



# Developments in the recovery of raw materials from sludge & wastewater

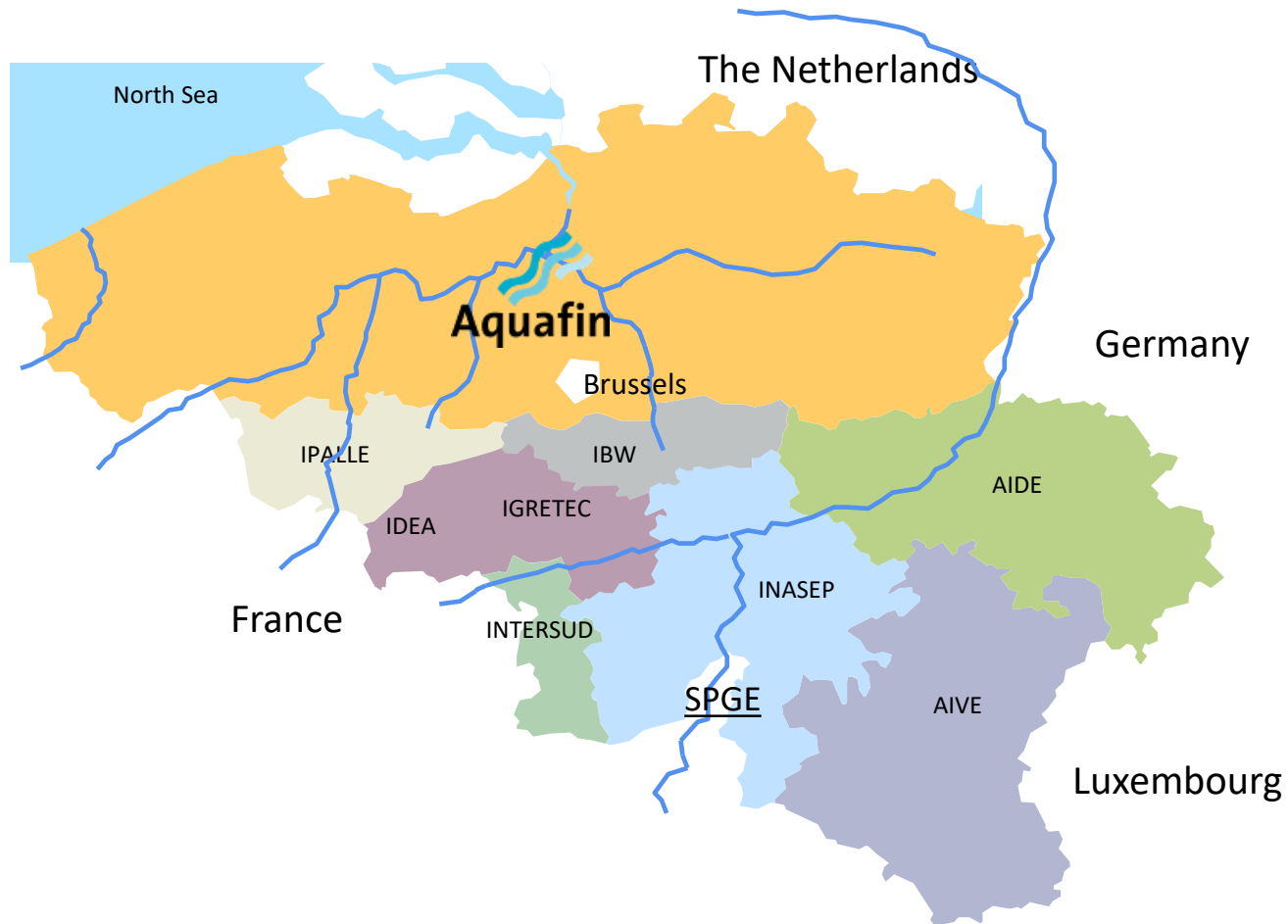
Aquarama trade fair  
30 September 2021

Francis Meerburg, R&D

[www.aquafin.be](http://www.aquafin.be)



# Aquafin is the municipal wastewater utility in Flanders

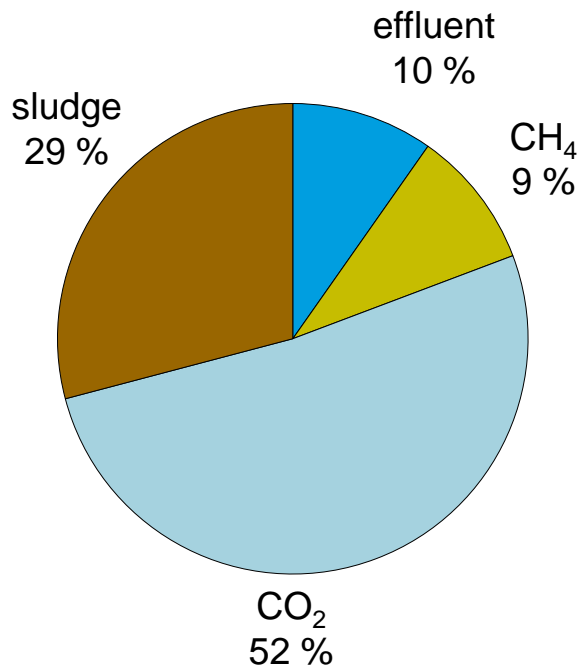


- **5,400,000 inhabitants**
- **6,808 km sewerage**
- **1,947 pumping stations / storage basins**
- **323 wastewater treatment plants**
- **15 anaerobic digesters**
- **4 driers**
- **1 incinerator**

# “Waste” water does not exist

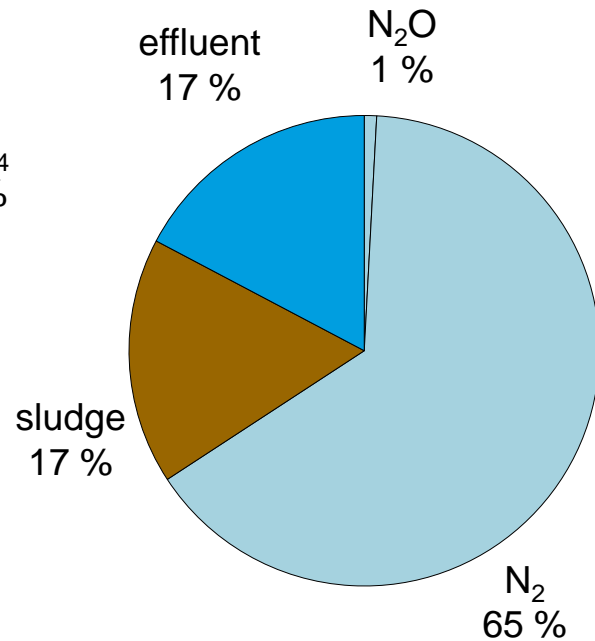
Resources in Flemish wastewater per year (6M inhabitants)

