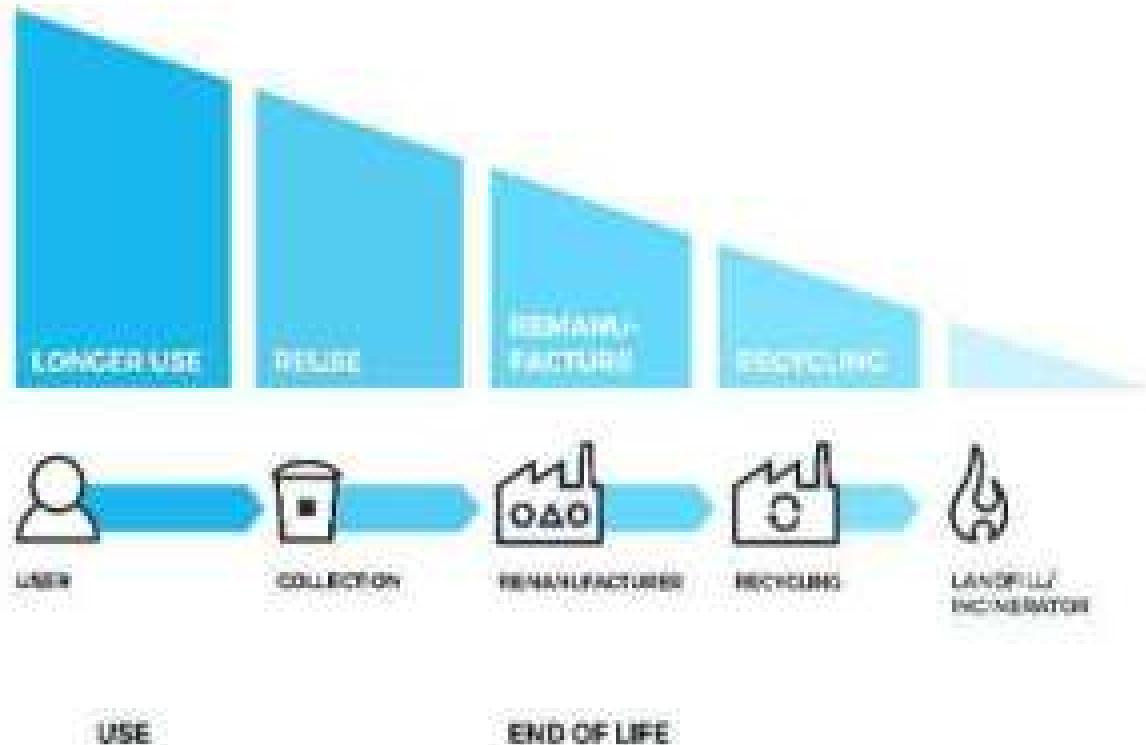


### Starting points circular design

- Avoidance
- Replacing 'finite' materials by renewable ones
- Using renewable / decentral energy
- Repulsing toxic content
- Eliminating waste

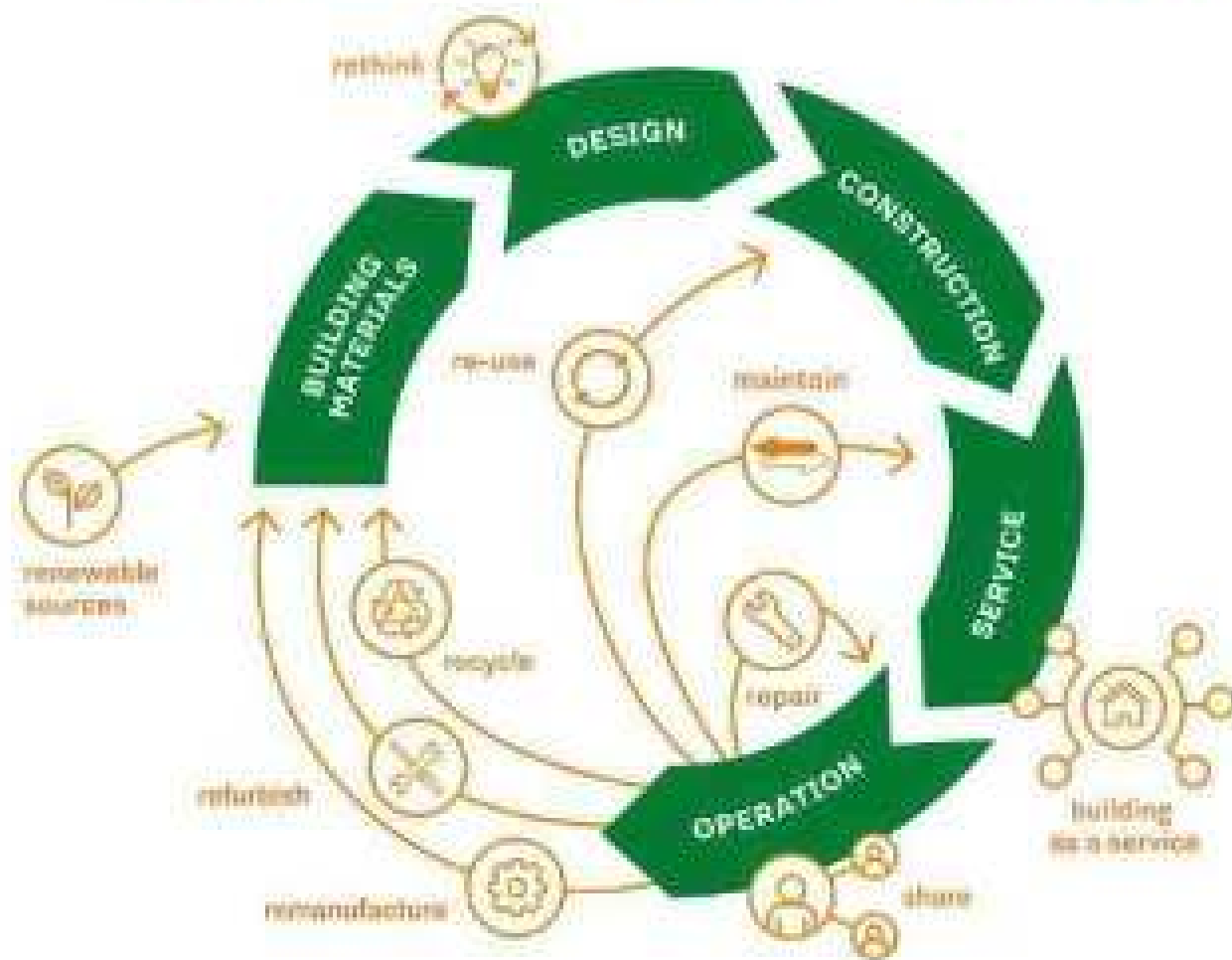
# OPTIMIZING OVER TOTAL LIFETIME

## DESIGN AFTER PROJECT DELIVERY



- Design task extended to total lifetime
- In design anticipating on / taking responsibility for
  - re-use of materials and products
  - easy repair
  - effective facility services
  - adaptations / function changes
- Using circular systems and business models

