Circular agriculture

From Explorative Concepts to Viable Practice

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From Explorative Concepts to Viable Practice

Plan of action **New perspective for agriculture, nature and food quality**

The Dutch government's Vision on Circular Agriculture sets out the ambition of the Netherlands to be a global leader in circular agriculture in 2030. The vision entails a paradigm shift from growth in production volumes and cost price reductions towards optimisation in resource use and food production in harmony with nature. The government has now published its plan of action to turn this vision into reality.

Netherlands as global leader in circular agriculture in 2030

BRINGING CIRCULAR AGRICULTURE IN PRACTICE

- Improving soils and water quality
- Reducing emissions and pollutants
- Closing nutrient cycles
- Collaboration at regional level
- Collaboration along the agriculture and food supply chain

POLICY EFFORTS TO SUPPORT CIRCULAR AGRICULTURE

- Promote precision agriculture and farm innovations
- Creating more possibilities for experimentation
- Focus Common Agricultural Policy on vison targets
- Utilise public land
- Promote re-usage of food nutrients, a.o. by adapting regulations
- Reward sustainable farming practices
- Support short supply chains

WHAT IS NEEDED?

- A solid economic base for producers;
- A commitment to knowledge and innovation;
- Reciprocity between agriculture and nature;
- A strong international market position and capacity to innovate;
- Food and food producers are more valued;
- Favourable legislation and regulation.

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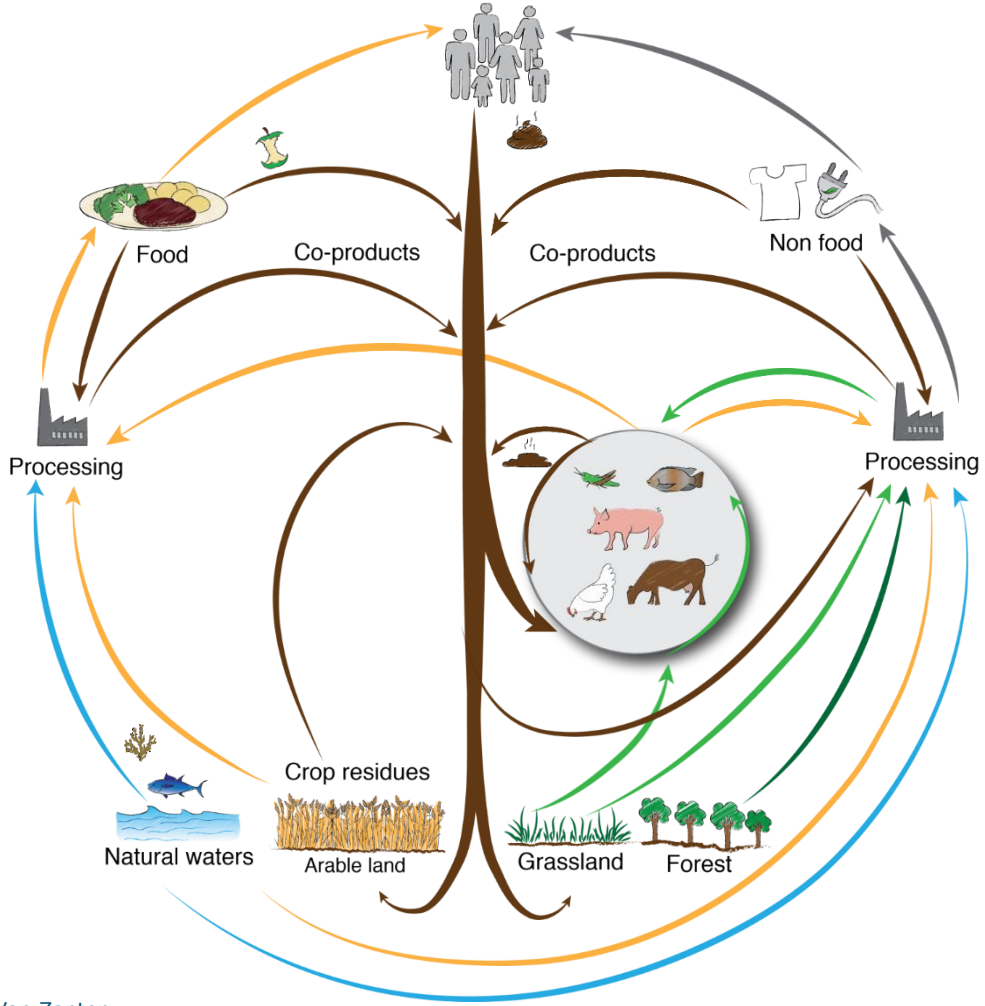
Food
Co-products
Co-products
Non food
Processing
Processing
Crop residues
Natural waters
Arable land
Grassland
Forest