## 230 ktonne COD



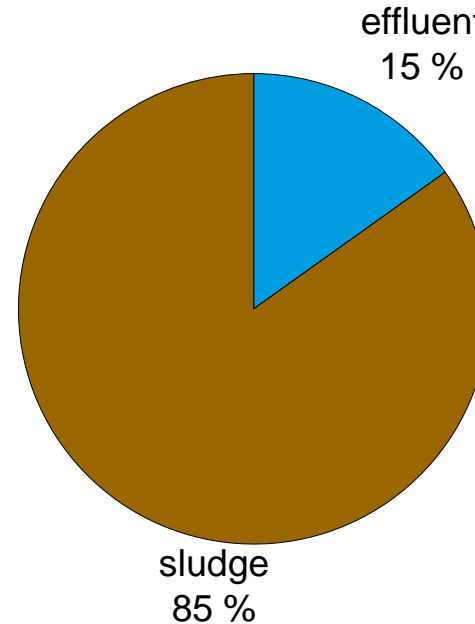
**GHG emission**  
**Energy consumption**

## 28 ktonne N



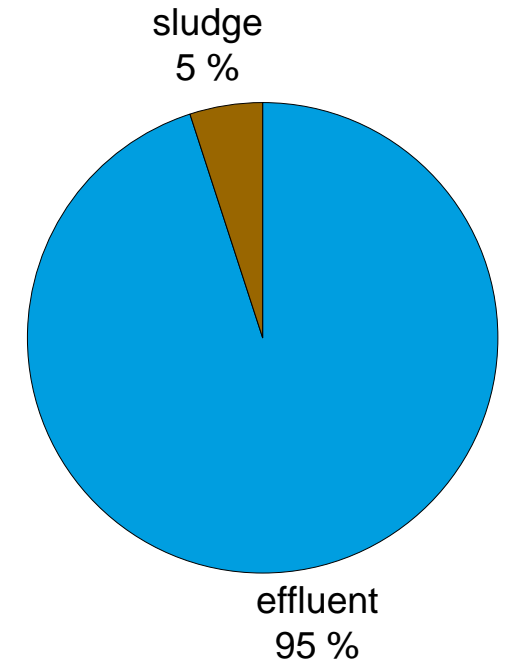
**1-2% of global**  
**energy use**

## 3.9 ktonne P



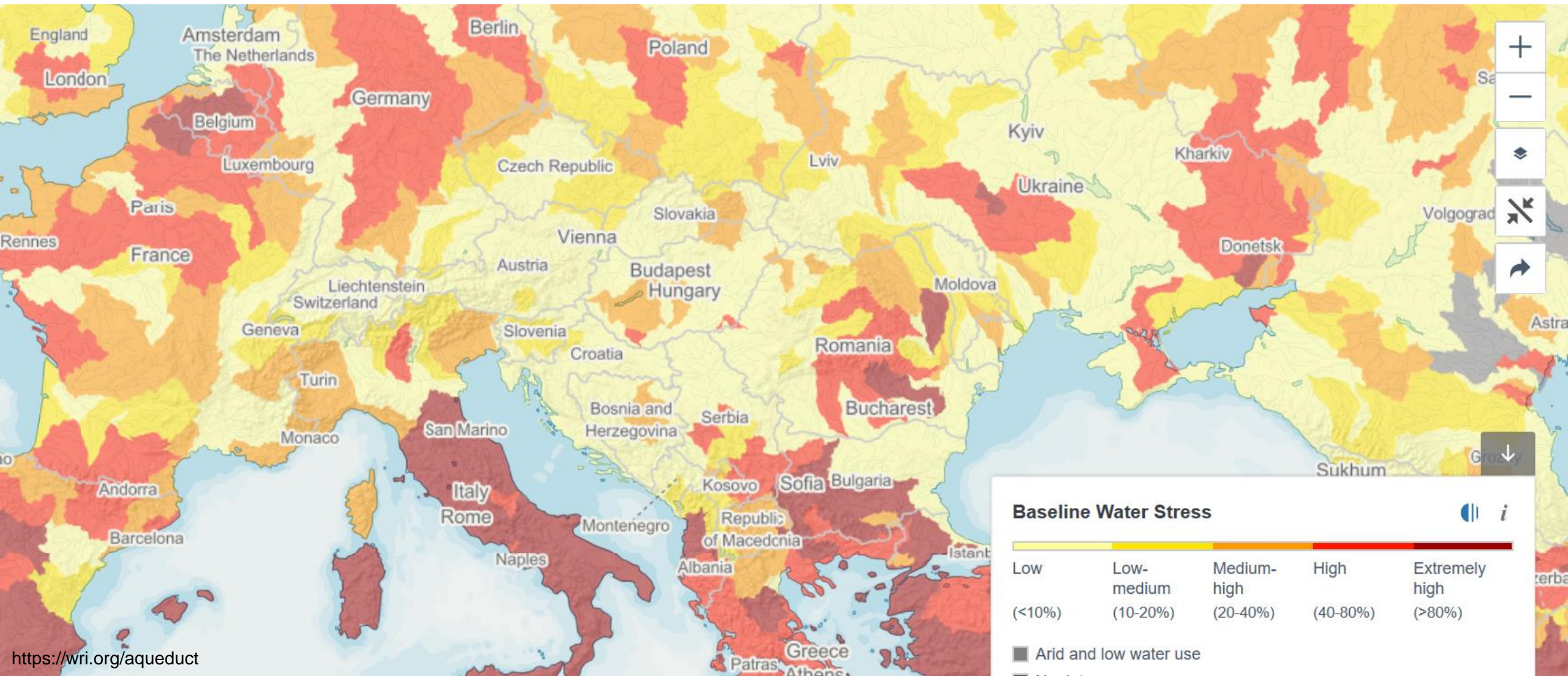
**World reserves**  
**under pressure,**  
**geopolitics**