# EXAMPLES OF DUTCH CIRCULAR BEST PRACTICES IN THE BUILT ENVIRONMENT



# FULLY BIOBASED COMPOSITE BRIDGE AT TU/E

FLAX & HEMP FIBERS AROUND A PLA FOAM CORE IN A BIO RESIN





## Smart Roof 2.0

# Water square Benthemplein Rotterdam





# MADASTER – MATERIAL PASSPORT



*Madaster  
Launch*

*Amsterdam  
17-02-17*

Using material passports, we can reuse building materials and eliminate waste

[www.madaster.com/en](http://www.madaster.com/en)



Photographer: Nijzen T...

# VENLO CITY HALL



Designed according the cradle-to-cradle principles, collaboration was a key point to make the circular ambitions a reality





The Edge, Amsterdam,  
Highest BREEAM score ever

# RAU ARCHITECTS – LIANDER OFFICE

Several old buildings were transformed into one new office with 80% of the on-site material reused

# CIRCL – CIRCULAR PAVILLION

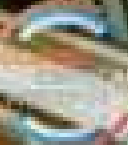
Many construction parts are made of second life materials. The wooden framework and other part are constructed for optimal re-use



# BLUE CITY – CIRCULAR INCUBATOR

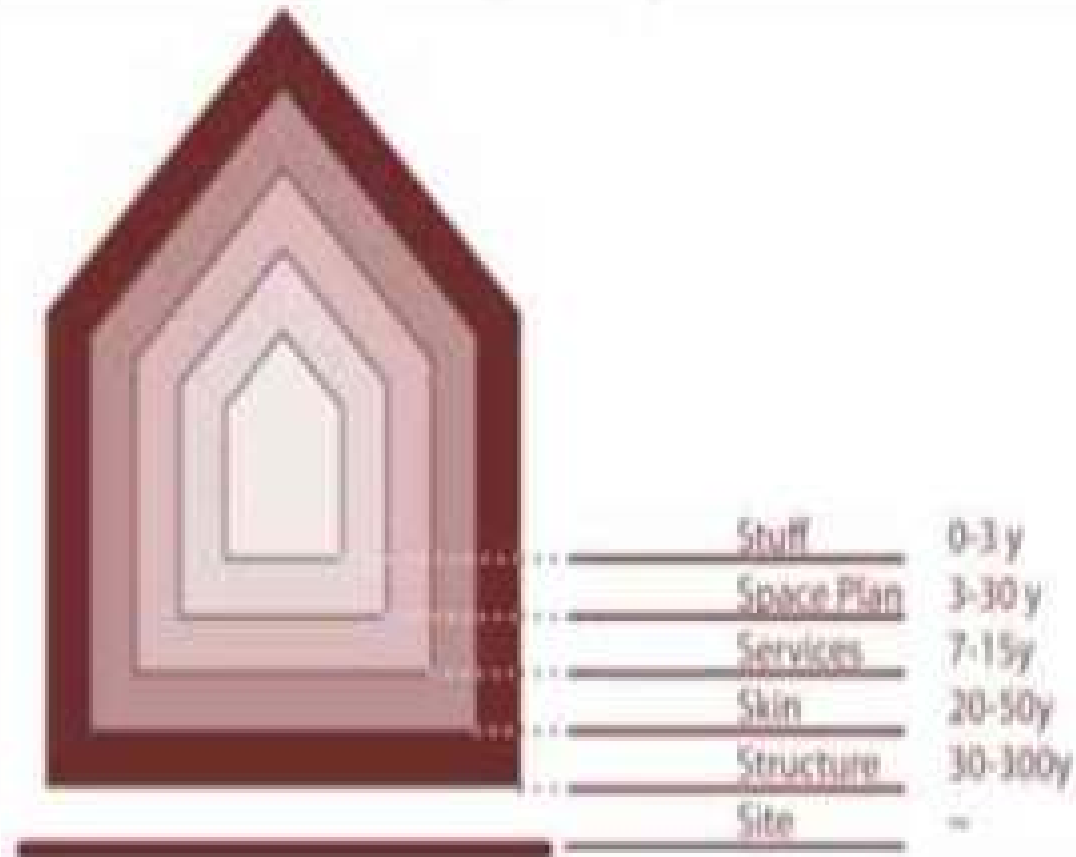
The image shows a long, brightly lit corridor or office wing. The ceiling is a prominent feature, consisting of a series of dark, curved, arched structures that create a rhythmic pattern. The walls are primarily glass, offering a panoramic view of a city skyline and a body of water under a blue sky with scattered clouds. The floor appears to be a light-colored, polished material. The overall atmosphere is modern and open.