Example: Open cultivation in Circular agriculture

Boundary conditions

- Nature-inclusive cropping systems
- Minimal use of fossil–based fertilizer
- Minimize use of pesticides
- Optimal use of arable land for food
    - Crops that grow in strips
    - Double purpose crops and rotations
    - Robust crop rotations with healthy plants and soils

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Test farm agroecology and Technology

Agroecological building blocks, supported by technology

Sustainable , regenerative food production system

Building blocks

Agro-ecosysteem

integratie van agroecologische bouwsten

Performance characterized by
Land Equivalent Ratio = sum of the relative yields

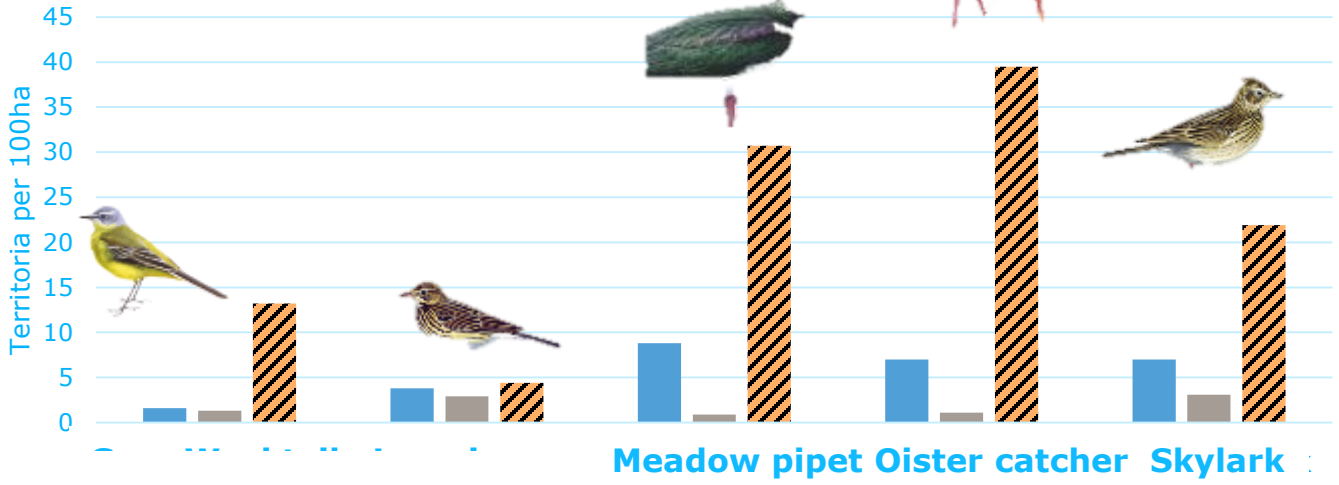
$$\mathrm{LER} = \frac{Y_1}{M_1} + \frac{Y_2}{M_2}$$