## 10 ktonne K

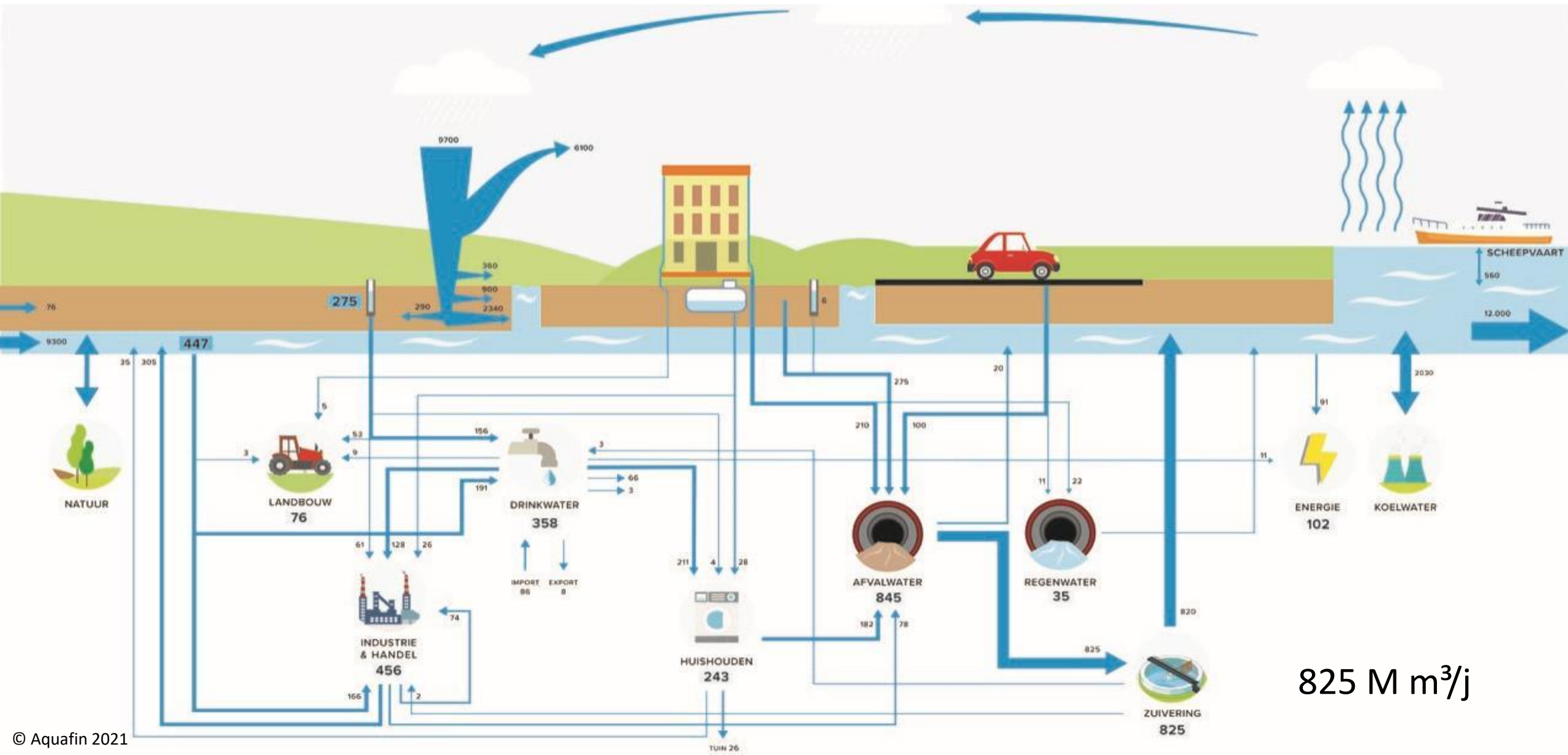


**World reserves**  
**for ± 100 years**

# “Waste” water does not exist

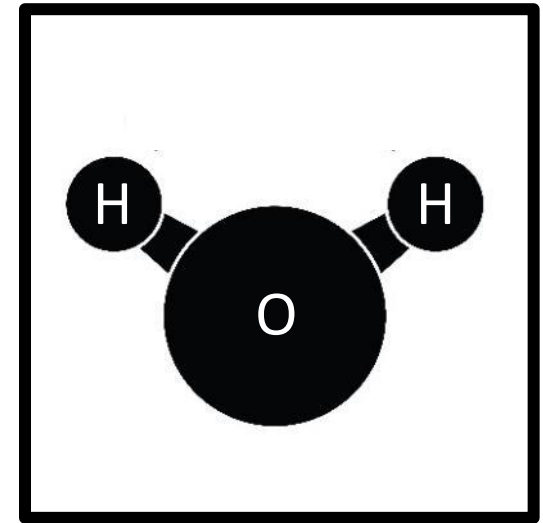
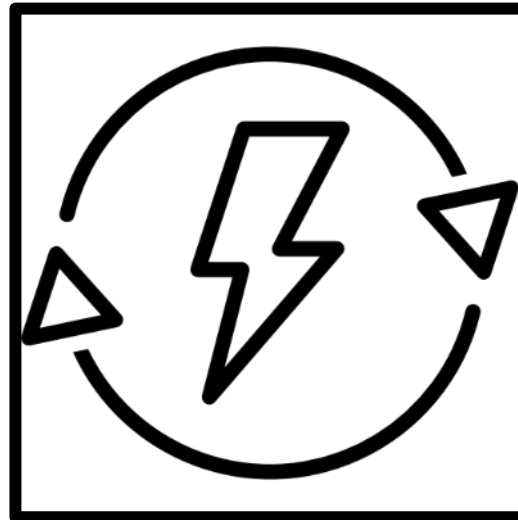
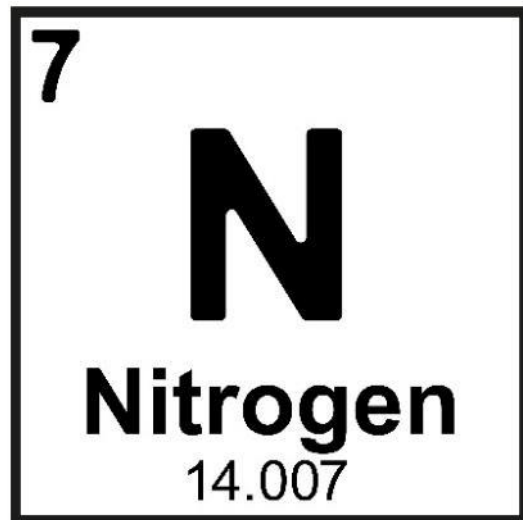
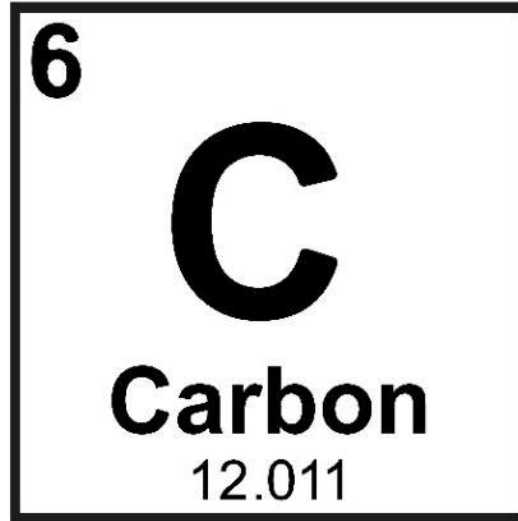
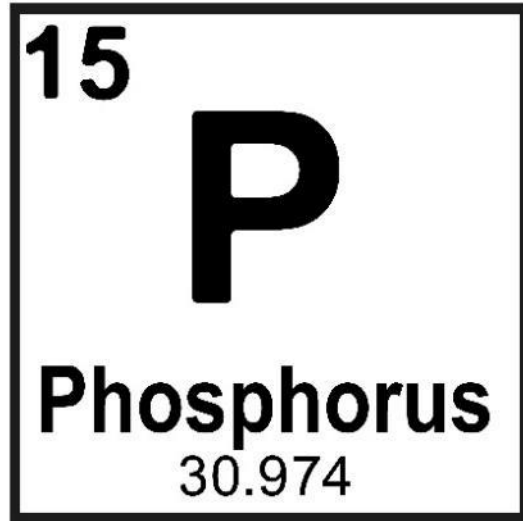


