



**Integratie van onderwijs  
en onderzoek**

-

**Integratie van duurzaam  
gas in de aardgas  
infrastructuur**

J. Bekkering



# Biogas potential

The Netherlands

**Current use of natural gas 45 billion m<sup>3</sup>**

**Biogas in the future (2020):**

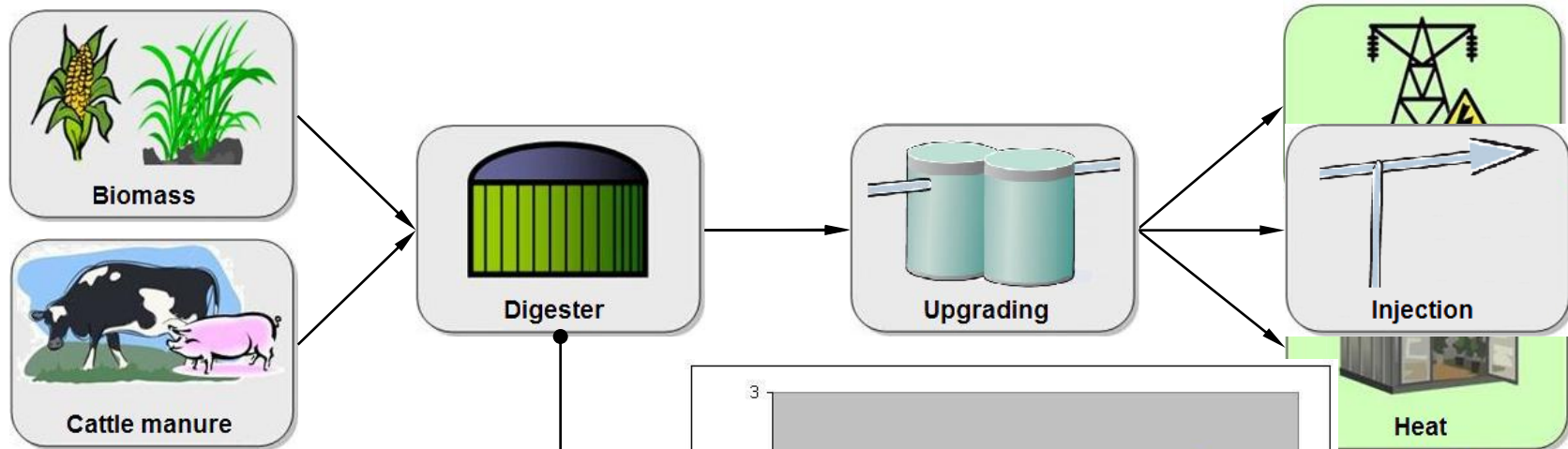
- **(Co)digestion 1.5 billion m<sup>3</sup>**
- **(Biomass)gasification 3.5 billion m<sup>3</sup>**

