

Interconnecting Water

Long-Term View on Completing the Water Cycle

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Introduction

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1. Introduction

Dutch households:

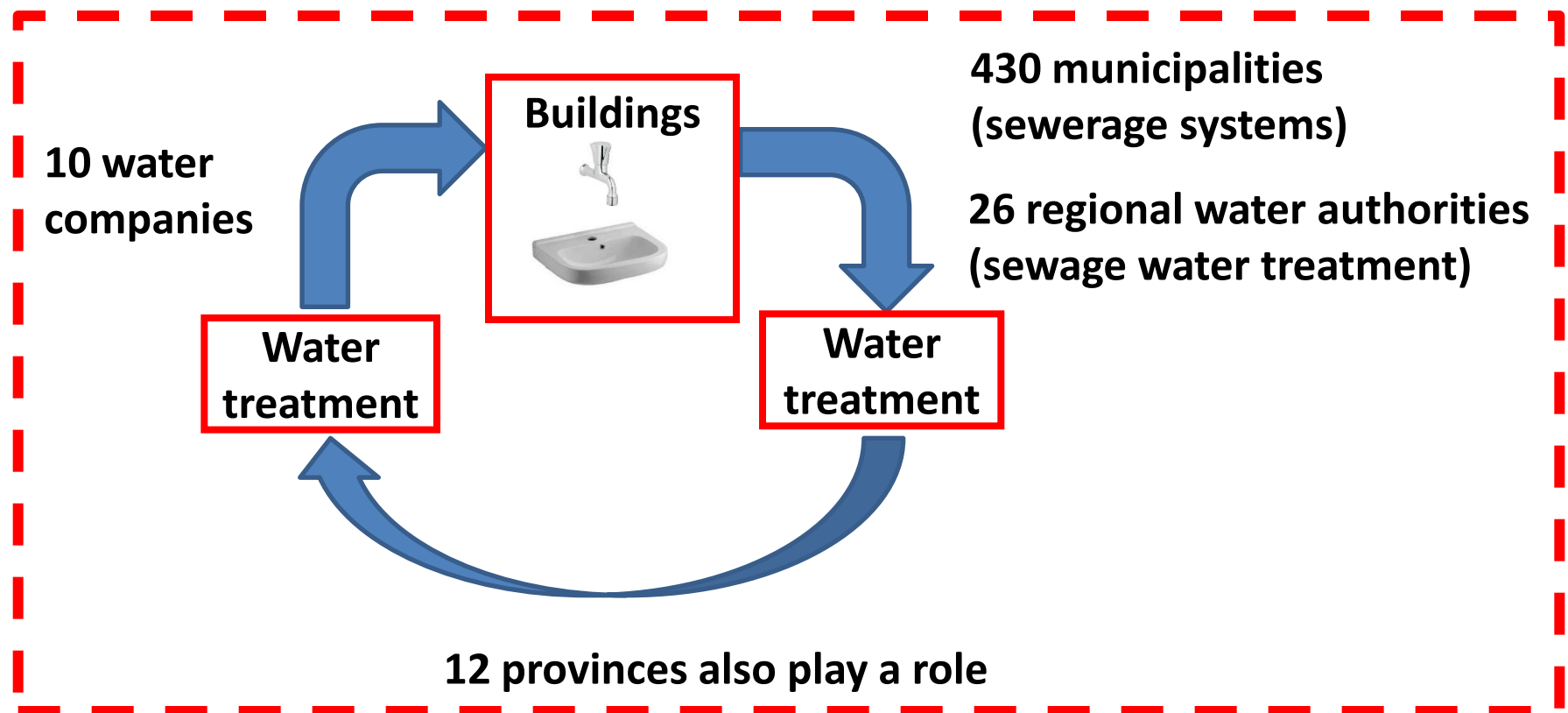
- **receive good quality drinking water (without chlorine)**
- **are connected to a safe sewerage system**

But in the years to come large investments will be required due to:

- **Climate change**
- **Renewal of sewerage systems**
- **Increasing demands on water quality in lakes and rivers**

2. Water Cycle in the Netherlands

The water cycle consists of a wide variety of stakeholders



2. Water Cycle in the Netherlands

In 2007 these stakeholders signed an agreement:

- **Cost-effectiveness: More value for money**
- **Transparency: Know what you pay for**
- **Describe a Long-Term View on Completing the Water Cycle**

Task of the working group: To develop a smart water cycle:

- **Sustainable**
- **Cradle-to-cradle**
- **Flexible**

Result: *'Interconnecting Water'* with four future scenarios

2. Water Cycle in the Netherlands

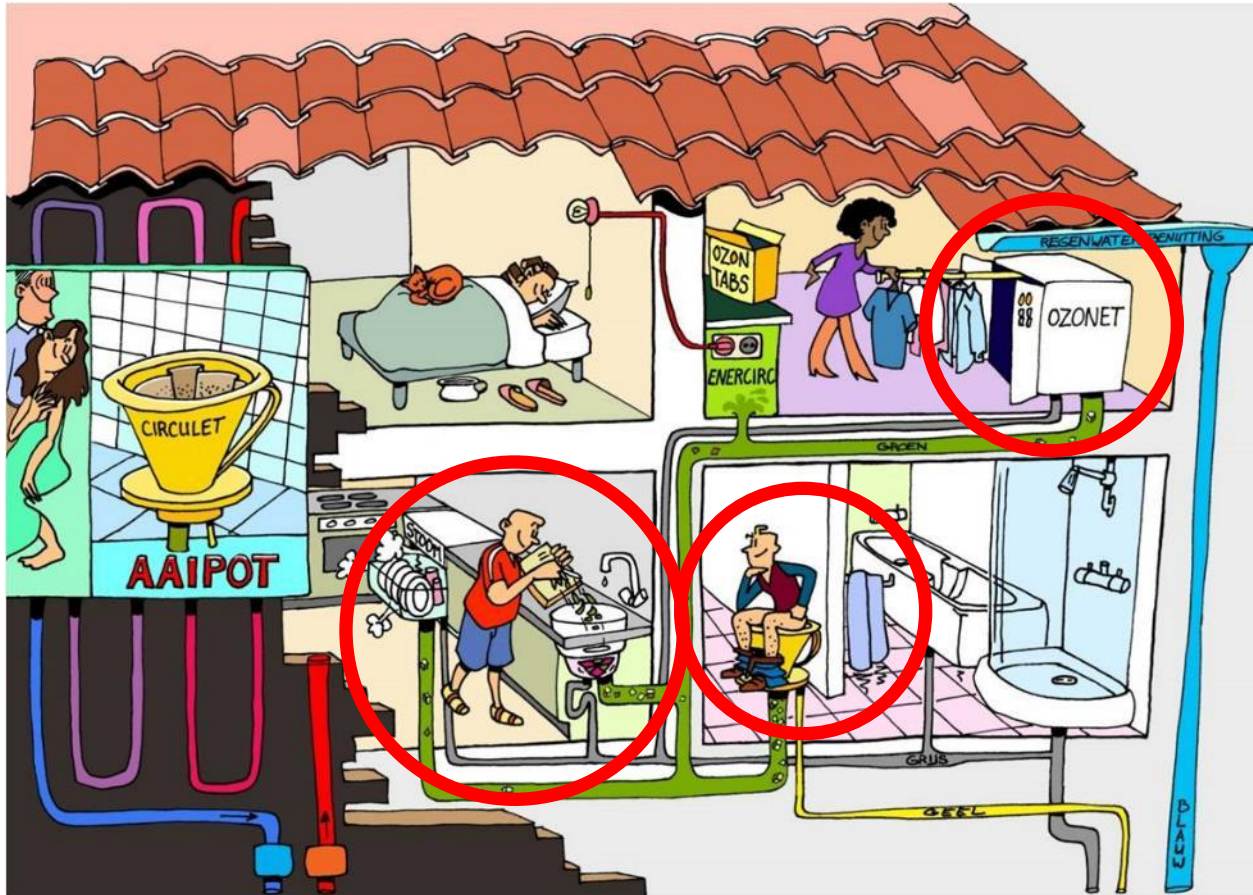
Parameters:

- Demonstrate what the realisation may look like
- Look beyond the boundaries
- For some visions the technologies are as yet not available.