# “Waste” water does not exist

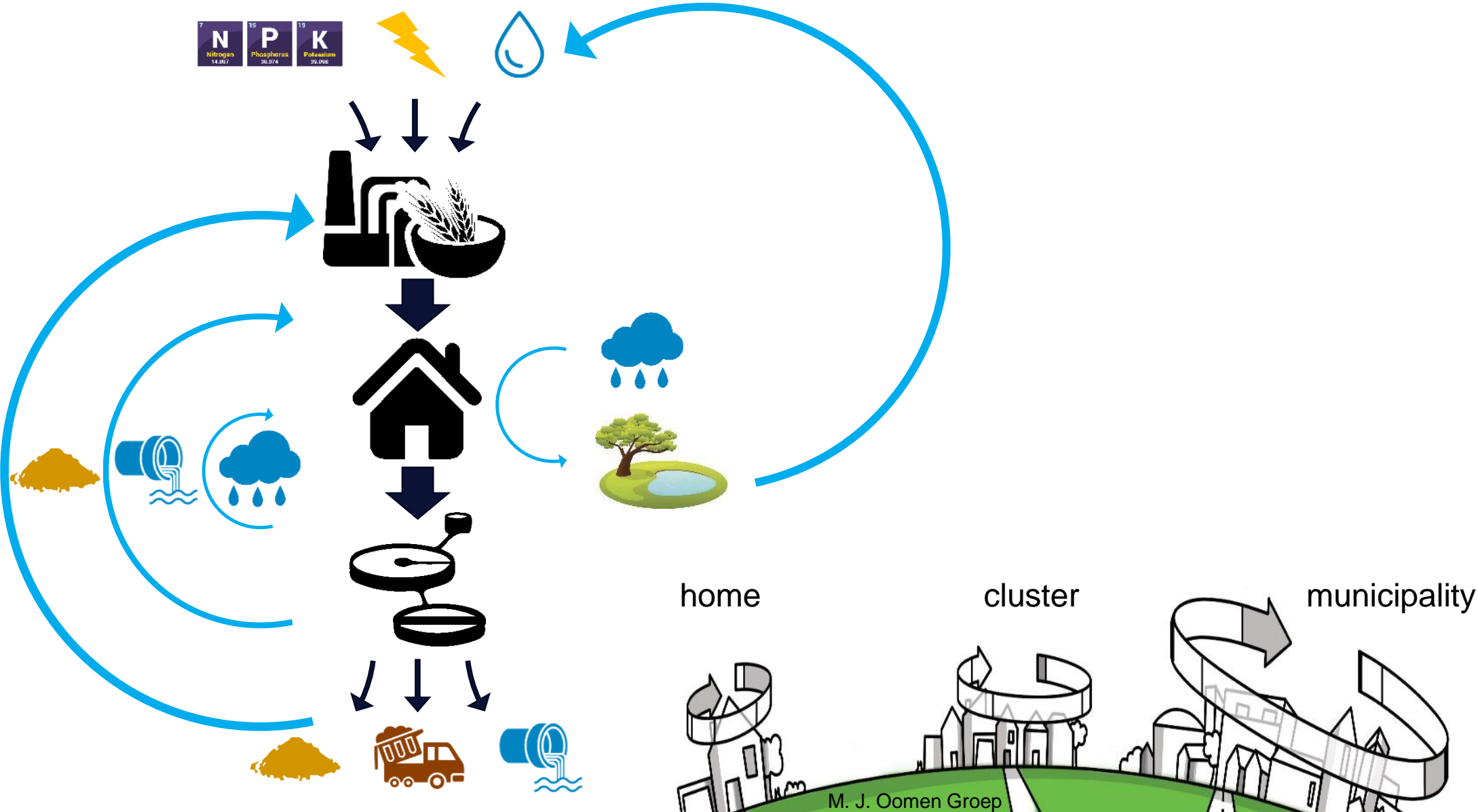


825 M m<sup>3</sup>/j

Which resources can be recovered?



# From linear chain to circular use



# Phosphorus recovery at different levels



Urine



Centrate



Digestate



Incineration ash

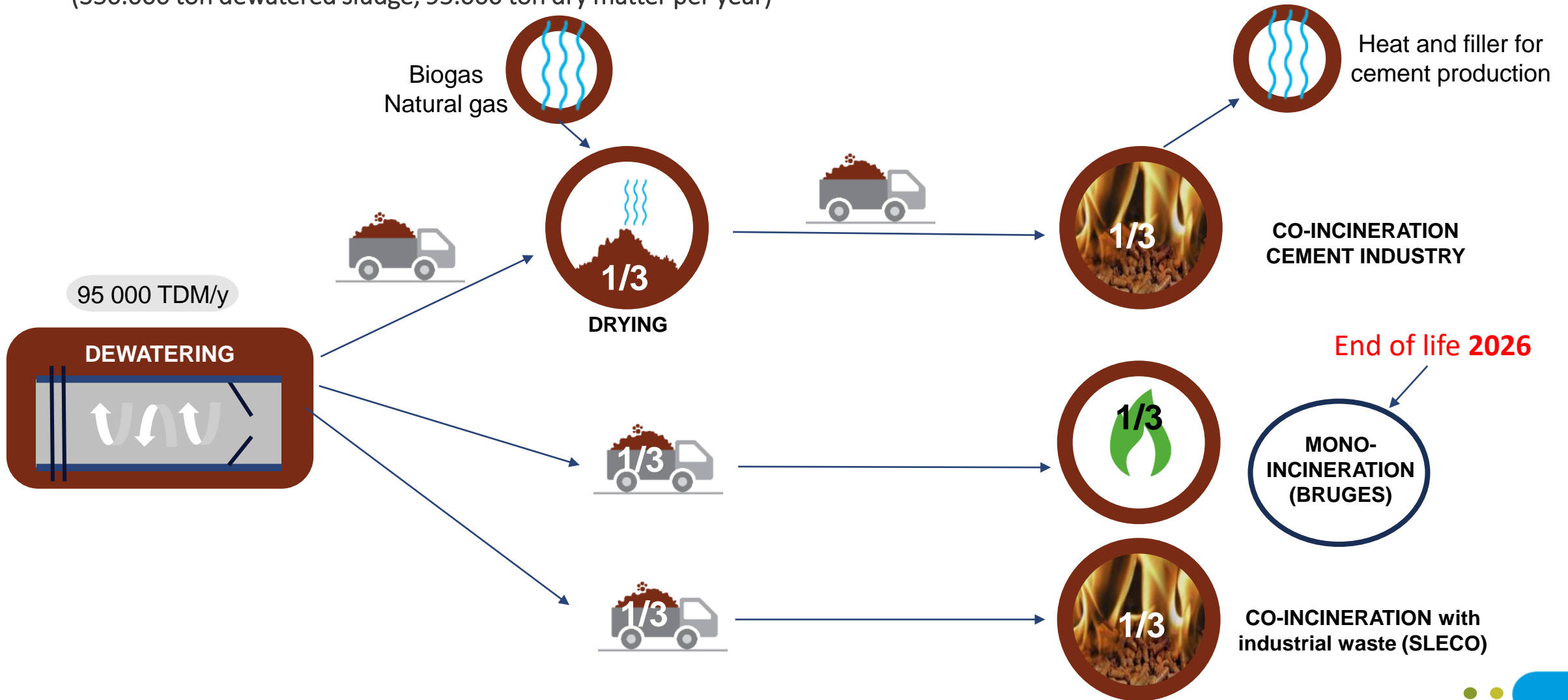


Mono-incinerator  
(2026)

