Welcome

P5 presentation Samuel de Vries
Tuesday 15 / 5 / 2014

Samuel de Vries, 1323644, samuel.vries.de@gmail.com
Subject: an agricultural complex

- Closing nutrient cycles
- Integration of essential streams and functions
- Food without waste
Subject: an agricultural complex

- Recreative green area
- From city to perifery
- Food without waste
Today:

Research
- Problem
- Framework: Sustainability in general
- Mapping: opportunities and potentials
- 4F farming

Design
- Context and Concept
- Architecture
- Technology and materialisation

Conclusion
- Research and design conclusions
- Suggestions for future research

Reflection

Questions
The problem(s):

- scarcity of nutrients

The problem(s):

- scarcity of nutrients
- scarcity of energy

The problem(s):

- scarcity of nutrients
- scarcity of energy
- scarcity of space
Framework: sustainability in general

- Environment: complex system of interacting systems.
- A hollistic perspective


Mapping: opportunities and potentials
Mapping: conclusion

current situation: Nutrients and CO2 are largely lost at the AEB and the RWZI

proposal: utilising nutrients and CO2 in a an agricultural landscape
4F farm: Food, Feed, Fibre, Fuel  
(fight for light and fertiliser)
4FFarming: equipment

4FFarming: biogas production process

LOW-TECH SYSTEM

A. Drying optional
- Dough or some substrates such as waste food waste

C. Composting optional
- Doughing / avoiding weeds; composting of the digested slurry; conventional agricultural machines can be used

D. Preparation tank
- Doughing, storage, transportation of the digested slurry

E. Digester
- Dough in tanks filled with new agro-waste

F. Gas holder
- Dough in the gas holder

G. Gas holder
- Dough in the gas holder

H. Residue tank
- Dough in the residue tank

I. Residue tank
- Dough in the residue tank

J. Residue tank
- Dough in the residue tank

K. Solid residue storage
- Dough in the residue storage

L. Solid residue storage
- Dough in the residue storage

RESEARCH  DESIGN  CONCLUSION

HIGH-TECH SYSTEM

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# 4FFarming: data generation

<table>
<thead>
<tr>
<th>AGRICULTURAL RESIDUES</th>
<th>CROP RESIDUES</th>
<th>YIELDS</th>
<th>CLIMATIC REQUIREMENTS</th>
<th>NUTRIENTS / SOIL</th>
<th>BIOGAS</th>
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<tbody>
<tr>
<td>Residue 1</td>
<td>Residue 2</td>
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<td>Primary yield</td>
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<td>Lighting conditions</td>
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<td>Temperature (°C)</td>
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<td>Water/medium</td>
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<td>Soil</td>
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<td>Life cycle</td>
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<td>Residue Type</td>
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<td>Nutrient availability</td>
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<td>Soil quality</td>
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<tr>
<td>Biogas potential</td>
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</table>

- **RESEARCH**
- **DESIGN**
- **CONCLUSION**

**yields**    **climatic requirements**    **nutrients / soil**    **biogas**
4FFarming: data generation

| Biogas potentials: shower and husbandry | Feedstock | Daily dose | Feedstock qty | Sheep over 1 and | Sheep over 3 years | Poultry Coop
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<tbody>
<tr>
<td>Sheep: good quality</td>
<td>200 kg</td>
<td>1.5 kg</td>
<td>3.5 kg</td>
<td>1.5 kg</td>
<td>2.5 kg</td>
<td>1.5 kg</td>
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<tr>
<td>Sheep: poor quality</td>
<td>200 kg</td>
<td>1.0 kg</td>
<td>3.0 kg</td>
<td>1.0 kg</td>
<td>2.0 kg</td>
<td>1.0 kg</td>
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<tr>
<td>Pig: good quality</td>
<td>200 kg</td>
<td>2.0 kg</td>
<td>6.0 kg</td>
<td>2.0 kg</td>
<td>3.0 kg</td>
<td>2.0 kg</td>
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<tr>
<td>Pig: poor quality</td>
<td>200 kg</td>
<td>1.5 kg</td>
<td>4.5 kg</td>
<td>1.5 kg</td>
<td>2.5 kg</td>
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**Manure yields**