For the office wing 90% of the materials used were of locally 'harvested' reused material



# Volker Wessels

## Social Housing Renovation in a day



Stuart Brand: The life expectancy of a house



**VolkerWessels**

Renovation in a day: project "Stroomversnelling"

<https://youtu.be/l3WBT2eAArI>

# DENIMTEX - WALL COVERING

Textile fibers are processed into a sound-absorbing, moisture-regulating paste that is applied to walls and ceilings



# SMARTCRUSHER – CONCRETE RECYCLING

Recovered cementstone can be reused directly  
CO<sub>2</sub>-free in the production of new concrete



# EXCESS MATERIAL EXCHANGE

"A dating site for materials"



Search for material or user

Home

Post Material

My Profile

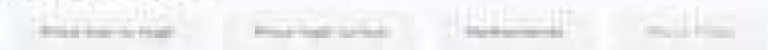


## Marketplace

### Categories



### Quick Filters



### New Products

[View All](#)



#### Rail Container

Amount

Since 07/01/20

\$1000 / per pc

[Add to cart](#)



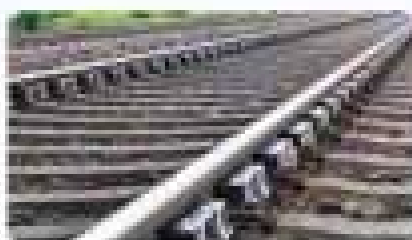
#### Wood Logs

Amount

5 days ago

\$40 / per pc

[Add to cart](#)



#### Rail Lines

Amount

3 weeks ago

\$200 / per ton

[Add to cart](#)



#### Steel Rods

Amount

Since 07/01/20

\$10000 / per ton

[Add to cart](#)



#### Wood Logs big

Amount

5 days ago

\$200 / per pc

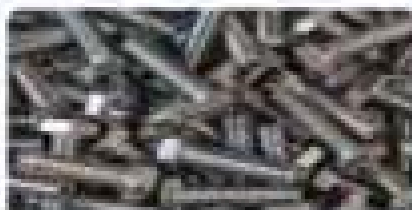
[Add to cart](#)

### All Products

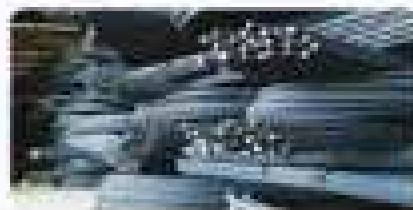
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# HOW REGULATION MIGHT HELP A CIRCULAR ECONOMY

FOCUS ON BUILDINGS AND INFRASTRUCTURE

DESIGN FOR DISASSEMBLY AND REUSE

LIFE-CYCLE THINKING

- CO<sub>2</sub>-RESOURCE EFFICIENCY- HSE-TCO

HARMONISED  
STANDARDS, TOOLS,  
LABELS

EDUCATION

MATERIAL  
PASSPORTS

EPR FOR  
BUILDINGS

BUILT  
ENVIRONMENT  
PART OF ETS

R&D: SHORTEN  
TIME2MARKET

MANDATORY  
TARGETS FOR %  
RECYCLATE IN  
MATERIALS

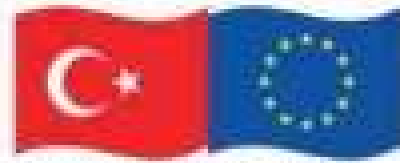
ACCESS2FINANCING

CIRCULAR PROCUREMENT

ALIGN WASTE REGULATION-REACH

RECYCLING %





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Netherlands

# Circular Agrifood & Biomass: Food & Materials for a Sustainable Future



# Turning Agrifood Challenges into Solutions



**CIRCULAR AGRIFOOD & BIOMASS  
FOOD & MATERIALS FOR A  
SUSTAINABLE FUTURE**

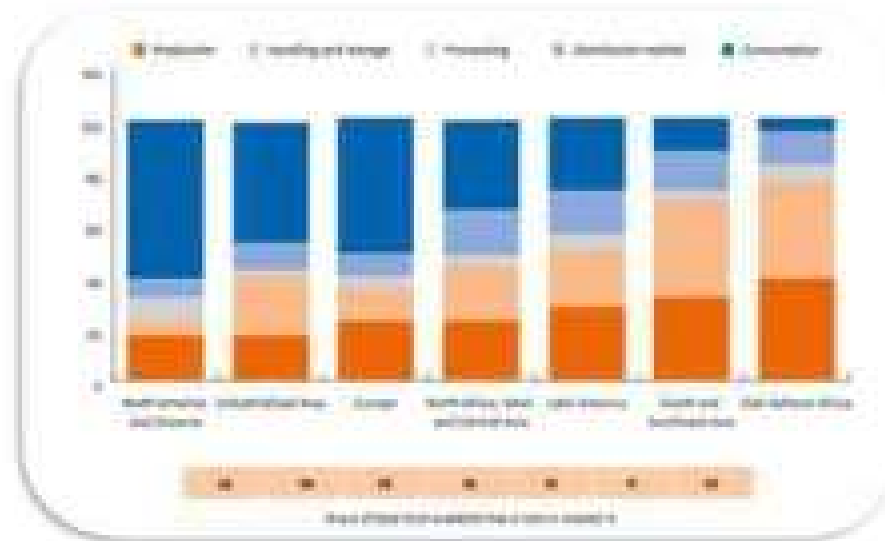
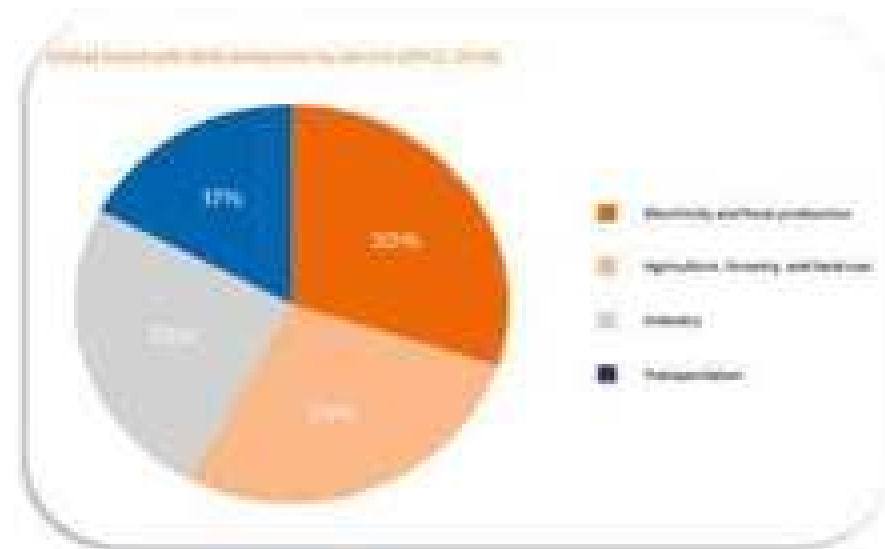
# Agriculture is...