The *Long-Term View on Completing the Water Cycle* is

- An source of inspiration
- Dot on the horizon

3. Domestic Water Cycle in 2050



Comfort will have improved

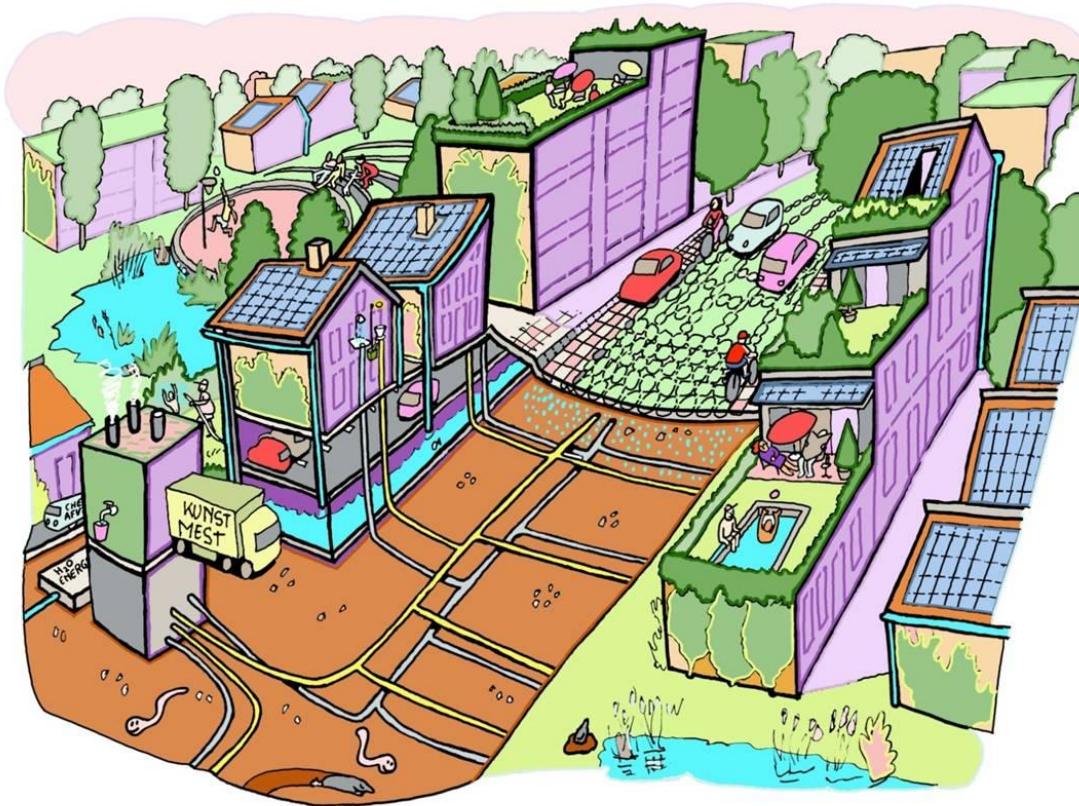
Kitchen and bath water is processed locally

