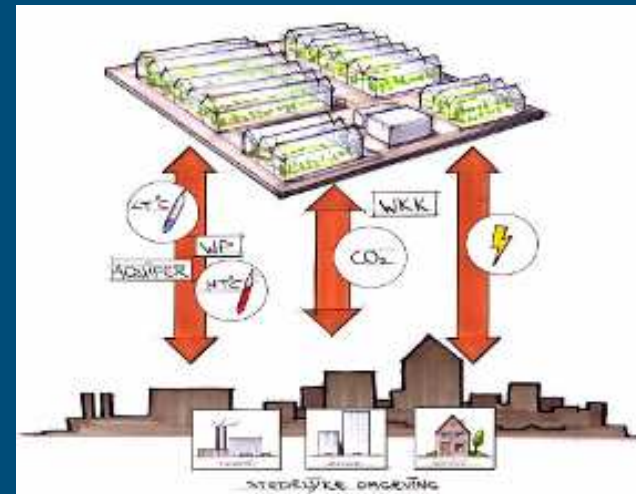


# Energy webs

Tycho Vermeulen



# Wageningen UR Greenhouse Horticulture

- Enhance innovation in and for a sustainable glasshouse sector
- + 100 employees
- 78 glasshouse compartments
  - Climate control, light, advanced technologies
  - Soil, substrate, tablets



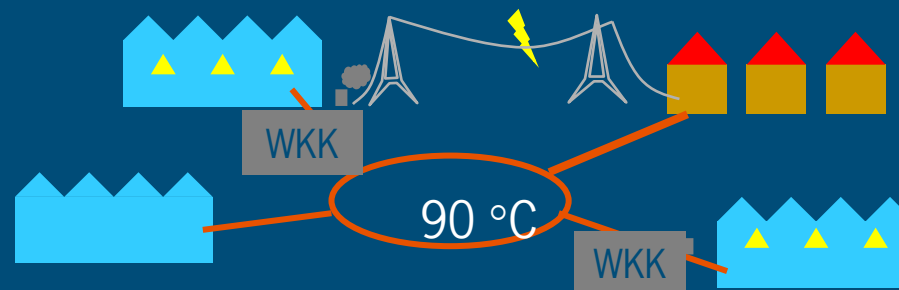
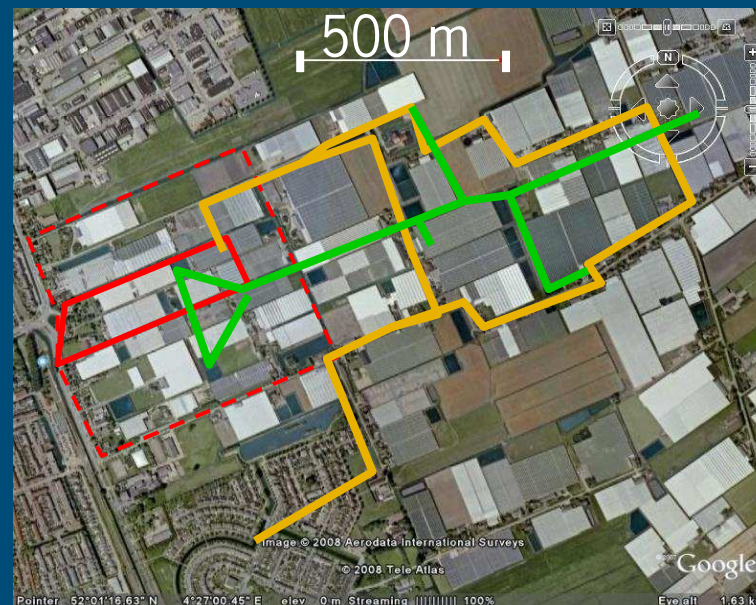
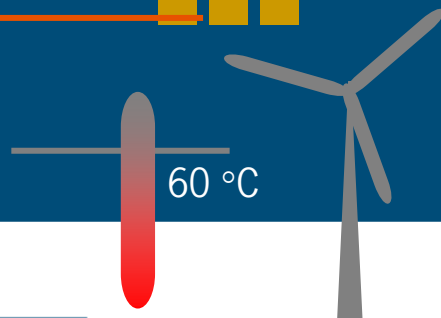
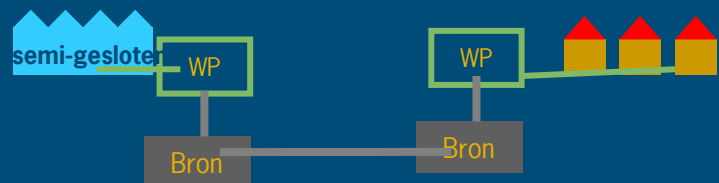
- What is an energy web?
- Our involvement: design and coach
- Feasibility
- Challenges