Largest consumer of freshwater resources

more than 25% of the energy used globally is expended on food production and supply

Touches on all SDGs

...but systems are locked in current market dynamics and policy regimes



Food loss  
←



# VIVIANNE HEIJNEN

Former Minister for the Environment

“The Netherlands has the ambition to be climate-neutral, fossil free and circular by 2050. (...)

By reusing and recycling as well as by redesigning the food systems, we can push back against losses, waste and excess, and create a sustainable and resource efficient future.”



# Our food system should operate within safe-and-just operating space

Imke de Boer, Professor of Animals & Sustainable Food Systems - Wageningen University



Inspired by Raworth, 2017

To feed the world in 2050

56% more food is needed, without using more land and this needs to be nutritious, affordable, reducing GHGs and increasing biodiversity and soil health

# 56%



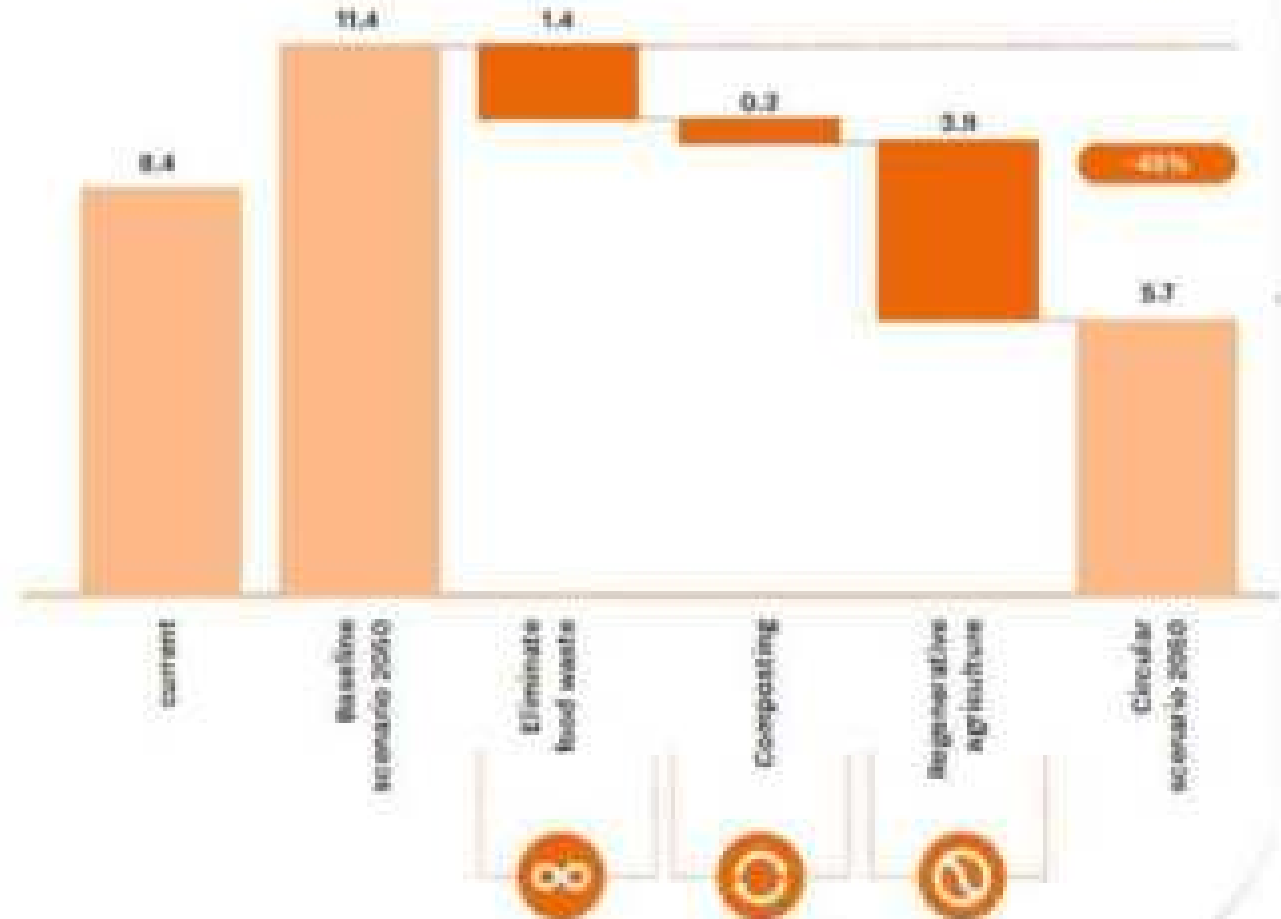
Circular agrifood & biomass as an answer

Turning Global  
Agrifood  
Challenges Into  
Opportunities

## Working Circular is good for CO<sub>2</sub> reduction

The models in a study by Van Zanten et al. (2023) explore the effects of adopting circularity scenarios adopting a more plant-based diet showing a potential reduction of 71% in agricultural land use and 29% per capita in agricultural greenhouse gas emissions.

Fig. 4 circular scenarios for food. In billion tonnes of CO<sub>2</sub>e per year (Ellen MacArthur Foundation).