Main washing agent is ozone

Dishwasher operates on steam

Urine and faeces are separated

4. New Housing in 2050



Rain and waste water are no longer mixed

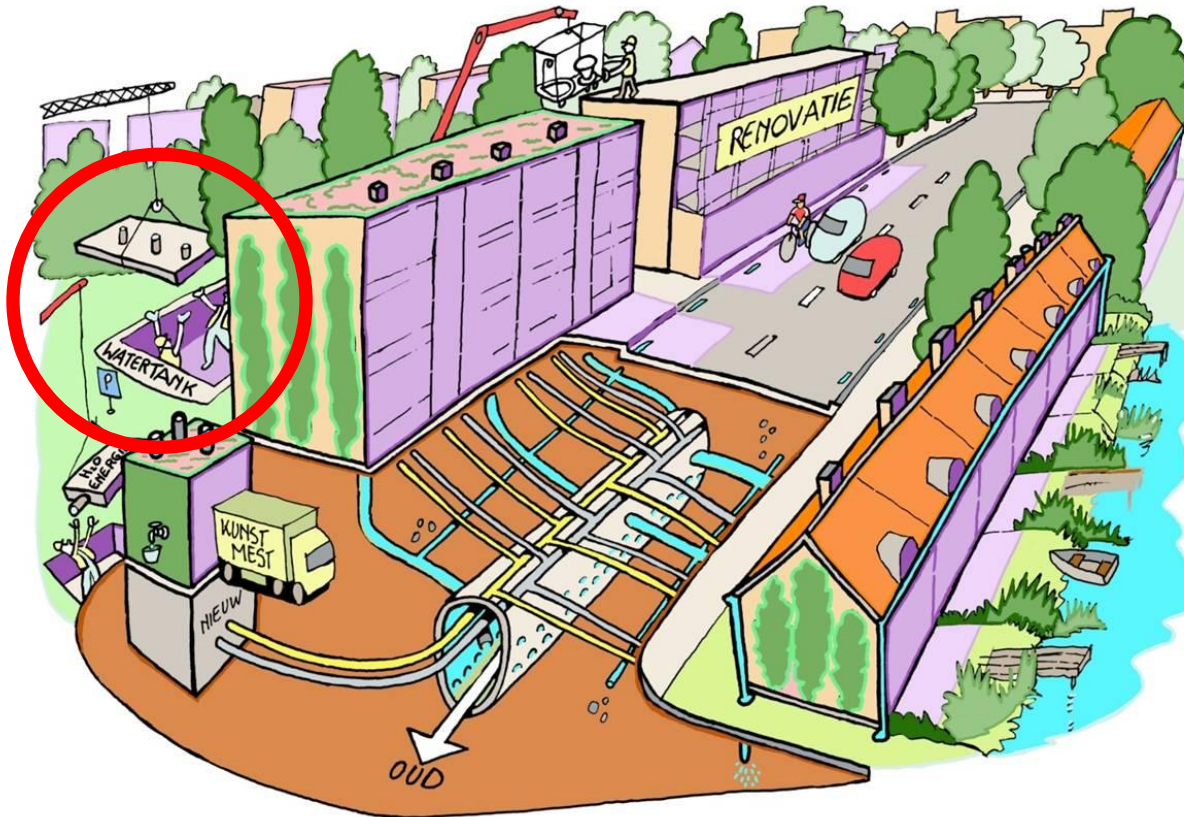
Rain water is used locally

Road with hollow shape

Urine and faeces are locally collected separately

Amphitheatre floods in periods of extreme rainfall

5. Existing Housing in 2050



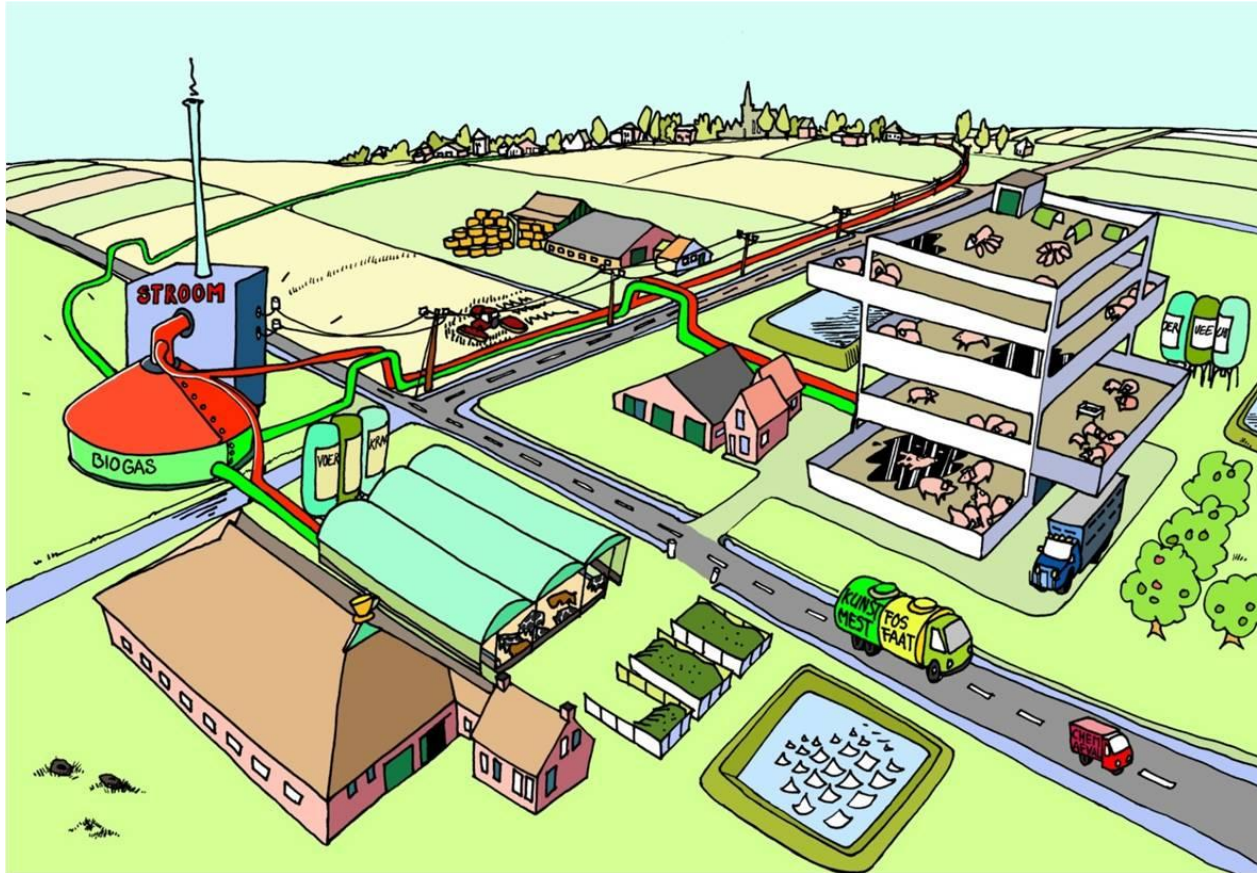
Waste water is disconnected from the sewerage system