WAGENINGENUR

*For quality of life*

# Energy - web



# Our involvement

2006 Calculation tool heat exchange– Agriport A7

2007 Process challenges

2008 System innovation

- Coach and design in real life

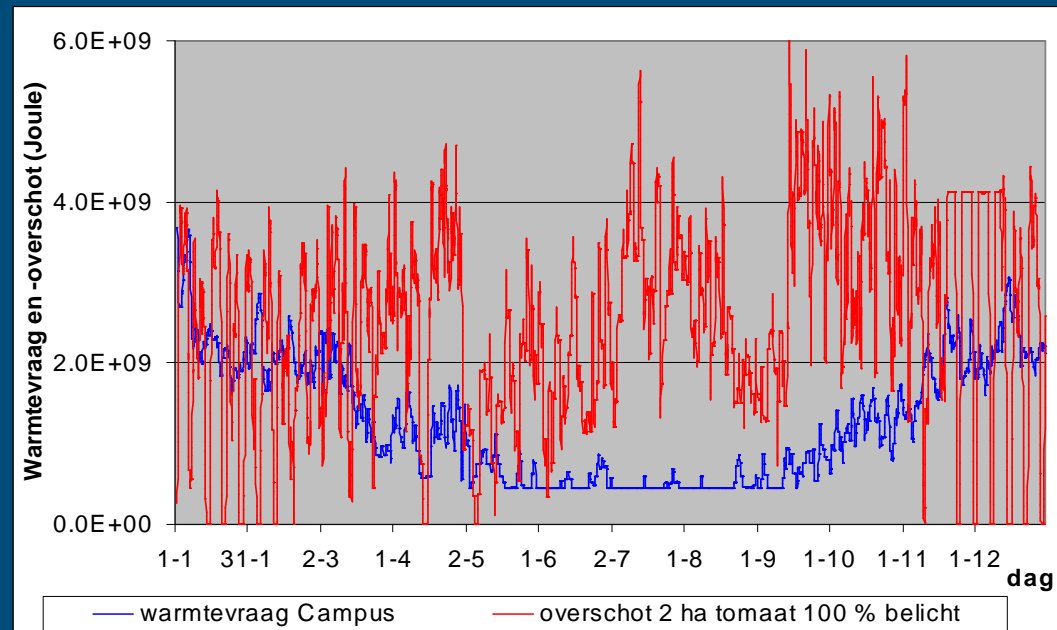
Greenportkas Venlo

- Supporting the grower

Agromere – design ‘City horticulture’

# Calculation tool

- Heat supply and demand
  - Costs for infrastructure
  - GJ prize
- => profitability



WKK: 1,2 MW<sub>e</sub>

Synergy = 83%

## Feasibility

- CHP+growth light      yes, provided short distance and enough demand
- CHP+semi-closed      yes, provided short distance and enough demand
- CHP+no extra light      first go for other options
- Aquifer      yes – not easy, but multiple cases with positive profitability
- Geothermal      yes