**Natural gas: 81% CH<sub>4</sub>, 14% N<sub>2</sub>, other**

**Biogas: 60% CH<sub>4</sub>, 35% CO<sub>2</sub>, other**

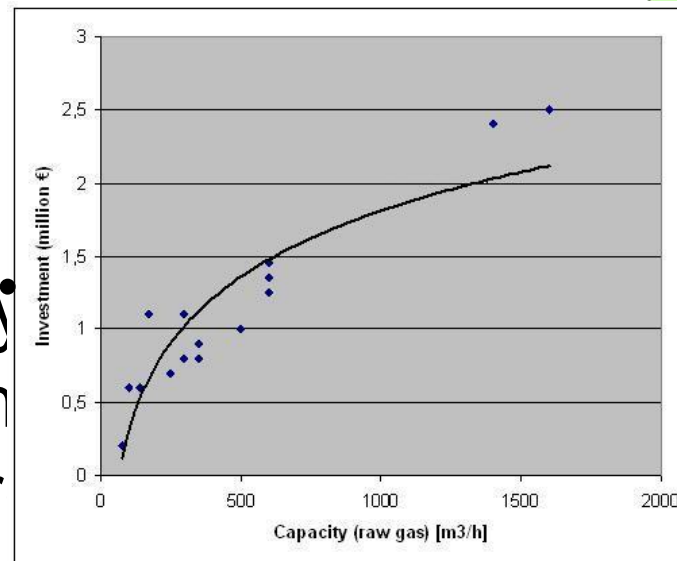
# Chain approach

Operational model



## Subquestions:

- Which sustainability
- Matching supply and
- Which gas quality r

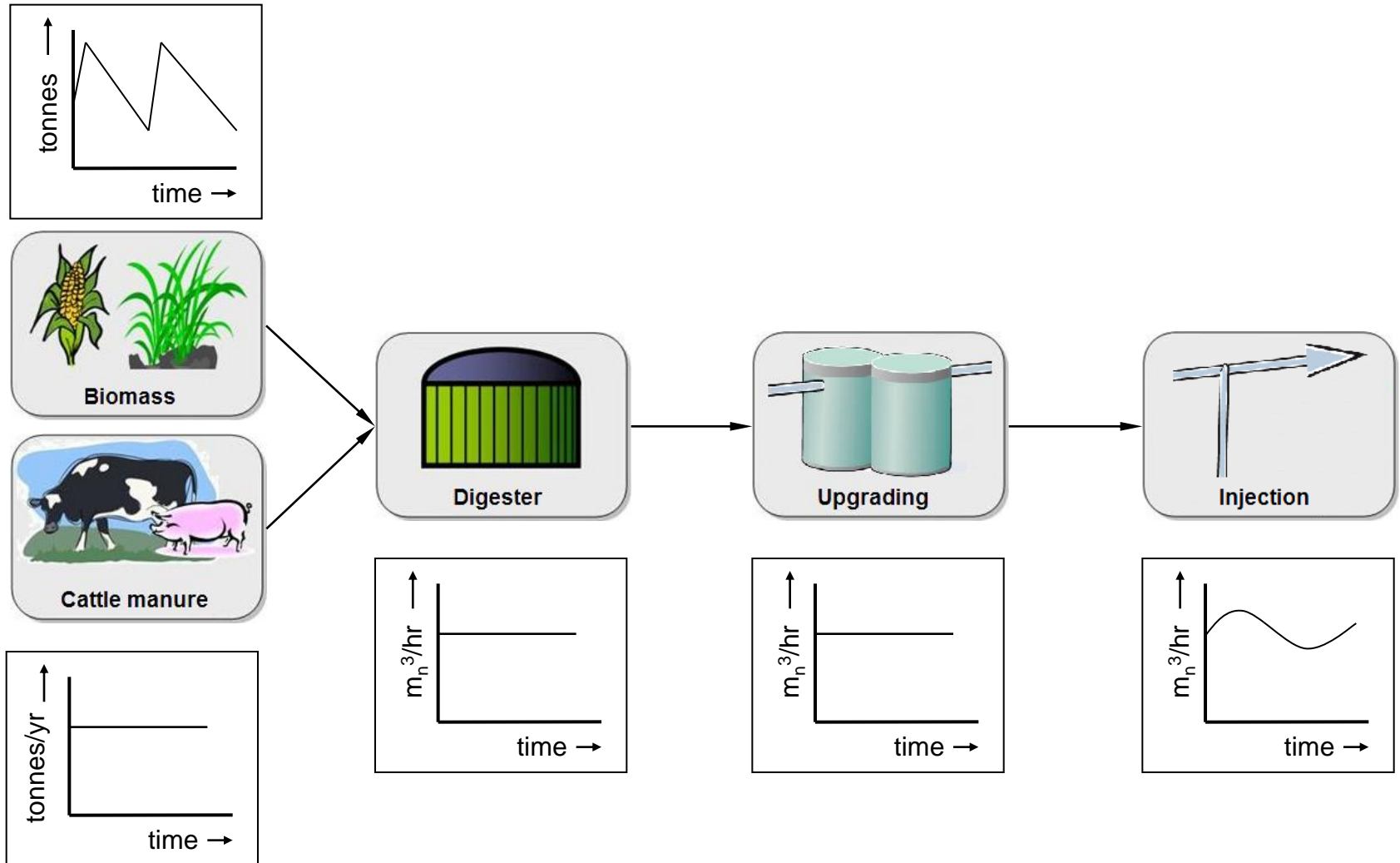


# Sustainability criteria

- 1. Green house gas balance (reduction min. 50%)**
- 2. Competition with food**
- 3. Biodiversity**
- 4. Profit**
- 5. Prosperity**
- 6. Environment**