Sewerage pipes have become rainwater pipes

Bottom of rainwater pipes is permeable and serve as drainage of excess rainwater

Water tanks store rainwater

6. Rural Area in 2050



Clustering agriculture activities forms the basis

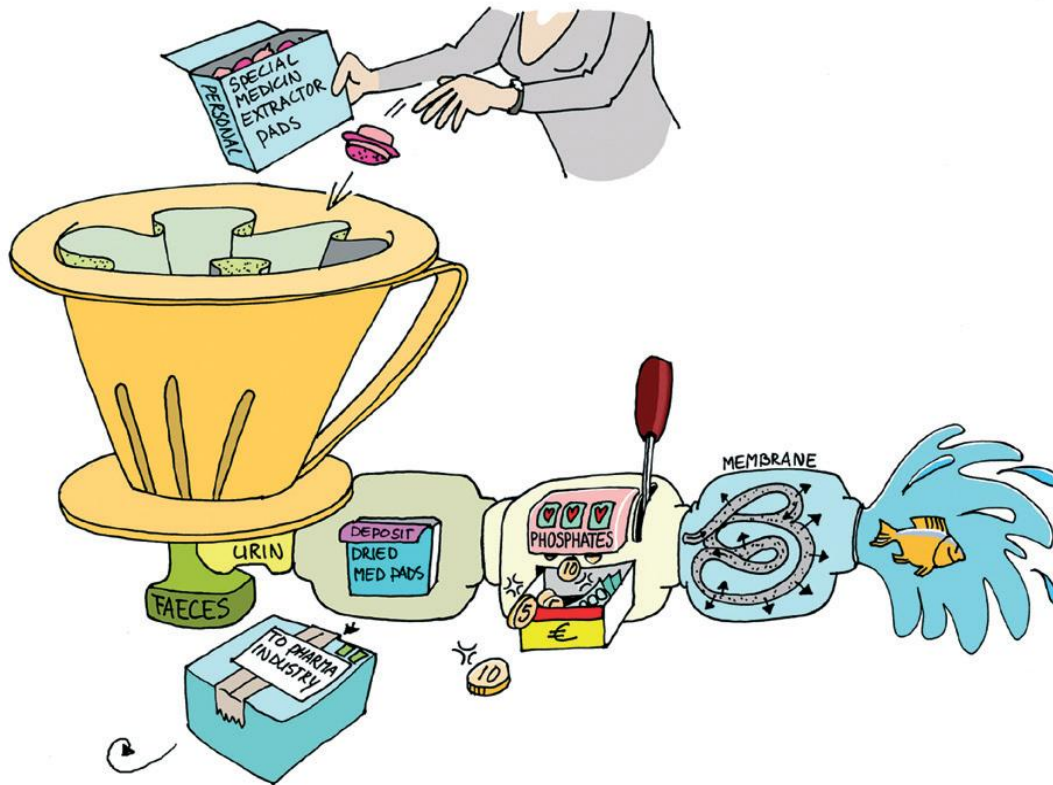
Intensive livestock farms produce fertilizer