**But The Story is crucial!**



# Coaching

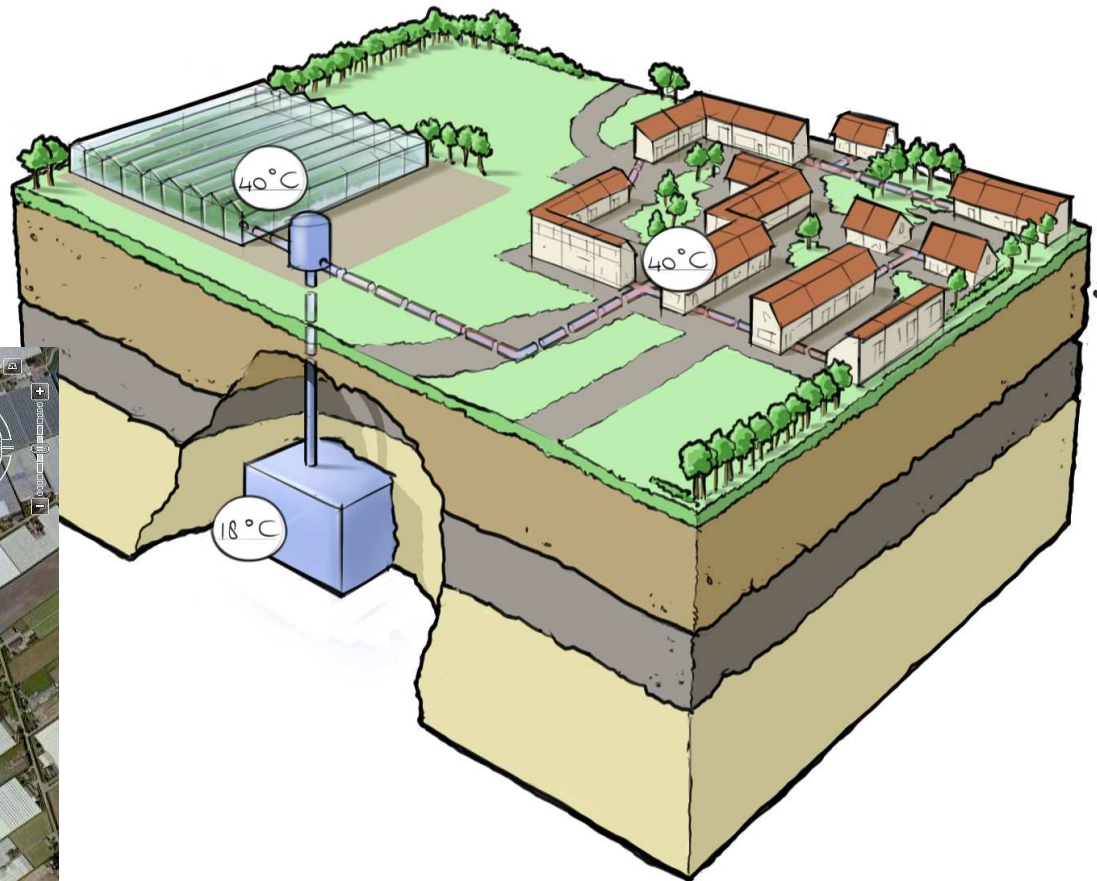
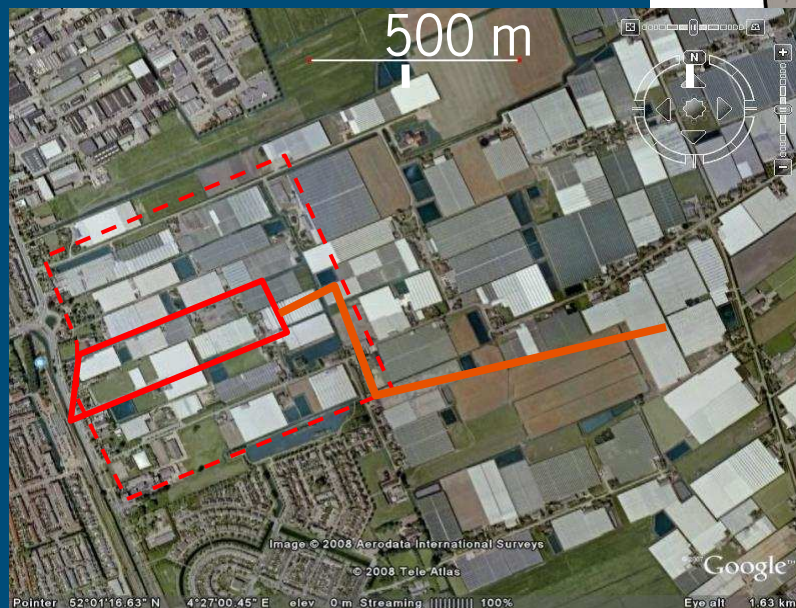
## Greenportkas Venlo