**Biogas yields**

**Feed requirements**
4FFarming: husbandry requirements
4FFarming: footprint of the human diet
4FFarming: footprint of the human diet ($1853m^2$)
Context: recreational 4F farming landscape
Brettenroute: a narrative route
Concept: 4FFErland

- 4F agricultural complex
- educational recreative landscape
- promotes sustainable agriculture and living
Architecture:

- Fruit and vegetable greenhouses
- Algae farmer (feed)
- Tilapia farmer
- Mushroom grower
- Poultry farmer
Layers: historical layer
Layers: productive landscape
Layers: recreational landscape
Layers: specials
Layers: structure
Layers: roof
Section A
The productive landscape

stacking: hierarchical use of light
The productive landscape

logistics: automated carts and conveyor belts
The productive landscape

harvest and residue ground floor (-1.0 m)
The productive landscape

Algae farm
Tilapia farm
Mushroom farm
Conveyor belt
Drying chambers
Automated unstacking and weighing
Storage
Transport to Amsterdam food centre
Poultry farm
Biomass bins
Biogas plant
Food / feed harvest
Residue collection

harvest and residue 1st floor (4.5 m)
The productive landscape

heat / cold storage in aquifer
The productive landscape

adaptable building system
The productive landscape

modular prefabricated structure: 6.4 X 4.5 meters
Alternative structures

1 layer venlo greenhouse

Foil greenhouse

Wide span greenhouse
Prefabricated demountable parts

Cast concrete with cleansing gutters
Prefabricated demountable parts

Hot dip perforated steel steps
Prefabricated demountable parts

Column: HEB 200
Beam IPE 330
Prefabriicated demountable parts

venlo greenhouse roof
Prefabricated demountable parts

Prefabricated steel floor slabs 1.6 X 4.5 m
Prefabricated demountable parts

venlo greenhouse structure
Prefabrcicated demountable parts

Floorcladding: Fermacell power panel
Prefabricated demountable parts

fruits and vegetables
Prefabricalized demountable parts

algal feed production
Subtropical space
Hierarchical use of light
Narrative elements
Water column
Water column details
Water column details
Sand filter
Chimneys: summer
Chimneys: winter
Chimneys: winter condensation
Chimneys: winter condensation
Chimneys: winter condensation
Chimneys:
Chimneys:
Big chimney: foundation
Big chimney: mother beams
Big chimney: daughter beams
Big chimney: floor boards
Big chimney: bamboo helix structure
Big chimney: CO2 and water
Big chimney: bypass
Big chimney: EFTE foil
Big chimney: top wing
Big chimney: cables
Big chimney: cables
Big chimney: cables
Big chimney: EFTE foil
Big chimney space
Big chimney: biogas basement
Biogas basement: water
Biogas basement: the factory
Biogas basement: the factory
Reflection: I did not meet my program of requirements
4FFerland produces:

Food:
- 71 to 107 persons

Electrical energy:
-263 to 121 households
- 881 - 406 MWh_e/y
biogas: 4.9 households

Thermal energy:
360 households
1.3% from biogas or
9.6 households
Conclusion:

• Biogas yield not substantial for connection to the AEB

• Design more suited for autarchy+
Conclusion & further research:

• design lays framework for sustainable food and energy production by autarchy throughout different scales and networks

• Gives direction for the social framework behind autarchy

other energy producers
other food producers
118 thermally dependent parasites
50 hh. Energetically served followers
5 hh. Farming communities
66 hh. Fully served participants

RESEARCH DESIGN CONCLUSION
ONTZETTEND BEDANKT!!!!!!

Annebregje Snijders, Maarten Meijs, Arjan van Timmeren

Peter Blekkenhorst, Floris Regoort, Eva Verheul, Sam Anders, Bram de Vries, Jesse van ’t Hull, Jan Ferman, e.a.

En bovenal: Geert de Vries en Meta Hees
Floorplan ground floor (0 m, 0.3 m n.a.p) 1:500

Basement -1.0 (-0.7 n.a.p)
Floorplan ground floor (0 m, 0.3 m n.a.p) 1:500
Floorplan 1st floor (4.5 m, 4.8 m n.a.p) 1:500
SECTION AA 1:100
SECTION AA 1:100 SEGMENT
WATER COLUMN 1:50

DRAWINGS 93 / 84
DETAIL WATER COLUMN