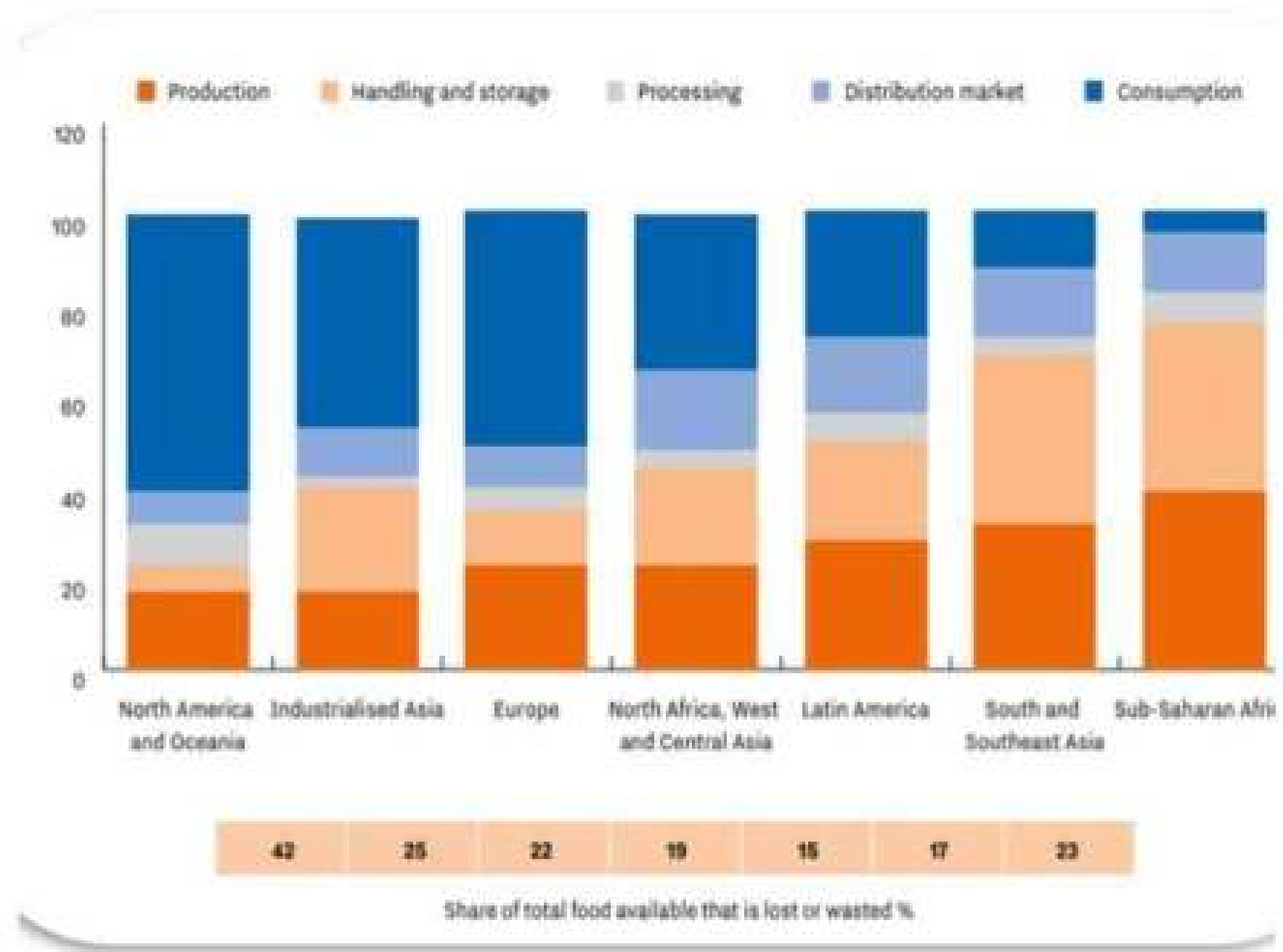


## Netherlands

In all valuechain steps food losses and sustainability challenges and scarce resources



How much food is wasted and where?



# The Fight for Resources

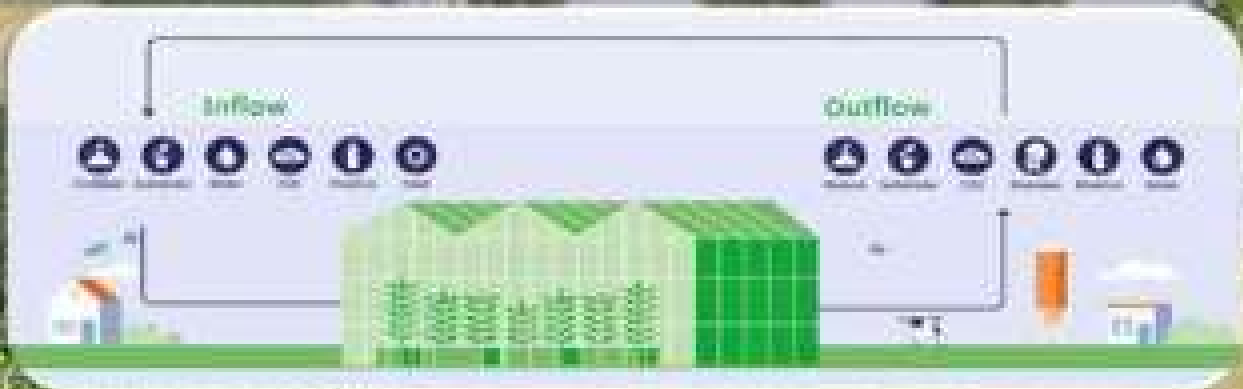