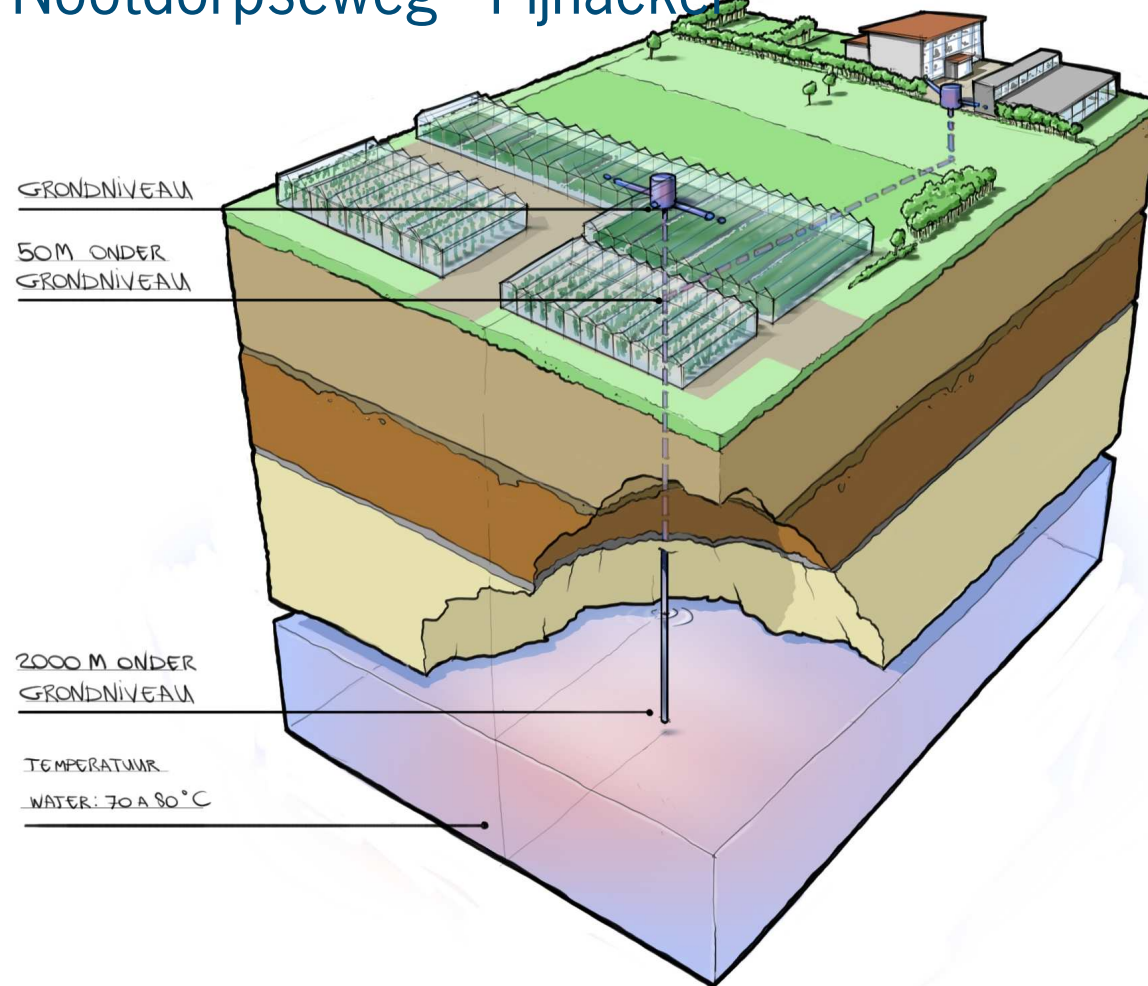
# Coaching

## AckersWoude - Pijnacker



# Coaching

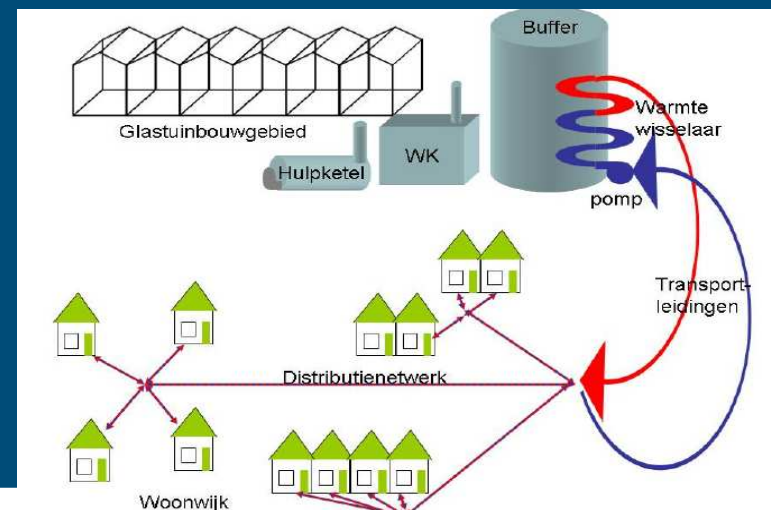
