# Modern sanitation for the developed world: an example for new areas

*Grontmij*: Roorda, Koetse, Kunst, Buunen-van Bergen

*LeAF*: Mels, Bisschops

*Waternet*: Piekema, Neef

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# Modern sanitation for the developed world: an example for new areas

Erwin Koetse

# Outline

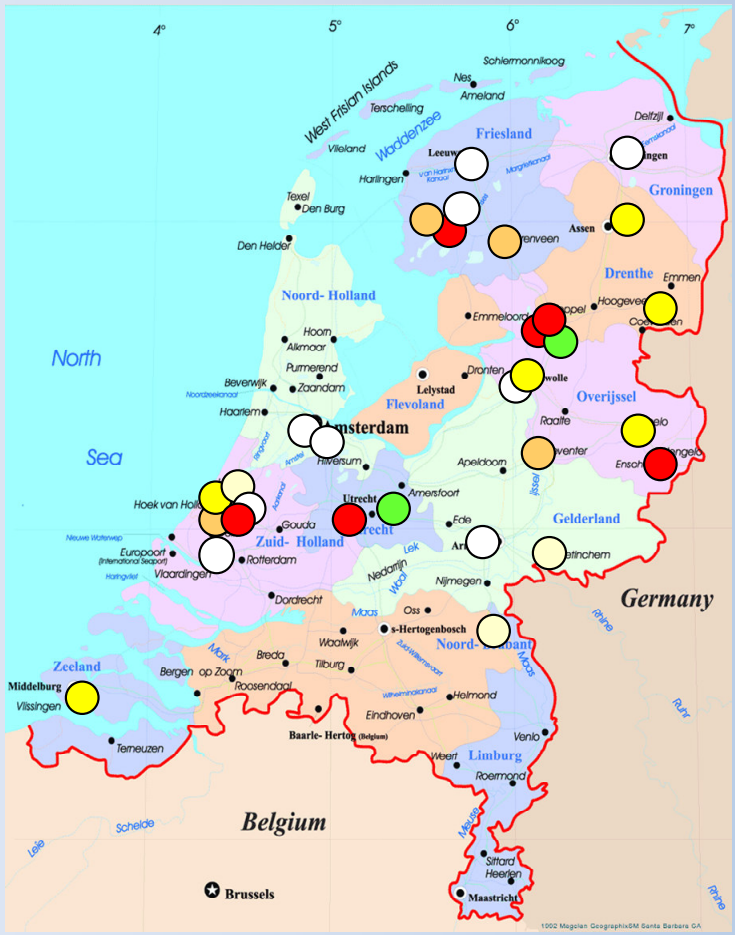
- Introduction
- Projects in the Netherlands
- Opportunities & threats
- Case Specific Opportunities & threats
- Case studies
- Energy balance
- Cost balance
- Conclusions (energy and costs)

# Why Modern Sanitation ?

- Removal of N and P more effective and efficient for concentrated wastewater streams
- Same for removal of micro-pollutants like pharmaceuticals and endocrine disruptors
- Costs for wastewater treatment increases by legislation (Water Framework Directive), cost reduction is needed

- For a more sustainable water chain

# *State-of-the-art* in the Netherlands




**December 2007**

- Finished projects
- Urine project in progress
- Urine project in preparation
- Blackwater project in progress
- Blackwater project in preparation
- Possible initiatives
- Non site specific project

*Source: STOWA (2008)*

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# Opportunities & threats

+ Not totally new
+ Adds to climate and energy objectives
+ Reduction of costs
+ Better surface water quality
+ Reduction of micropollutants
+ Better use of nutrients
+ Reduction of drinkingwater usage

- New system
- Implementation is complex
- Good functioning is needed
- Exploitation and maintenance

# Opport. & threats – case specific

+ Not totally new
+ Influence local plans still possible
+ Governmental ambition
+ Need for local sustainable solution
+ Economic possibility