More management on Cascading and allocation of biomass is needed

- Economic Value
- Environmental Value
- Social Value





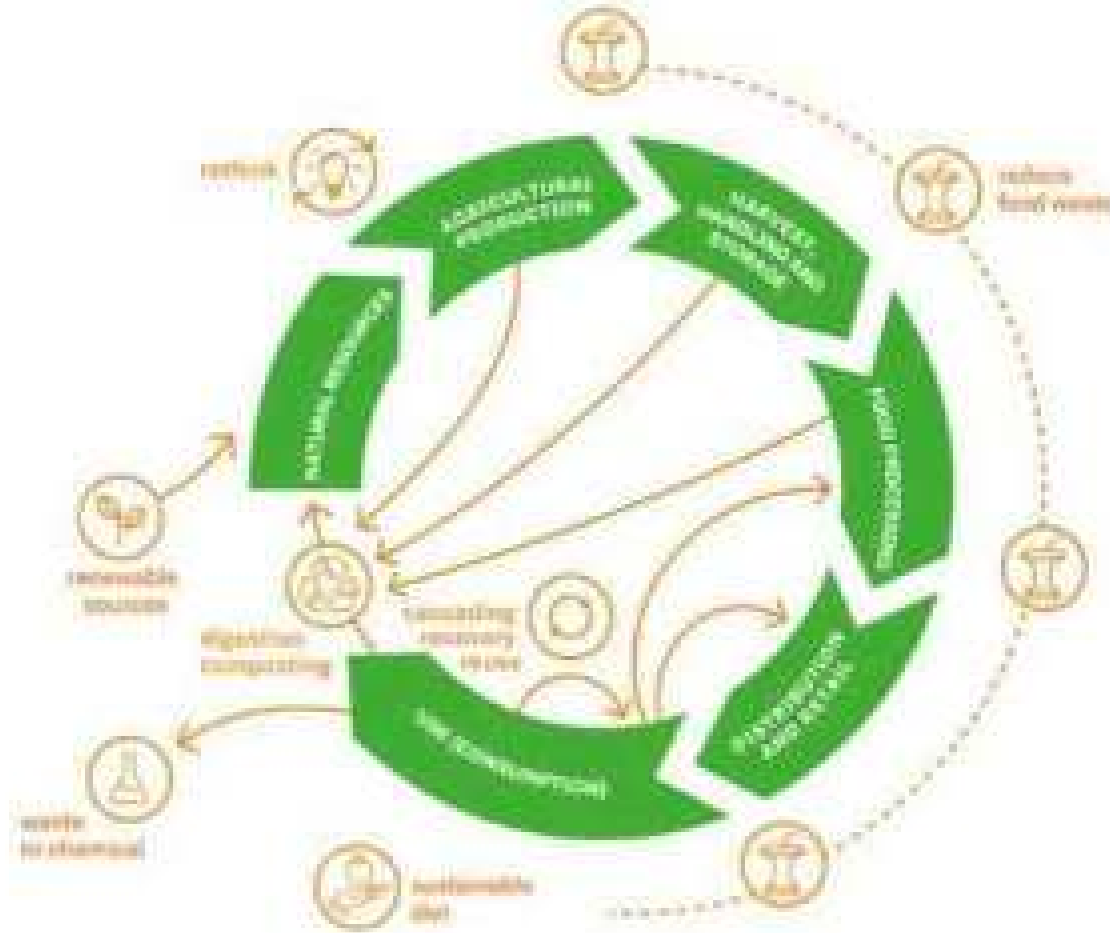
WHERE WORLDS COLLIDE  
COLLAB!