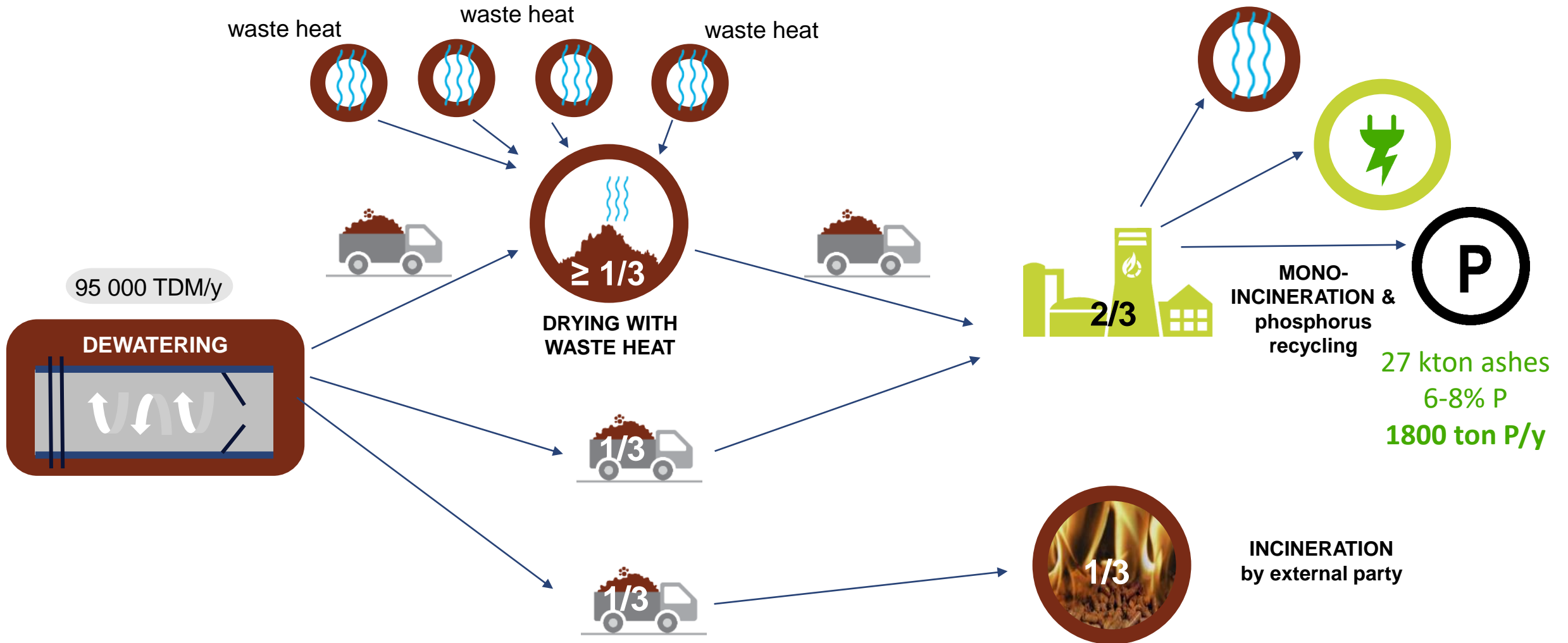


# Sludge line today

(350.000 ton dewatered sludge, 95.000 ton dry matter per year)