Fermentation plant processes the fertilizer

Fermentation plant also processes other waste streams

Generation of electricity

3. Domestic Water Cycle in 2050

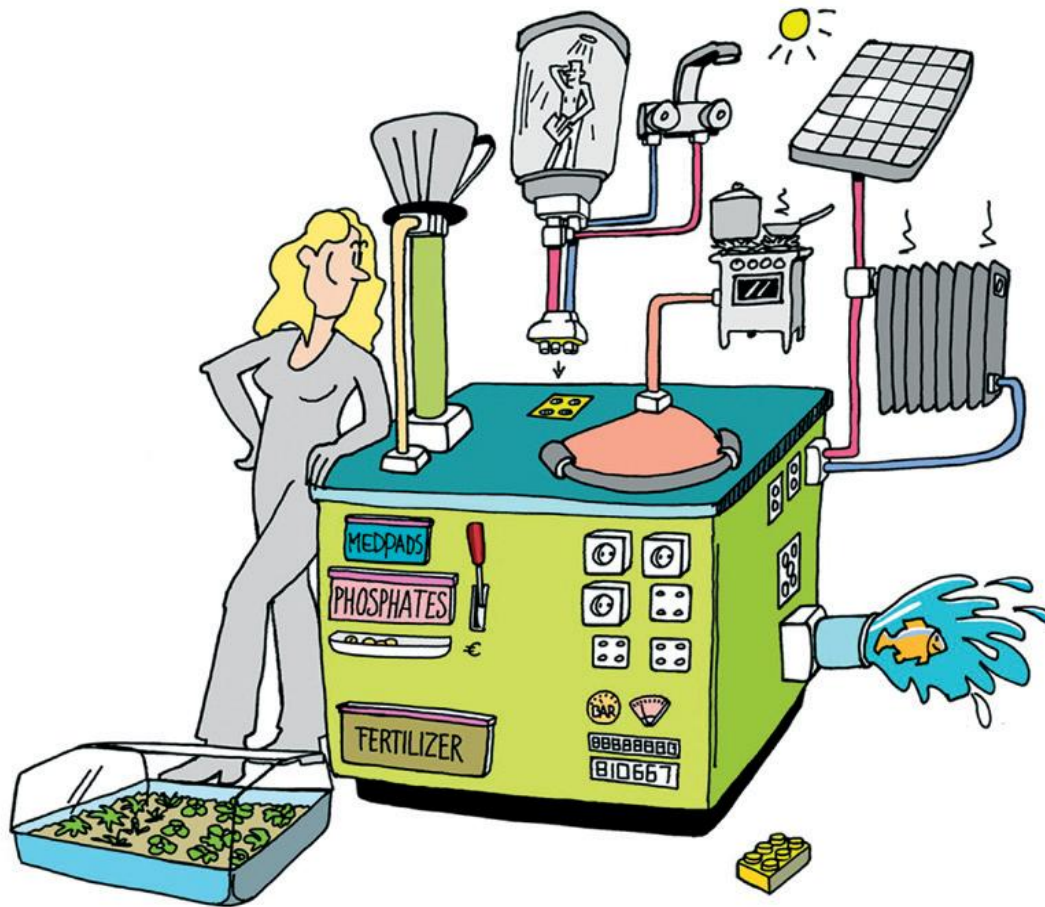


**Urine passes
through the filter**

**Medicine
residues are
filtered out**

**The rest is
processed to
fertilizer**

3. Domestic Water Cycle in 2050



The faeces are collected in a filter

To be processed with other organic waste to generate energy

7. Lessons learned ...

... from good practice examples



Sealskin NMX



Dubletten

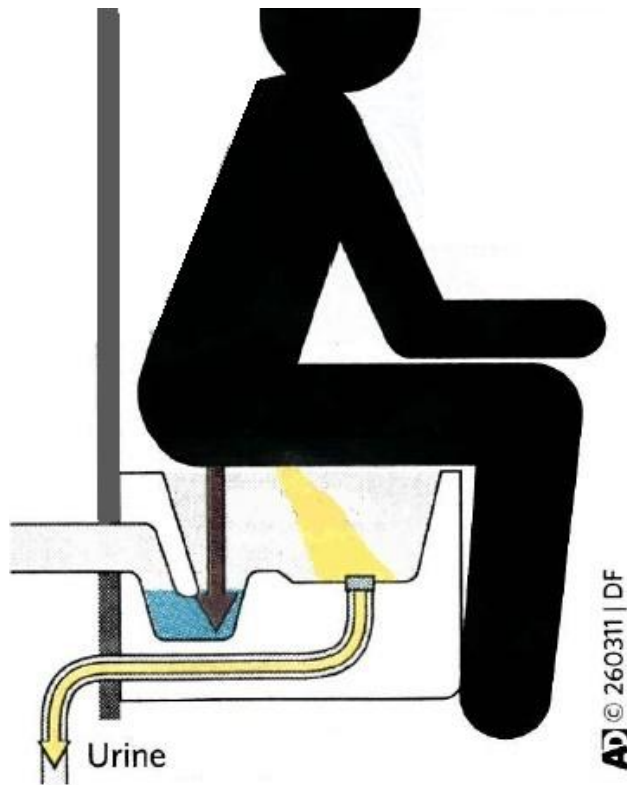


Roovac



Wost Man Ecology

7. Lessons learned ...



Aspects:

- Ratio compartments faeces 2/3 and urine 1/3
- Sitting position
- People are reluctant to sit on public toilets
- Children have problems targeting the right compartment