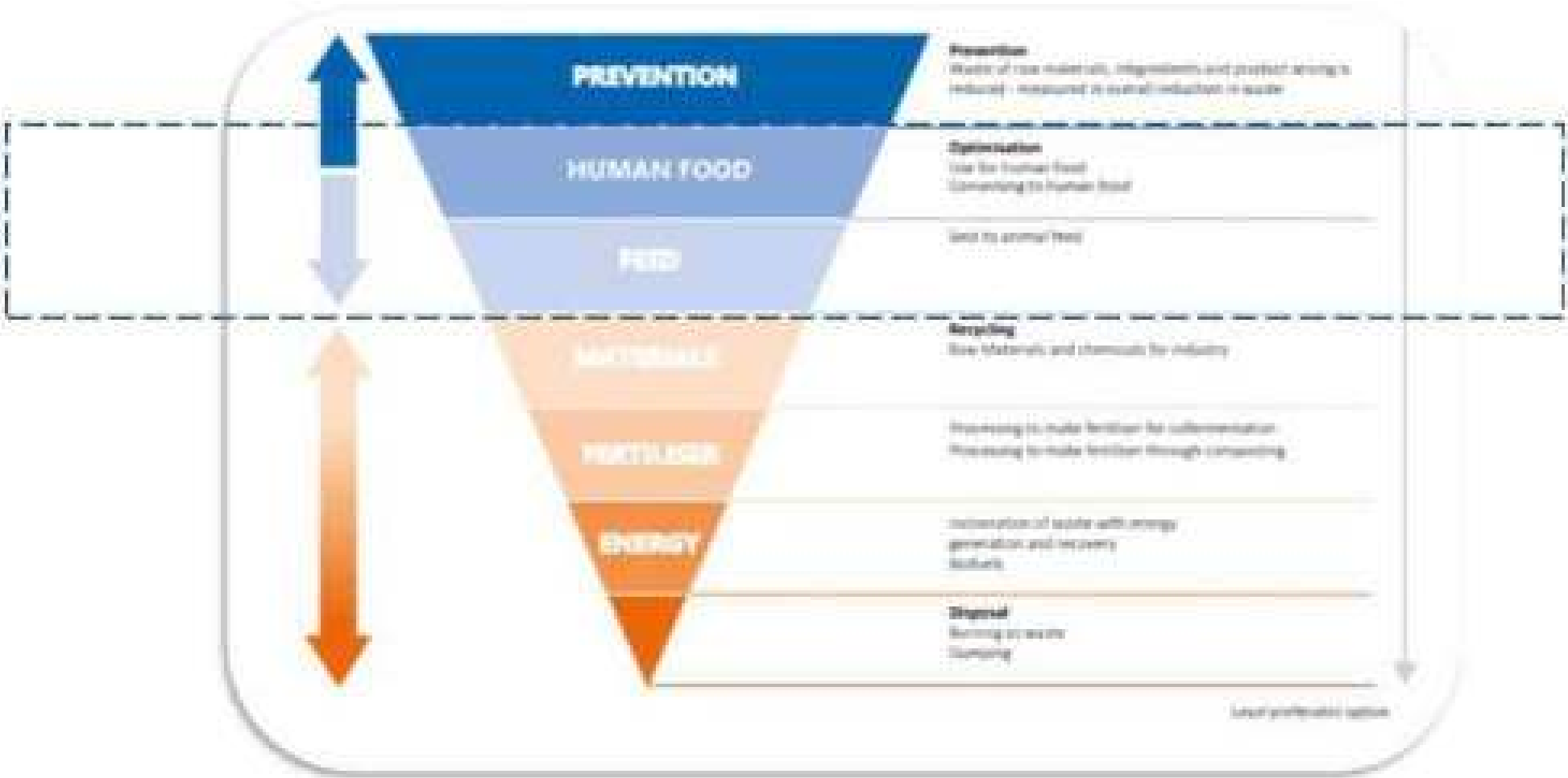
# Circular Agriculture

# CIRCULAR OPPORTUNITIES

DUTCH EXAMPLES OF CIRCULAR BEST PRACTICES IN AGRO-FOOD & BIOMASS



# Linking biomass to food applications



# THE VEGETARIAN BUTCHER



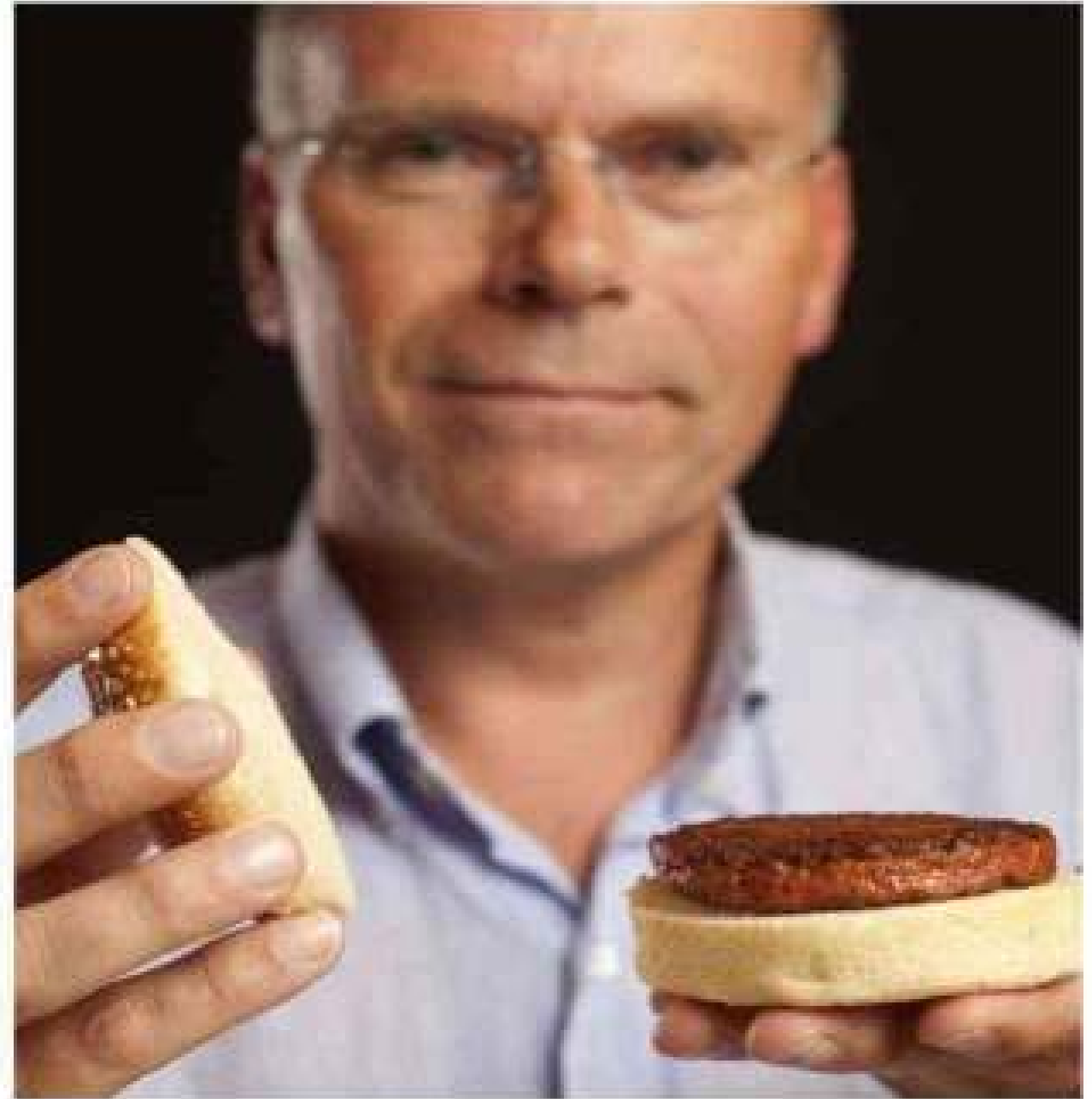
# PROTIX: NEW PROTEIN NEW PROTEIN SOURCES



# MOSA Meat

## Introduced the world's first cultivated meat

Our founders Mark Post and Peter Verstrate introduced the world's first cultivated beef burger in 2013, which cost €250,000 to produce.





THE SURPLUS FOOD  
FACTORY  
NL Netherlands



At Kumasi Drinks we produce delicious cocoa salt drinks for the European market, based on our mission *Fighting Food Loss and Poverty with every bottle you drink.*

PULP



COCOA BEANS

www.kumasi.com

*With our drinks, we are bringing a whole lot of EXTRA to the table. By purchasing a product that was previously wasted we are creating extra income. Cocoa farmers are paid for a product that was wasted.*