# Sludge line 2026



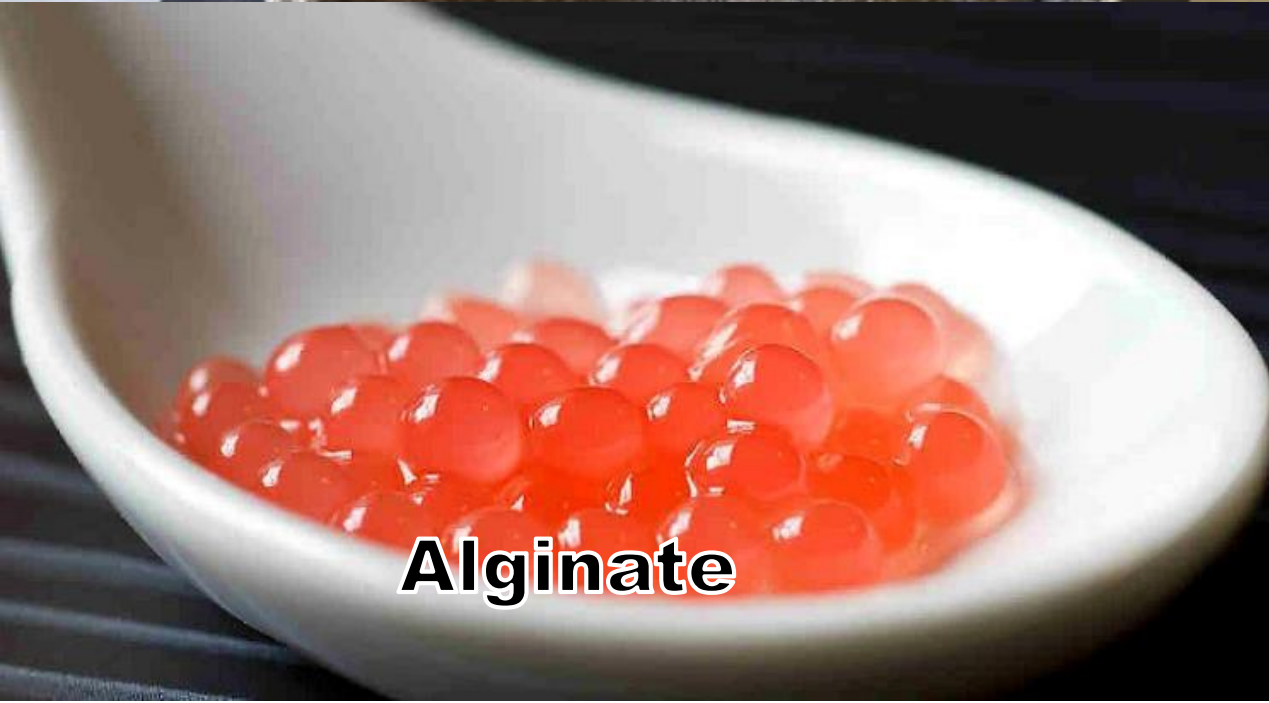


# Carbon recovery – Full scale

Cellulose



Bioplastics



Alginate



Compost

# Carbon recovery – Lab- and demo scale



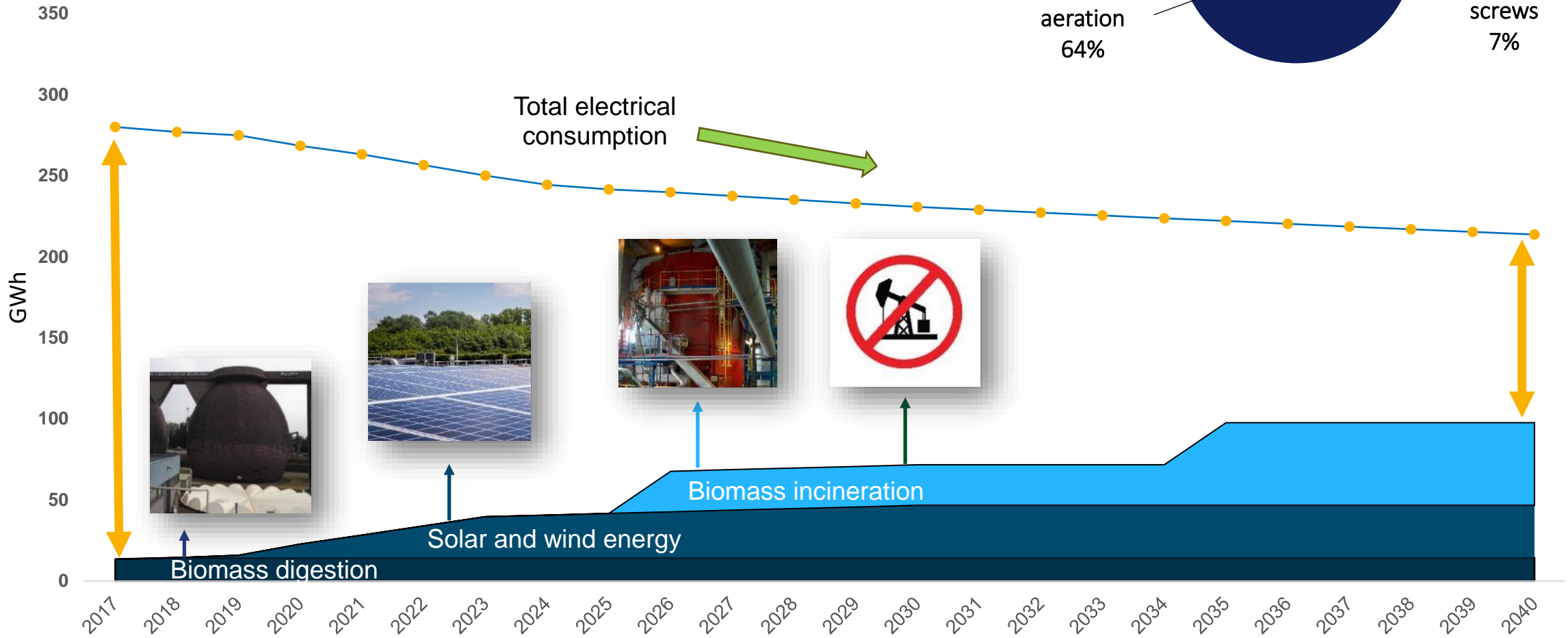
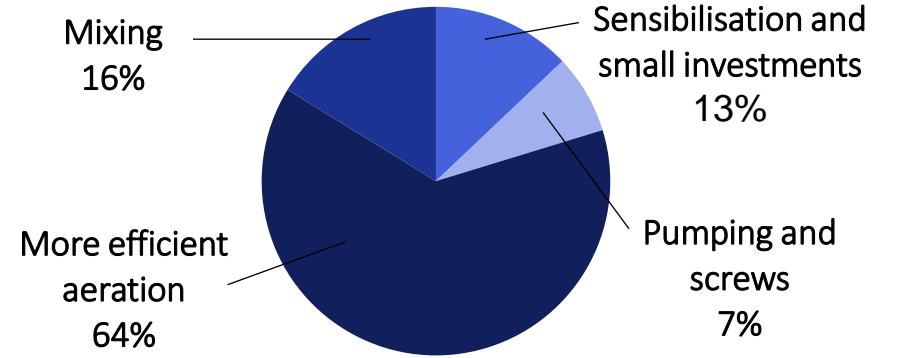
# Energy

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# Future plans: Energy

0.7% of electricity use in Flanders!



# Future plans: Energy

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Biomethane production in Antwerpen-Zuid and Harelbeke



Production unit for 600,000 m<sup>3</sup> biomethane per year

Investment of € 1,0 Mio

Partnering with IMOG (heat) and Fluvius (gas injection)

# Heat recovery

Aquafin as heat supplier for housing project (Slachthuisite, Antwerp)



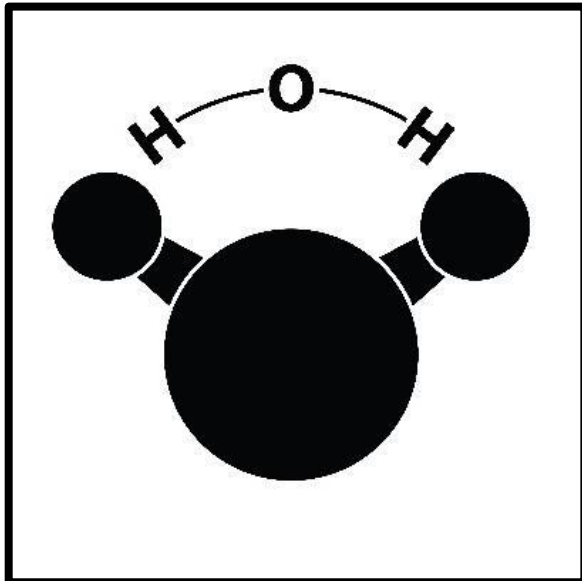




No shortage

Recovery is a matter of energy optimization

⇒ Pilot project WWTP Antwerpen-Zuid



Potable water projects

Industrial reuse: low-grade to high-grade

Irrigation

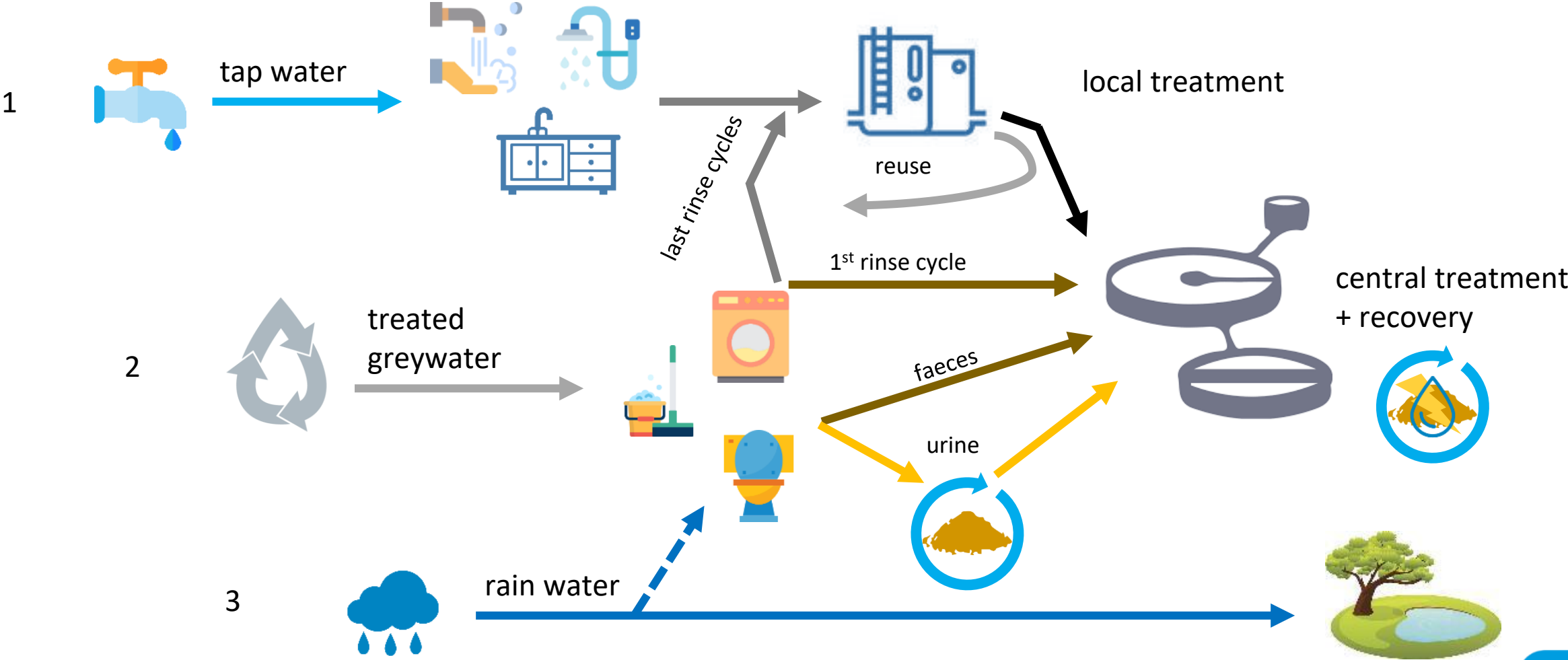
Landscaping and municipal use

Decentral projects on “new sanitation”