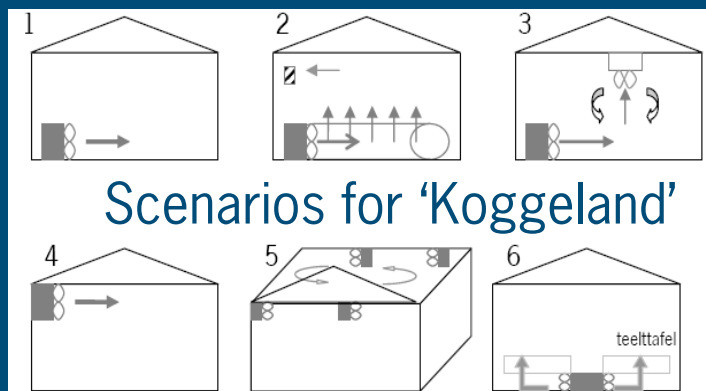
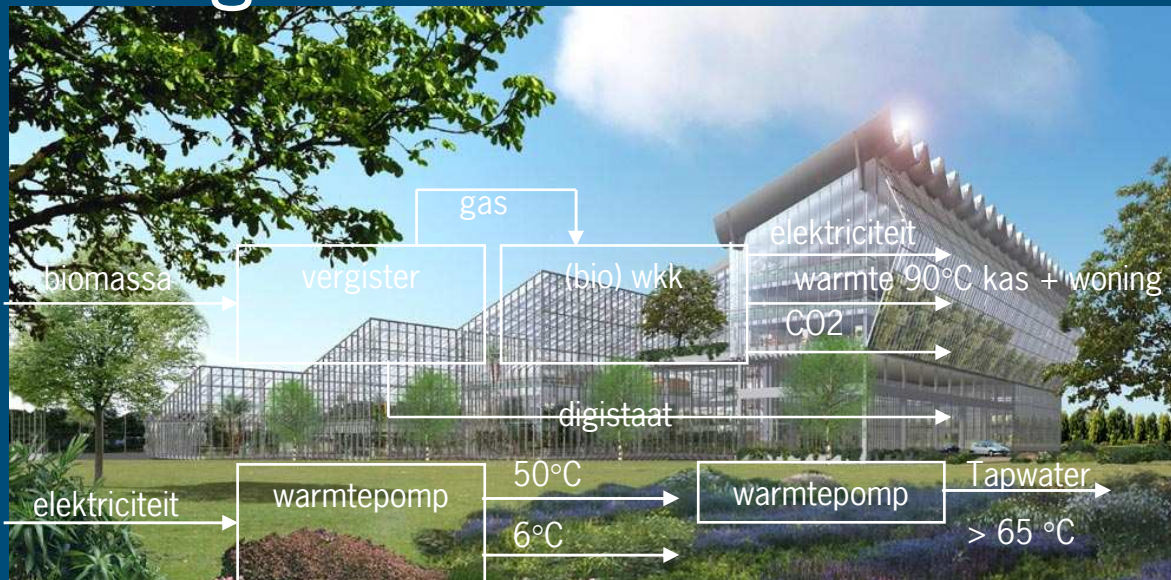
## Nootdorpseweg - Pijnacker