*Taste: Bringing a new flavor to the market*

*(Energy) efficiency: Overlapping output from cocoa pod*

*Nutrition: Saving otherwise lost calories and nutritional values*



# KUMASI

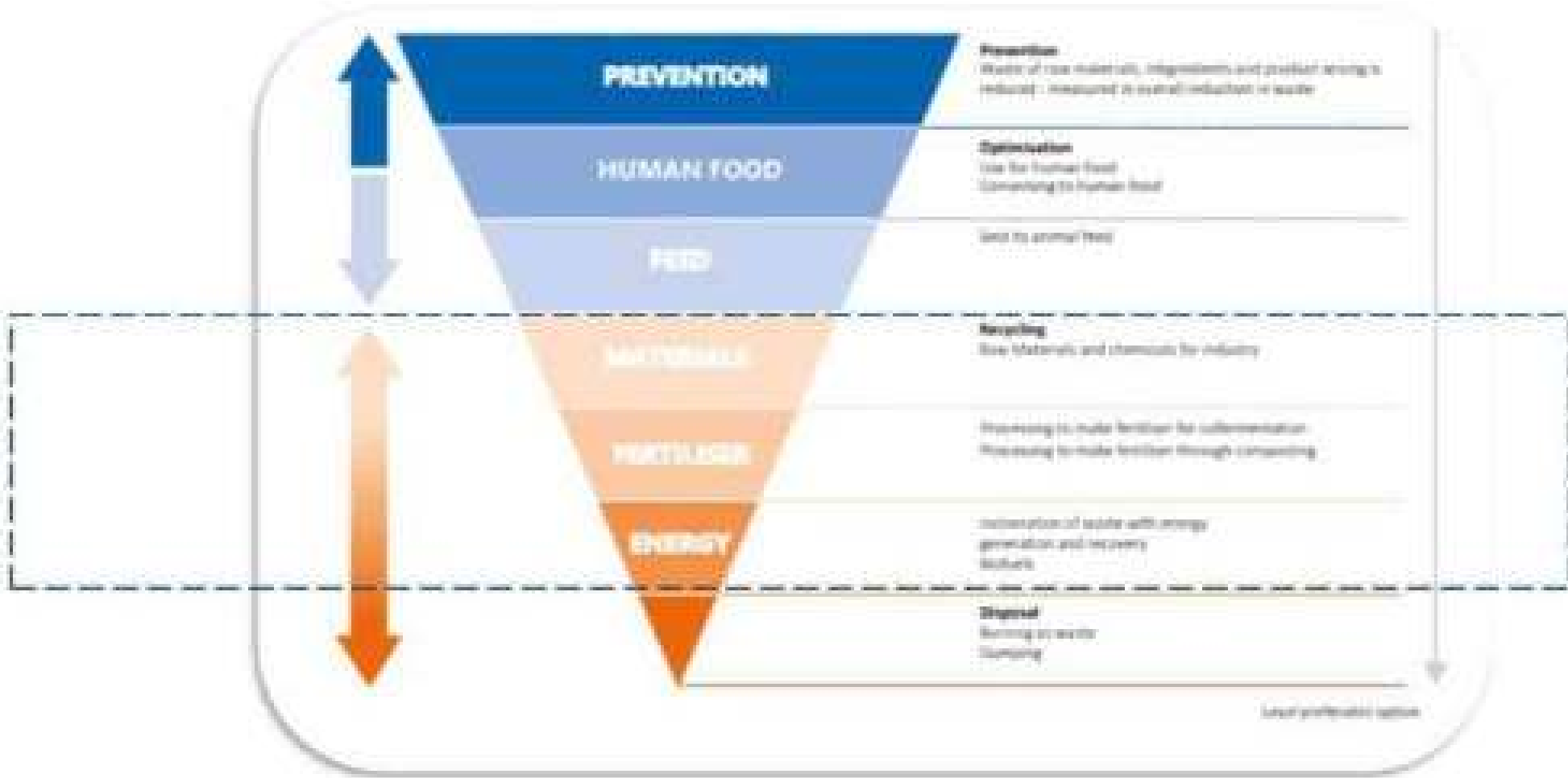


De Clique



Duynie Ingredients contributes to a circular agri-food system with sustainable plant-based pet food ingredients made from upcycled side streams

# Linking biomass to non-foodbased applications



**LIQUIDSEAL**  
*preserving freshness*



Liquidseal is a plant-based coating which achieves shelf-life extension of perishable products such as flowers, fruits, and vegetables.

**NL** Netherland

[www.liquidseal.nl](http://www.liquidseal.nl)

# EOSTA



ELIMINATING PACKAGING

[www.eosta.com](http://www.eosta.com)

**NL** Netherlands



**Floriade pavillion**



Greenclusive





# FULLY BIOBASED COMPOSITE BRIDGE AT TU/e

FLAX & HEMP FIBERS AROUND A PLA FOAM CORE IN A EPOXY RESIN

# JEANS ON THE WALL: DENIMTEXT



FRUIT LEATHER



RENEWI &  
PEELPIONEERS:  
NEW MATERIALS  
FROM CITRUS  
PEELS

# CIRCUROAD / CHAPLIN CONSORTIUM : BIO- ASPHALT

Replace bitumen in Dutch asphalt on a large scale with the natural binder lignite



# INNOVATION: CHEMICAL RECYCLING

Challenging but great potential as the chemical industry is massive



# PYROLYSIS PILOT PLANT MOERDIJK



# BIORIZON: THE PROFITABLE WAY TO BIO-AROMATICS







Host





© 2014 Dutch Roots



**SUGAR** Foodstuff, raw material for fermentation & bioplastic



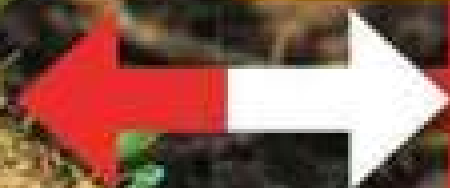
**BEET PULP** Animal feed



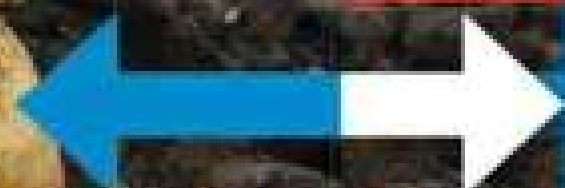
**MOLASSES** Raw material for fermentation, pharma and animal feed



**FIBRES** Pharma, personal care products, cleaning agents, cosmetics, paper



**CHALK & MINERALS** Soil improver, fertilisers



**WATER** Process water, greenhouse irrigation water



**RESIDUES** Green gas, bioethanol

Nothing gets wasted

ARABLE FARMING

# Ecosystem Innovation (Food Valley, The Netherlands)

From Network to Communities  
to Initiatives to Viable Businesses  
to new sustainable sectors!



# Stay in touch

[www.hollandcircularhotspot.nl](http://www.hollandcircularhotspot.nl)

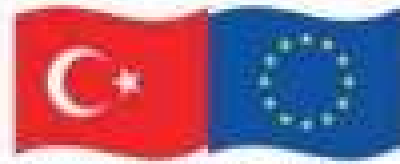
## Circular Economy Opportunities in Türkiye

Türkiye's exceptional economic growth over the past years coupled with environmental concerns, is one of the leading motivations in the region to develop circular. The national government and local businesses have set goals and ambitions to implement a circular economy and thereby create more jobs in 2030. The Netherlands Enterprise Board, Economy Development Department, will support you to realize this ambition.

Get more in-depth business intelligence on Türkiye below you will find an overview of the most relevant business sectors based on strategic and development policy sectors: **Food, Construction, and Food & Agriculture**.

An overview of the most important information for circular business in Türkiye:

[download the 2 pages](#)



This project is co-funded by the European Union and the Republic of Turkey

# Thanks for your attention.



Türkiye Döngüsel Ekonomi

IPACevre



@turkiyedonguseleekonomi

@ipa.cevre



@tdonguseleko

@ipacevre



Türkiye Döngüsel Ekonomi

IPA Çevre/Environment TÜRKİYE



Türkiye Döngüsel Ekonomi

IPA Çevre

[dongusel.csb.gov.tr](http://dongusel.csb.gov.tr)