This increases the need for cleaning

People flush several times

7. Lessons learned ...



Urine-separating toilets

School with 102 toilets

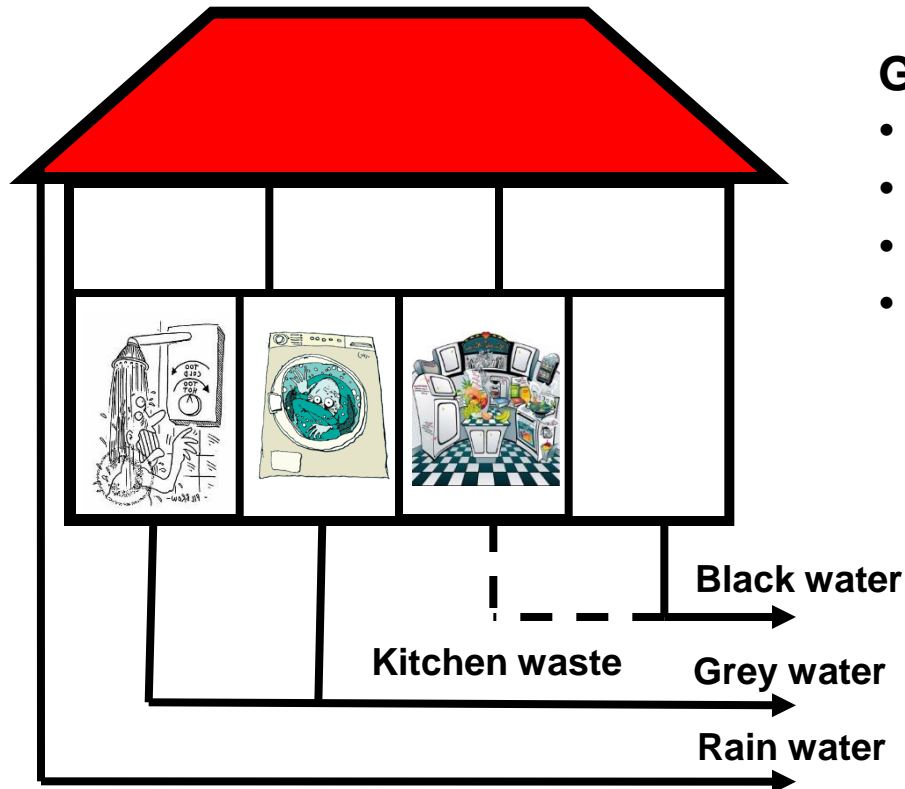
2010 Into operation

2012 Replacement lady toilets

Lessons learned:

- **Water mixes up with urine, concentration decreases**
- **More need for cleaning**
- **Consider application in public toilets**
- **Involve all parties at a very early stage**

8. New technology: vacuum system



Goals:

- Energy recovery
- Phosphate recovery
- Minimal water usage
- Easy to use

8. New technology: vacuum system



Vacuum toilet

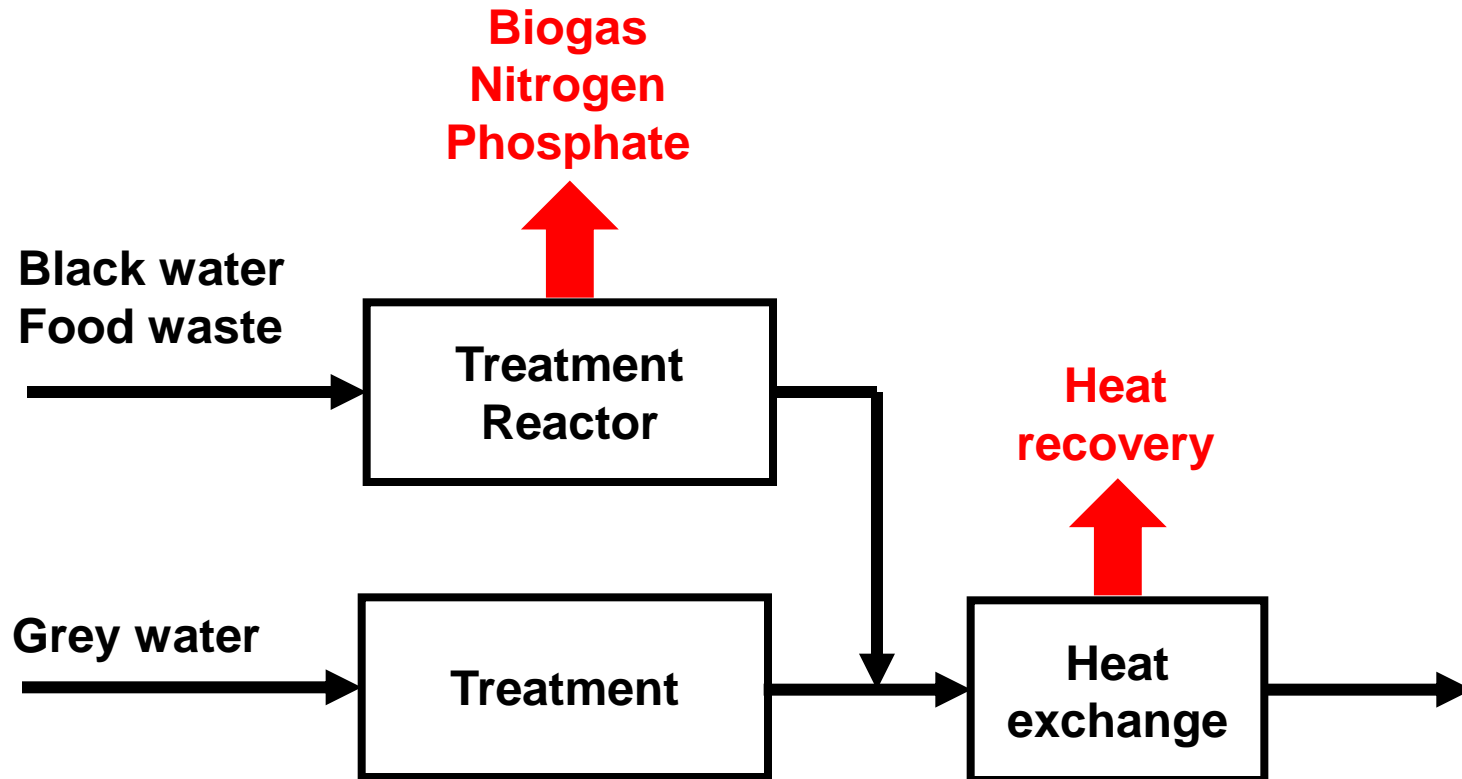


Food waste disposer

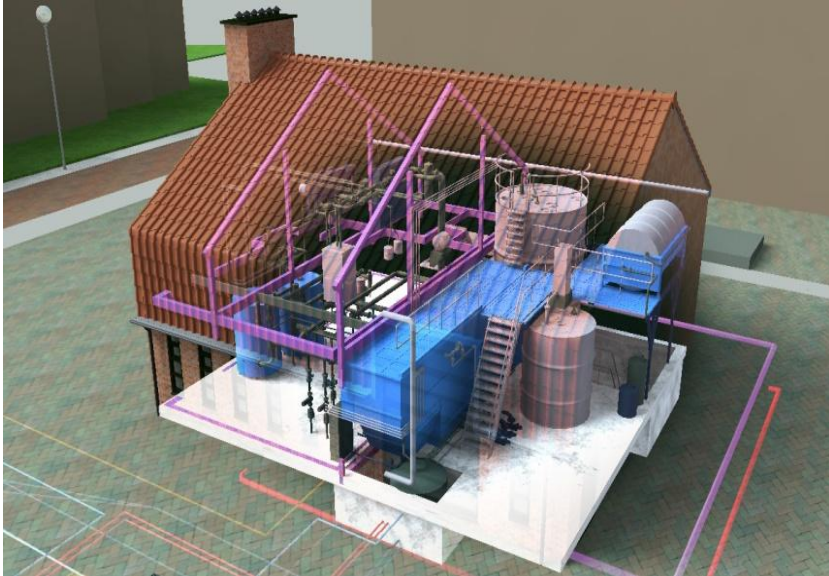


Black water and food waste

8. New technology: vacuum system



8. New technology: vacuum system



Advantages:

- Flush 1 litre
- Applicable in many buildings
- Small pipe diameter
- Flexible pipe layout

Considerations:

- Noise production

Local technical plant

Lessons learned:

- As little water as possible
- Noise production
- Involve users at a very early stage
- Demonstrate the use
- Technical plant visible

9. Conclusion and considerations

**The report Interconnecting Water,
Long-Term View on Completing the Water Cycle**

Provides us insights:

- **Buildings interconnect the water supply and sewerage system**
- **The environment necessitates unorthodox approaches to the way we deal with water**
- **The four future scenarios encourage us to find new technologies**
- **Increasing urbanisation leaves us no other choice**
- **Local investments will be required but they will lead to savings elsewhere**

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Thank you for your attention

References

1. **Interconnecting Water, Long-Term View on Completing the Water Cycle, May 2009**
2. **Interconnecting Water in a changing practise, March 2012**
3. **Cartoons, Beeldleveranciers, Amsteden**
4. **Desah consultants, Sneek, The Netherlands**
5. **Evaluation Neighbourhood Noorderhoek, Sneek, The Netherlands, STOWA, December 2014**
6. **Study ST-25 Application, design and construction of separated urine collection in buildings, TVVL, 8th July 2010**