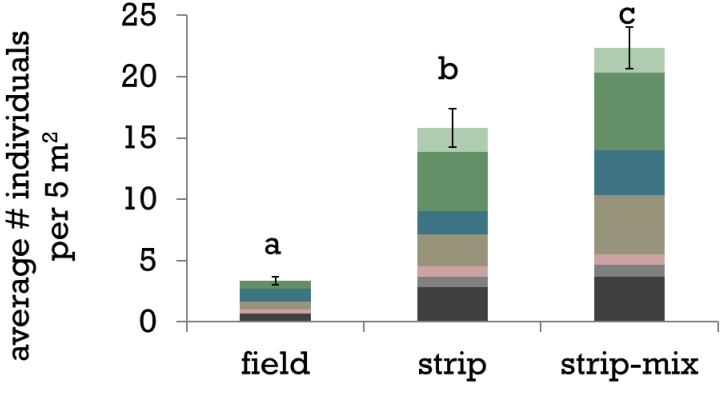
Y_i: yield crop *i* in intercrop
M_i: yield crop *i* in mono crop

Intercrop system	LER
Wheat/maize	1.21-1.58
Wheat/soybean	1.23-1.26
Faba bean/maize	1.13-1.34

LER = land area that would be needed as sole crops to produce the same yield as a unit area of intercrop

Example: Open cultivation in Circular agriculture





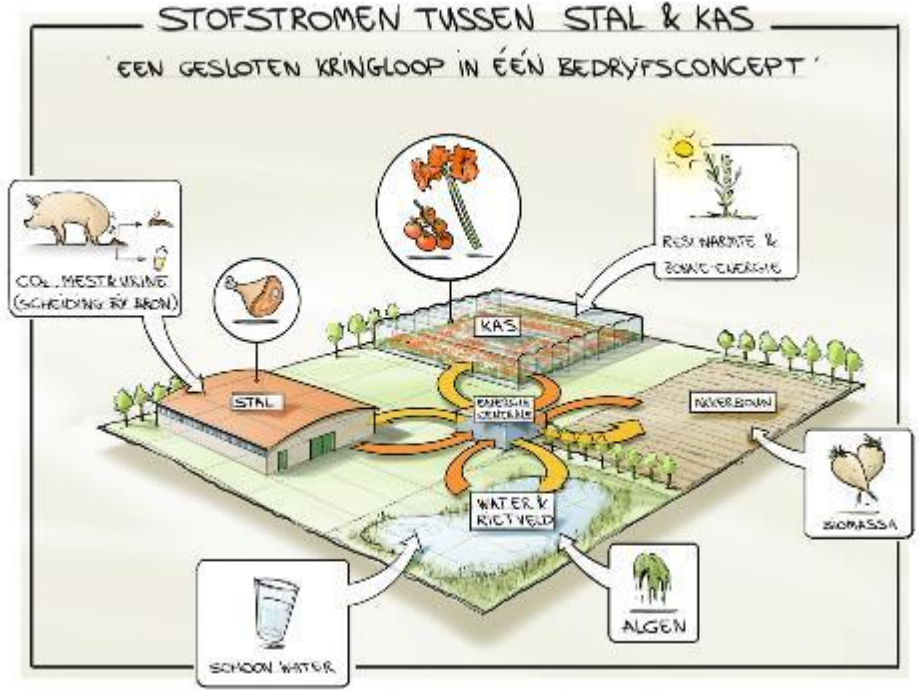
Example: Circular Horticulture

First European
vertical farm

- Vertical farming is on the rise world-wide.
- First European vertical farm in Dronten - a nine-story building.
- Fresh locally grown products close to the consumer.

Example Circular Horticulture: Redesign

- Circular Horticulture is defined as **Efficient, Clean & Connected**
- Systematic analysis of all flows
- Develop Cross-overs other systems
- Define bottlenecks in connections
- Set up partnerships



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Greenhouse 2030

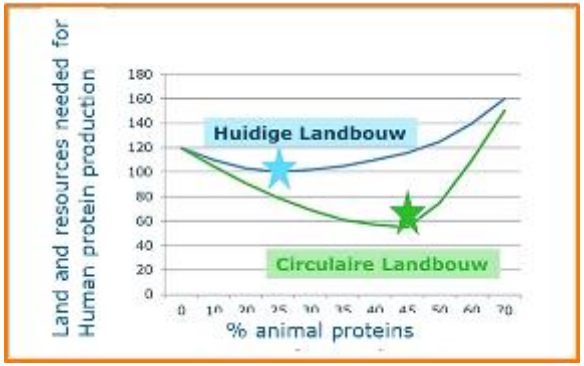
Research greenhouse facility:

-Efficient, Clean & Connected

- Fossil free (insulation for less energy, no CO_2 losses, sustainable energy sources)
- Emission free (closed water loops, no nutrient losses)
- Pesticide free (maximum biological control)

→integral sustainability

Example:Livestock in circular agriculture



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Kernebeek, 2018

KIPSTER

www.kipster.nl

- Stable design starting from animal well-being
- Feed from bakery side streams
- Roosters are grown for meat
- Direct contract with large retailers

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Manure

- A threat to public health and biodiversity:
  - carrier of pathogens
  - carrier of heavy metals
  - full of reactive N
  - full of pharmaceuticals
  - full of unappreciated odour
- A source of
  - energy (biogas, dung cakes)
  - organic matter
  - Nutrients: N, P, K, Ca, Mg, Na, S, Cu, Co, Se, Zn, etc.

We cannot

avoid manure

Example: Manure management Technical Innovation

Feedstocks
- Pig manure
- Poultry litter
- Sewage sludge
- Energy crops
- Agro-industrial residues

Innovative Technologies
- Reverse Osmosis (RO)
- Evaporation
- N-stripping
- P-stripping

End Products
- Biogas
- NK concentrates
- $(NH_4)_2SO_4$ fertiliser
- Struvite & Ca phosphate
- Organic fertilisers and soil improvers
- Organic fibres

Downloads: (www.systemicproject.eu)
- Technical Factsheets of demoplants
- Newsletter of demoplants

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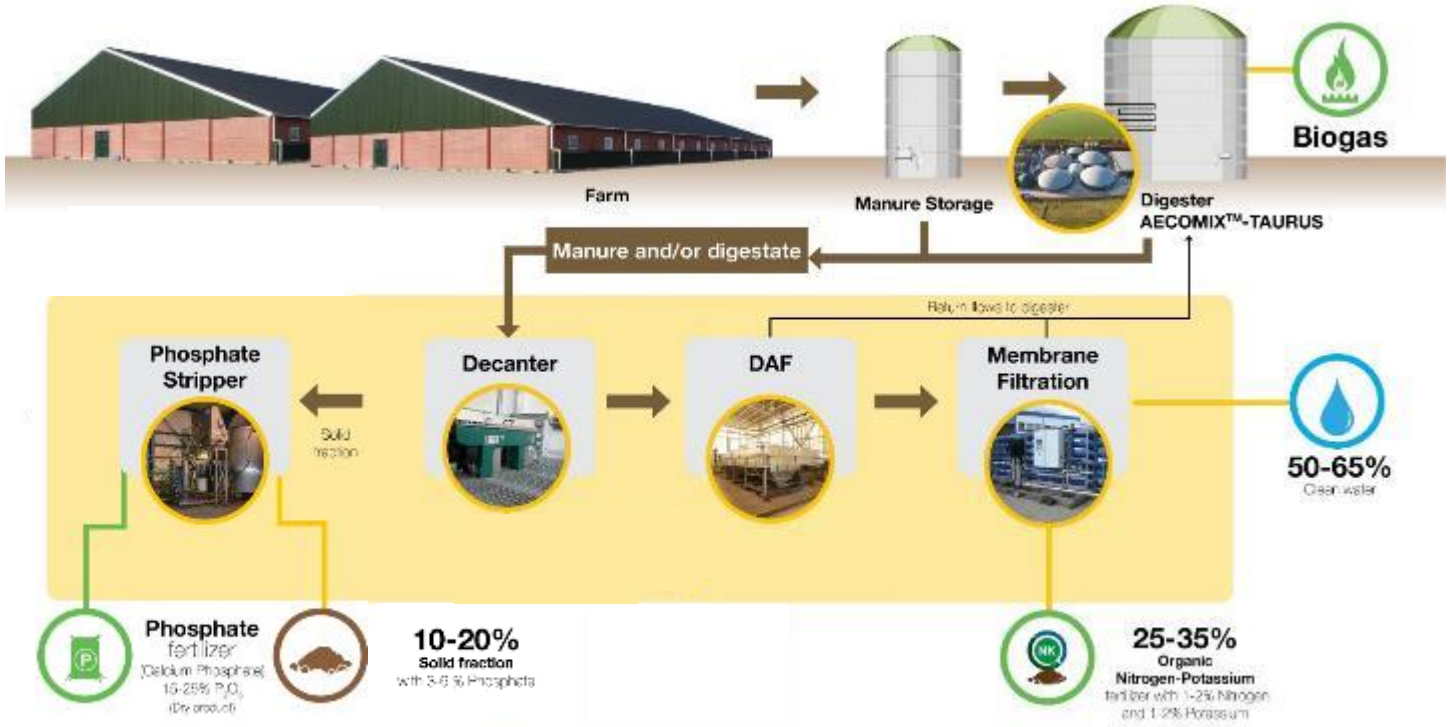
SYSTEMIC