WAGENINGENUR

For quality of life

# Design



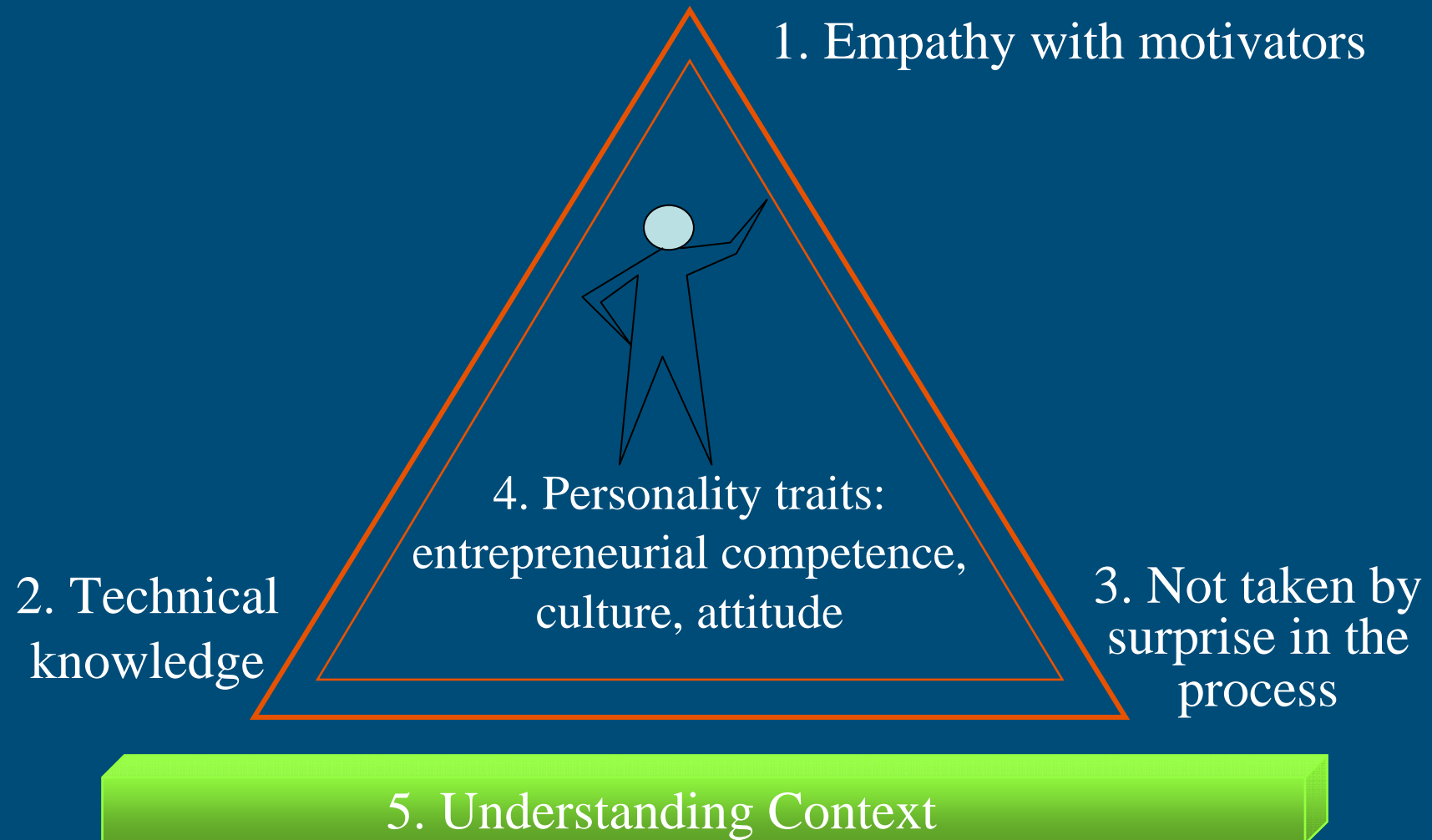
figuur 3.1. Schematische weergave van het systeem voor warmtelevering vanuit een glastuinbouwgebied aan een woonwijk.