- Number of stakeholders
- Future stakeholders
- Costs

# Two case studies

**A** : Suburban area (30-40 houses/ha)

**A1-2** : Urine (20%, 100%)

**A3-4** : Urine + faeces (20%, 100%)

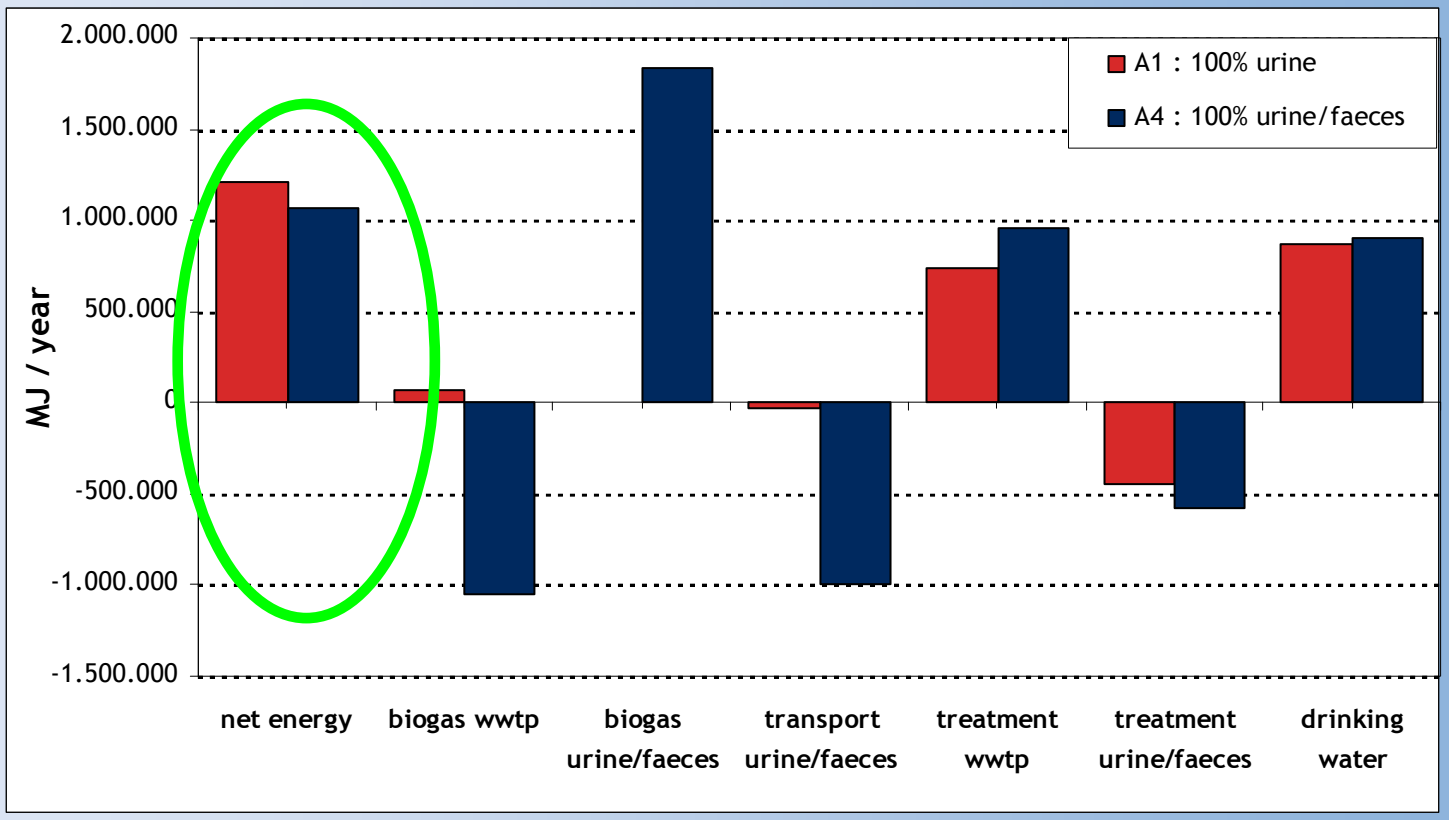
**B** : Urban area (50-85 houses/ha)

Urine (13.1%, 100%)