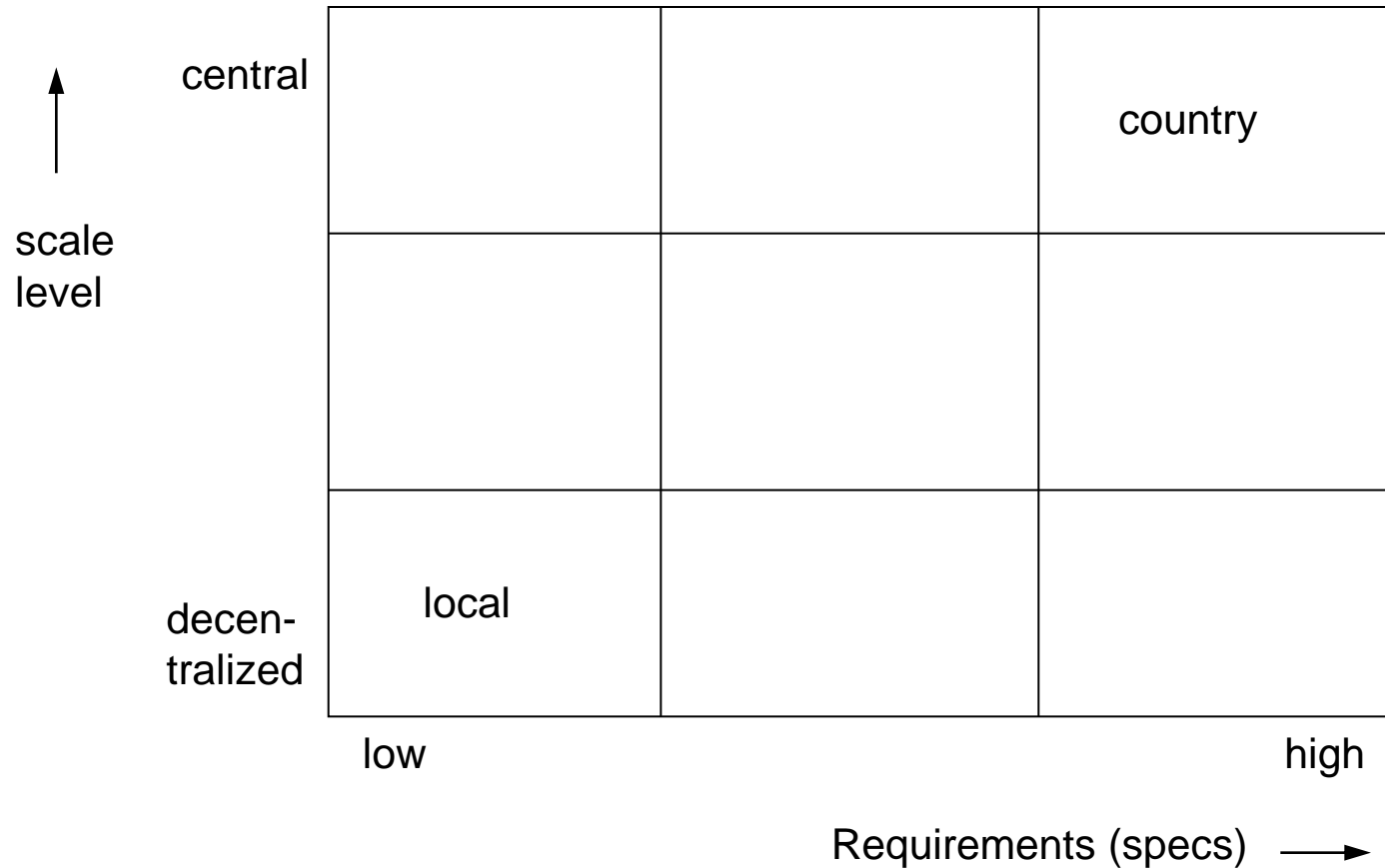
# Supply and demand

## Chain approach

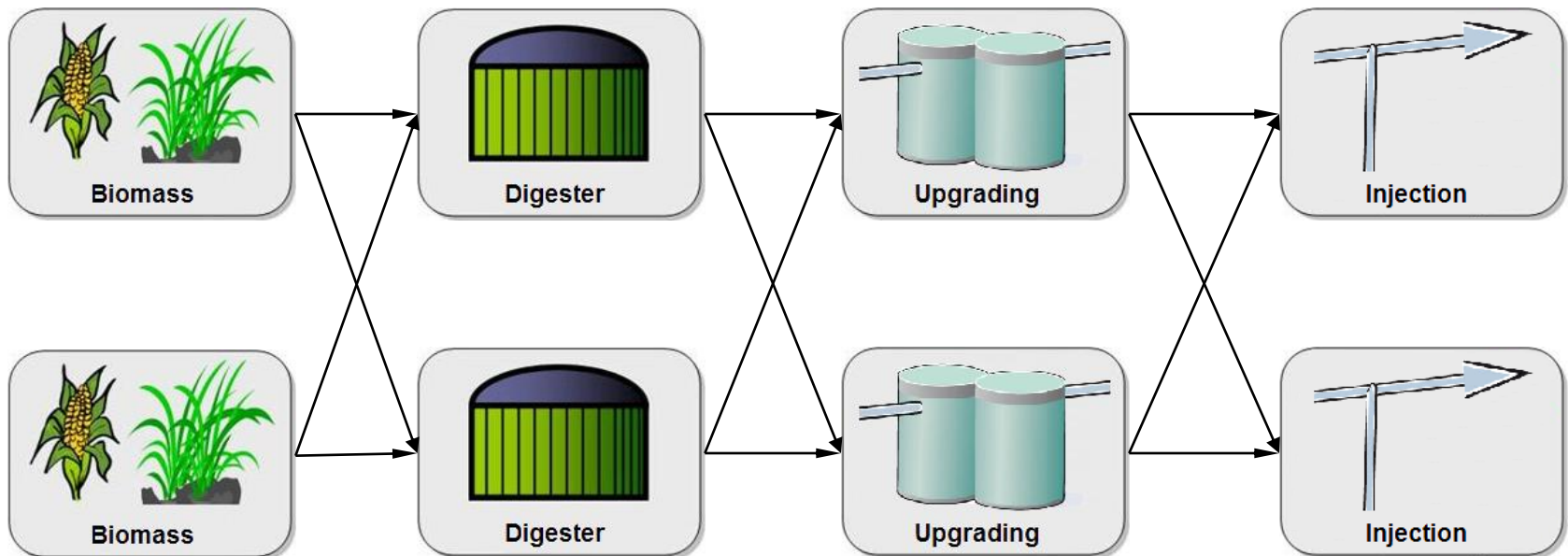


# Gas quality

Scale level



# Expanding the model



# Final objective

- **Knowledge about sensitivity of parameters**
- **Systematic research into improvements in the sustainable gas supply chain**
- **Development of a generic model: expand to other scale levels and other gases**



# Inpassing onderwijs

## Onderzoek en onderwijs een tegenstelling?

- **Duurzaam ontwerpen**
- **Operations research**
- **Verdieping en verbreding (contacten, disciplines)**
- **Projectonderwijs – Gerard Lammers**