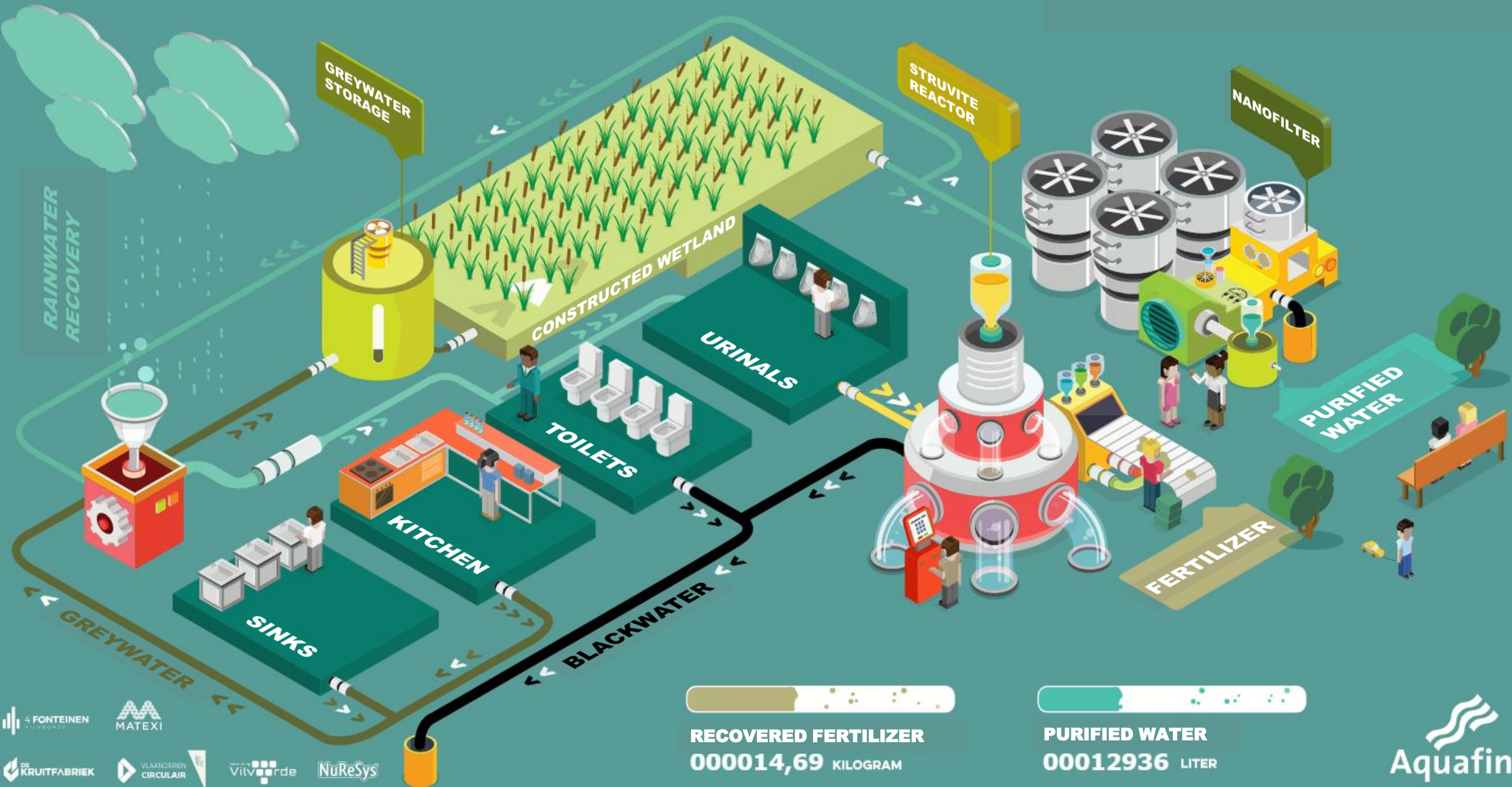
# Nitrogen recovery at WWTP Antwerpen-Zuid



# Every drop used twice



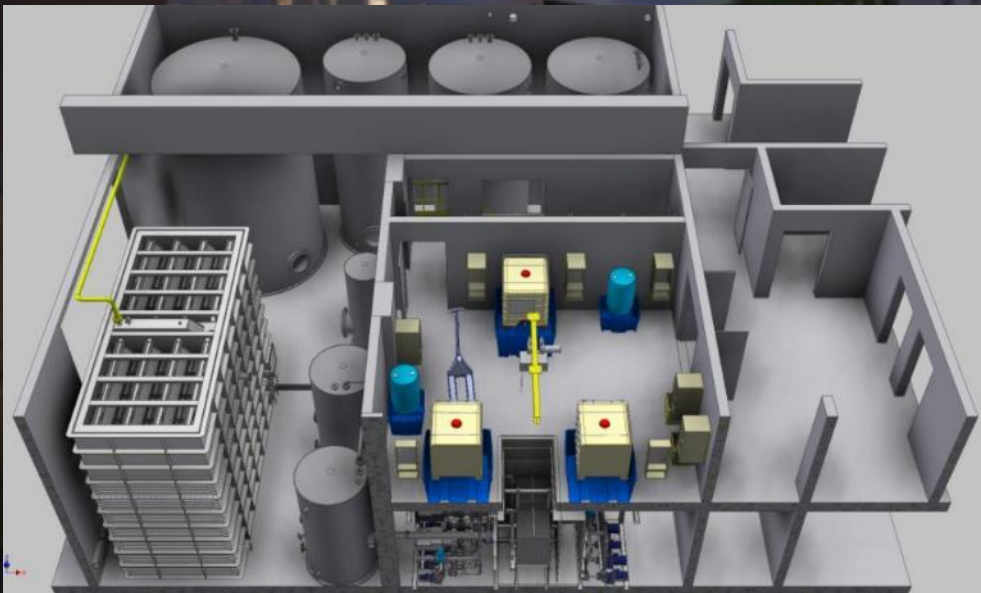
# THE GUNPOWDER FACTORY



# Many decentral treatment and reuse projects



# New sanitation: “New Docks” (Ghent)



# Effluent reuse projects

- **AWAIR**: drop irrigation

<https://www.proefstation.be/project/awair>

- **Partners for Water**: cucumbers on WWTP effluent

<https://www.waterfuture.nl/portfolio-items/natrium-verwijdering-uit-drainwater-komkommerkas/>