**B1-2** : Dense area

**B3-4** : Dense + multi-storey office buildings

# Energy balance – one example

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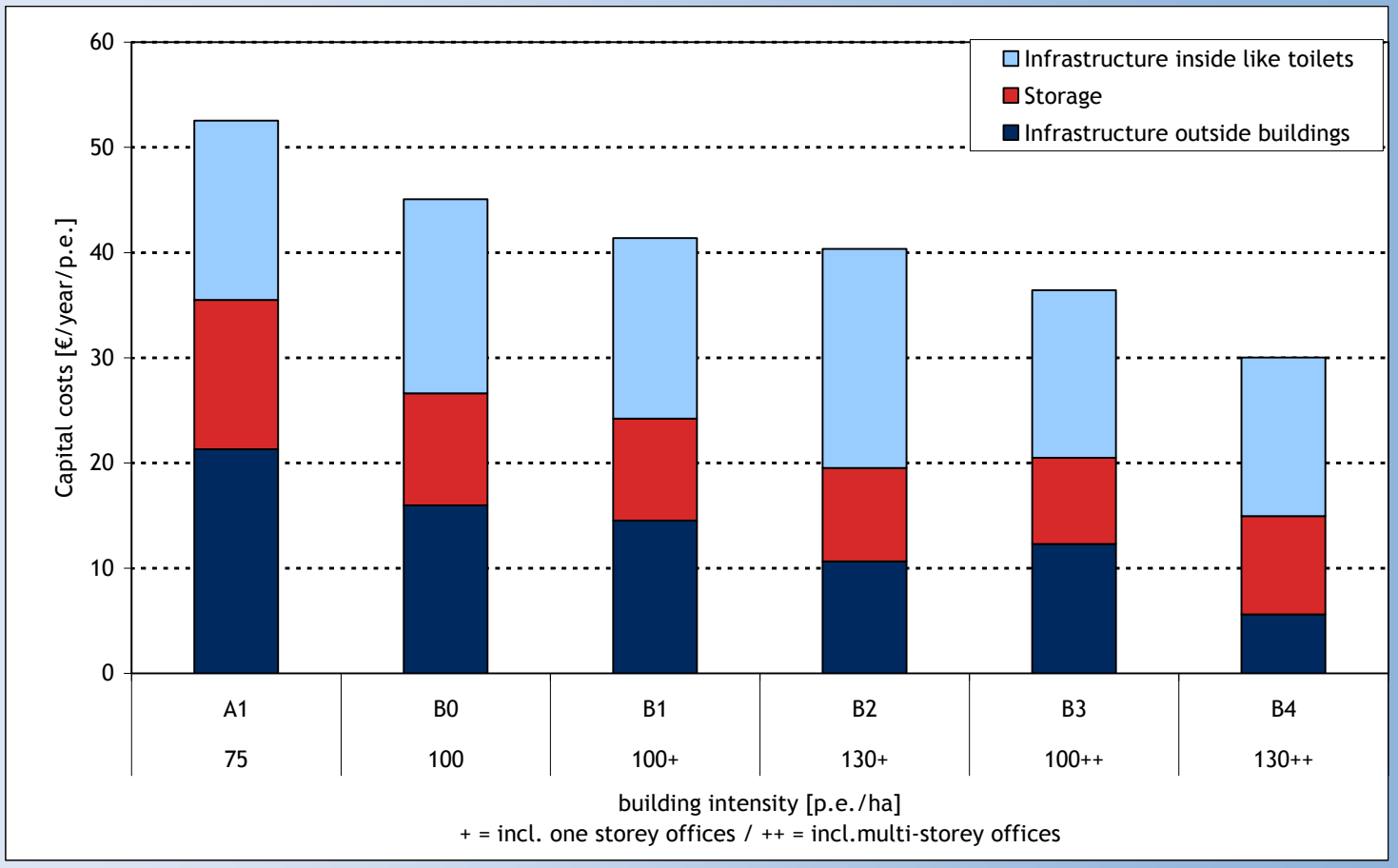
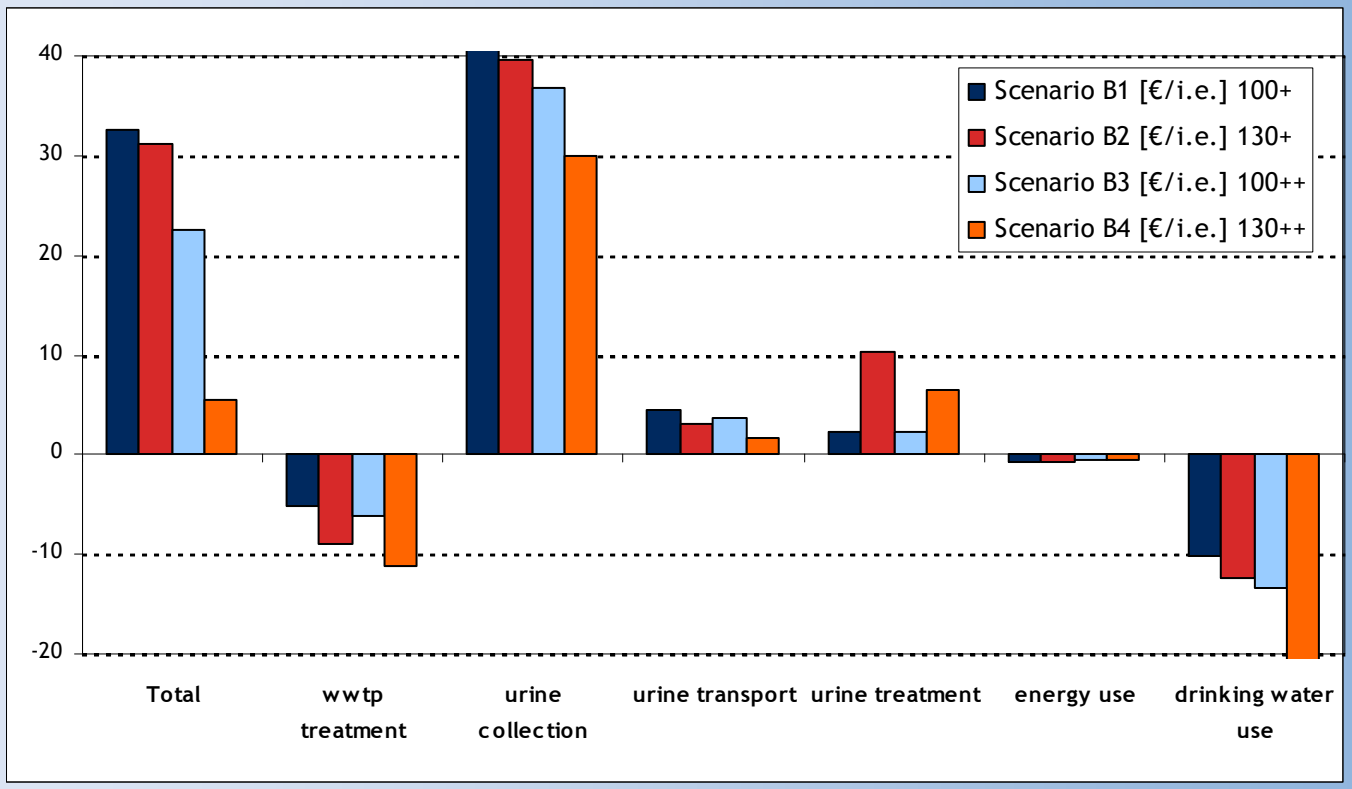
# Cost balance – capital cost



# Cost balance – cost per p.e.



# Conclusions - energy

- Modern sanitation shows a positive energy balance compared to conventional treatment
- Energy balance urine higher than black water, mainly due to the vacuum system
- Urine as fertilizer has a more positive energy balance

# Conclusions – cost

- Modern sanitation is (still) more costly than conventional
- Capital cost about €30 - €52 /p.e./year for installing the system
- Net cost (urine only disinfected):
  - € 5,5/p.e./y (dense, multi-storey)
  - € 33/p.e./year (dense)
- In developed world is modern sanitation interesting for densely populated areas

# End

- Thanks for your attention

# More information?

Erwin Koetse
Grontmij Netherlands
*erwin.koetse@grontmij.nl*
+31 30 2207919

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