Demonstration plant Groot Zevert Digestion (NL)



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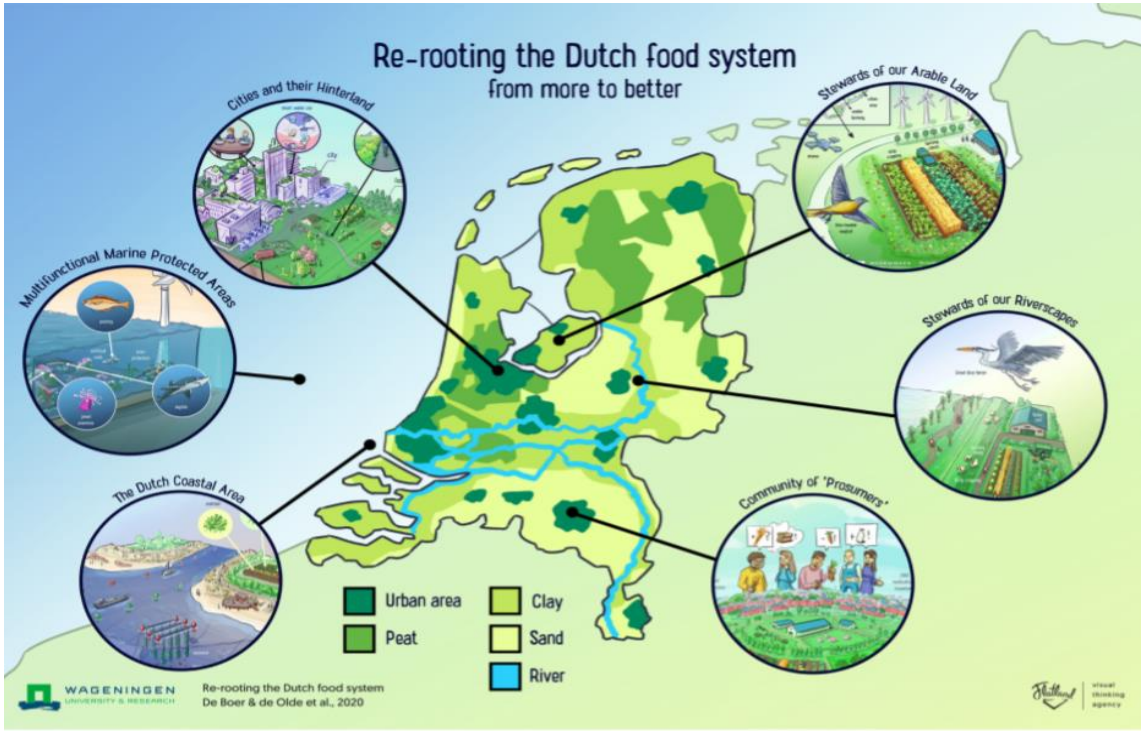
Rockefeller Food Vision (de Boer and Olde)



https://media-openideo-rwd.oiengine.com/attachments/daea677e-e90b-43de-a605-cf51b31d3293.pdf

Finding Answers Together

Hope you got inspired

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