- **Project Kinrooi**: subirrigation with WWTP effluent

<https://www.boerenbond.be/actualiteit/gezuiverd-afvalwater-voor-subirrigatie-kinrooi>

- **H2020 B-WaterSmart**: Water smartness living labs

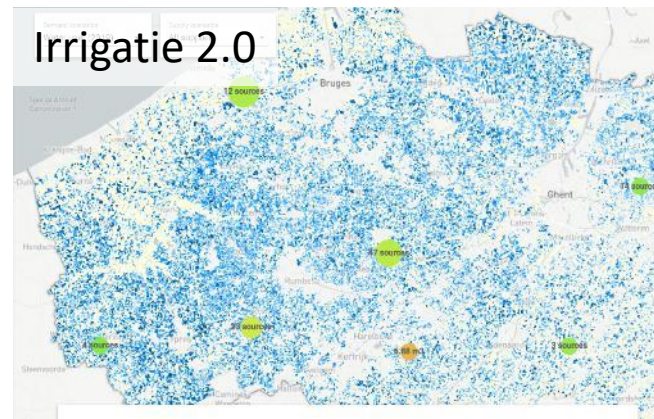
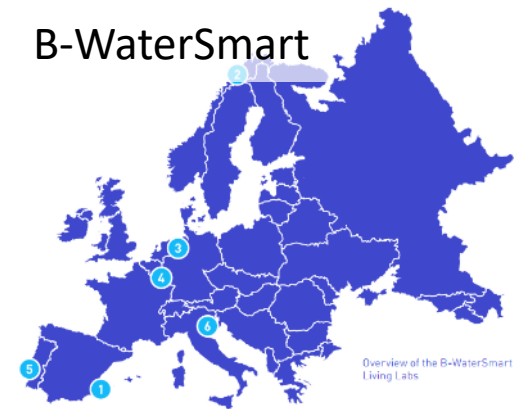
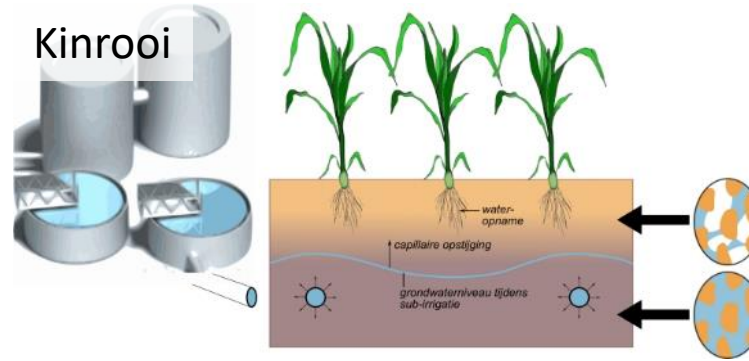
<https://b-watersmart.eu>

- **Irrigatie 2.0**: What water when and where

<https://vlakwa.be/nl/projecten/waar-wanneer-met-welk-water-irrigeren>

- **Life Aclima**: Climate adaptation demos in agriculture


website tbd




# Effluent reuse: Industry

2 million m<sup>3</sup>/y effluent  
to industry

Ecowerf  
compost installation



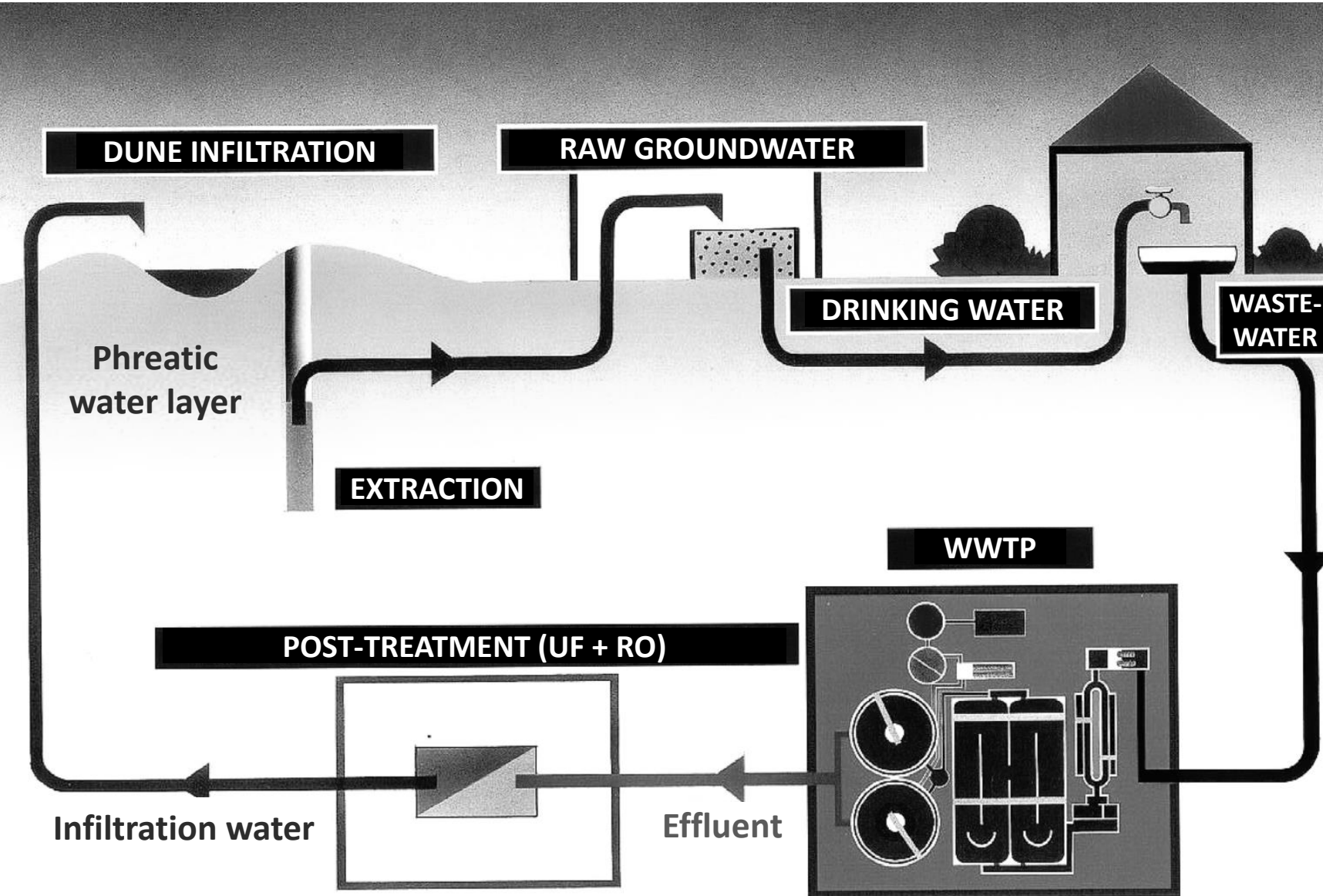
Citrique Belge





# 20 years of indirect potable water reuse in Wulpen!

3 million m<sup>3</sup>/y effluent to drinking water



- Effluent WWTP Wulpen
- ↓
- Post-treatment (UF + RO)
- ↓
- Infiltration in dunes
- ↓
- Groundwater extraction
- ↓
- Drinking water production

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