# Challenges

- Cultural differences
- Complex process – new partnerships
- High investment (mainly infrastructure)
- Debate added value
- Prejudices in horticulture (in the past)

# How to tackle challenges

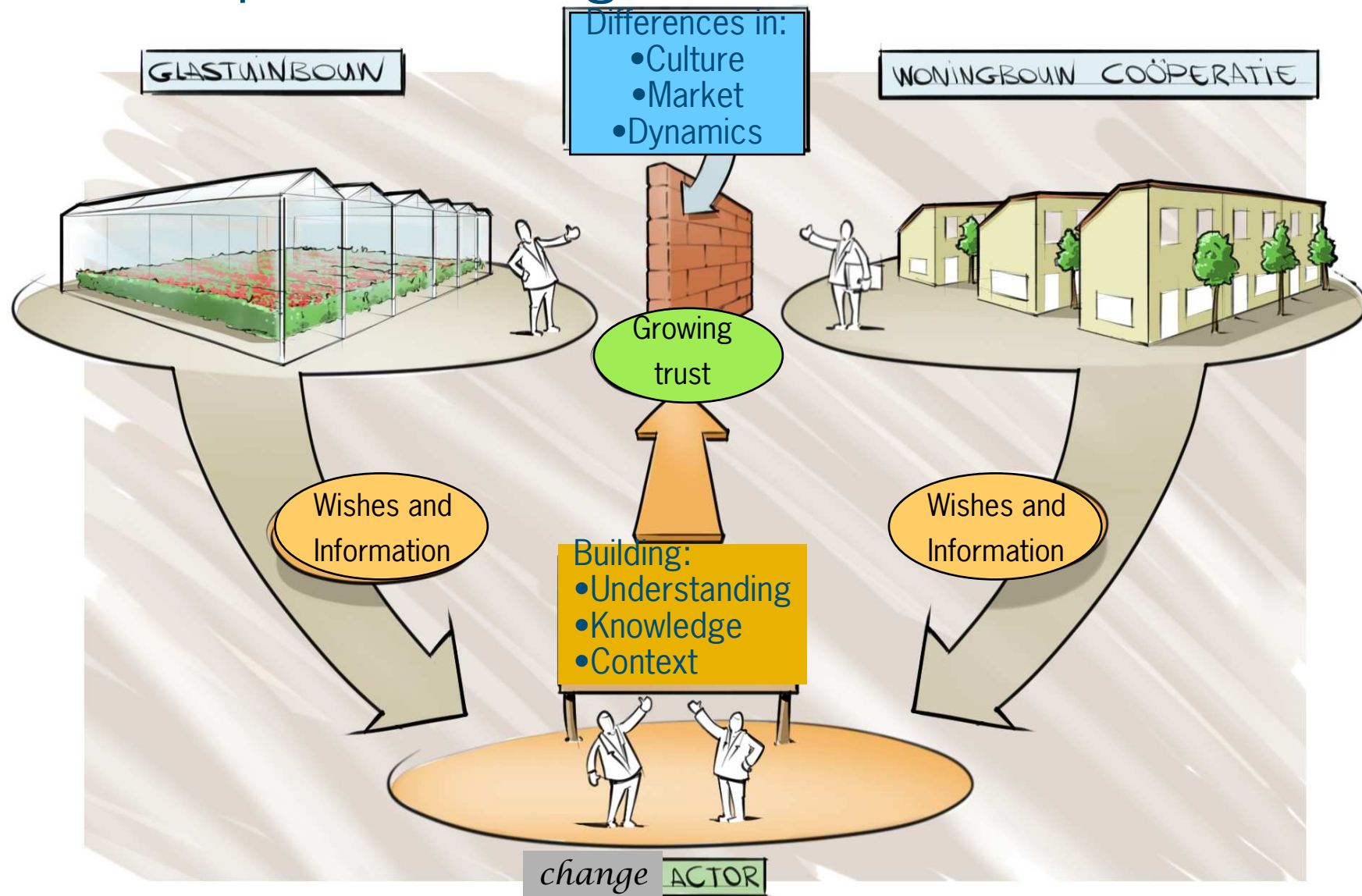


# Changing roles of Research

- Stakeholder engagement
- Concepts and visions (beefed up with rough calculation)
- Siding with initiators and entrepreneurial people
- Coaching towards new thinking and doing, and supporting the risk-taker
- New alliances (city, infrastructure, housing agencies, energy companies, etc.)



# new role in process management



# Concluding remarks

- Complexity is in the process rather than in the technique
- Initial phase is crucial for building confidence
- Transitions for sustainability require parties to take on new roles:
  - Local government – risk taking and facilitating
  - Research – process oriented knowledge generation
  - Broader view on cooperation

# Thanks for your attention!

© Wageningen UR



**WAGENINGEN UR**

*For quality of life*