

# Biobased Solutions integrated in the Water and Waste Sector

An integrated perspective by  
the  
Amsterdam Partners Waternet and AEB

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Brazil June, 2014



water  net



# The Netherlands from a water perspective

compared to sea level



# Watermanagement in a region below sealevel

1 m = 3,3 ft

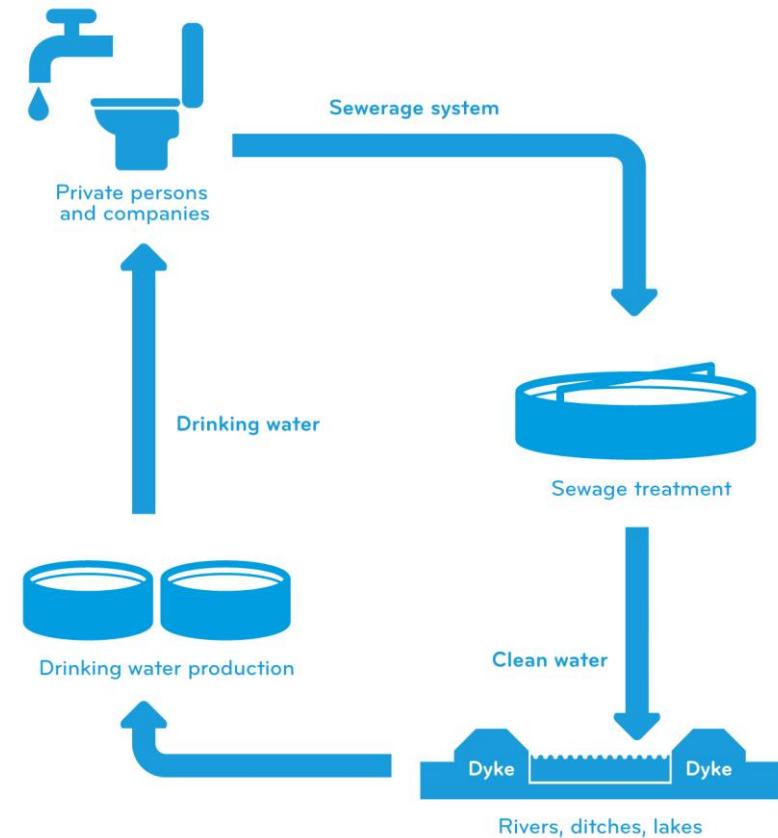


# Waternet as a mutual organization

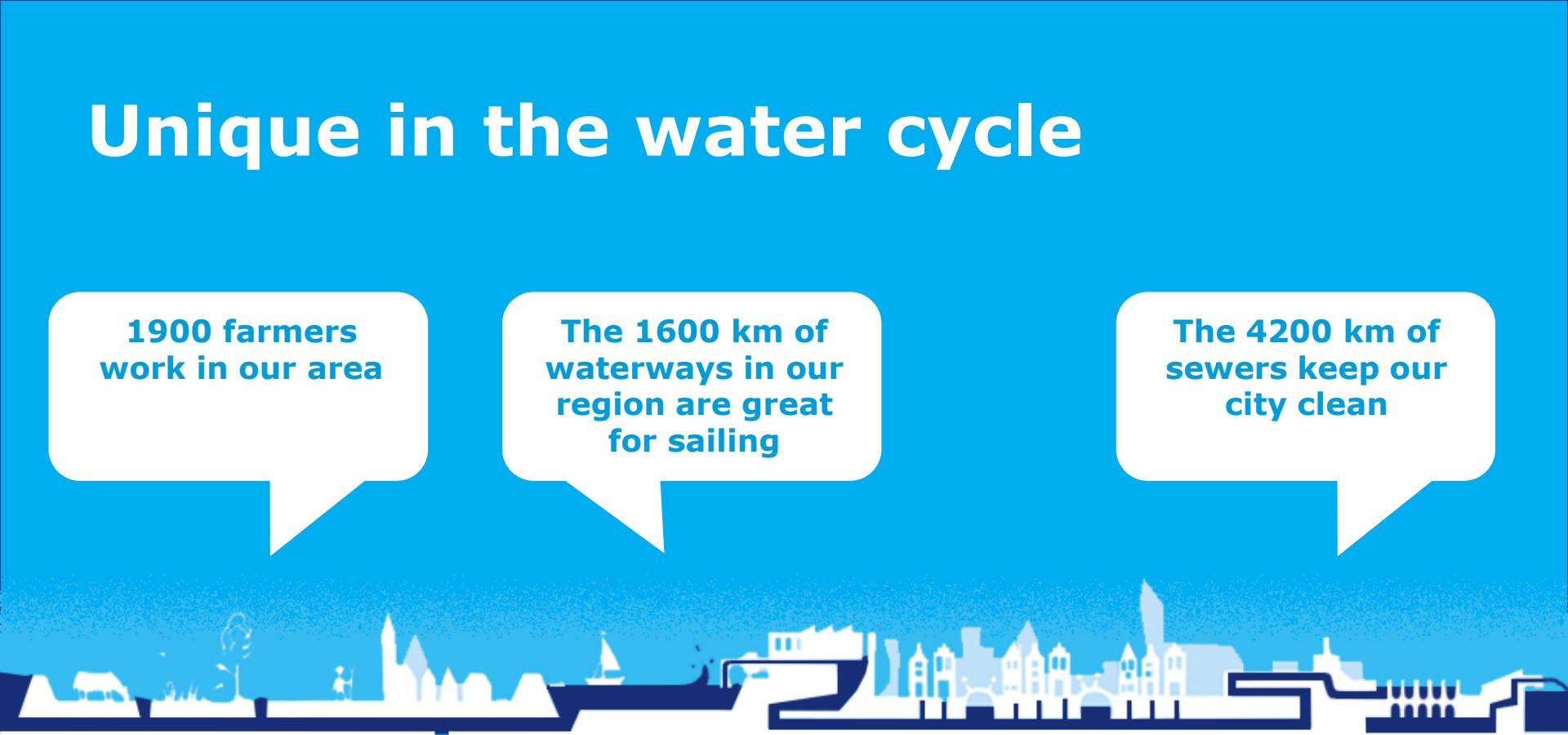


# Waternet works with all kinds of water

- Drinking water
- Waste water
- Surface water
- Groundwater
- Rainwater



# Unique in the water cycle



**1900 farmers  
work in our area**

**The 1600 km of  
waterways in our  
region are great  
for sailing**

**The 4200 km of  
sewers keep our  
city clean**



**Citizens are protected  
by 900 km of dykes**

**Our customers use an  
average of 133 litres  
of drinking water  
per person per day**

# Waternet: some key factors

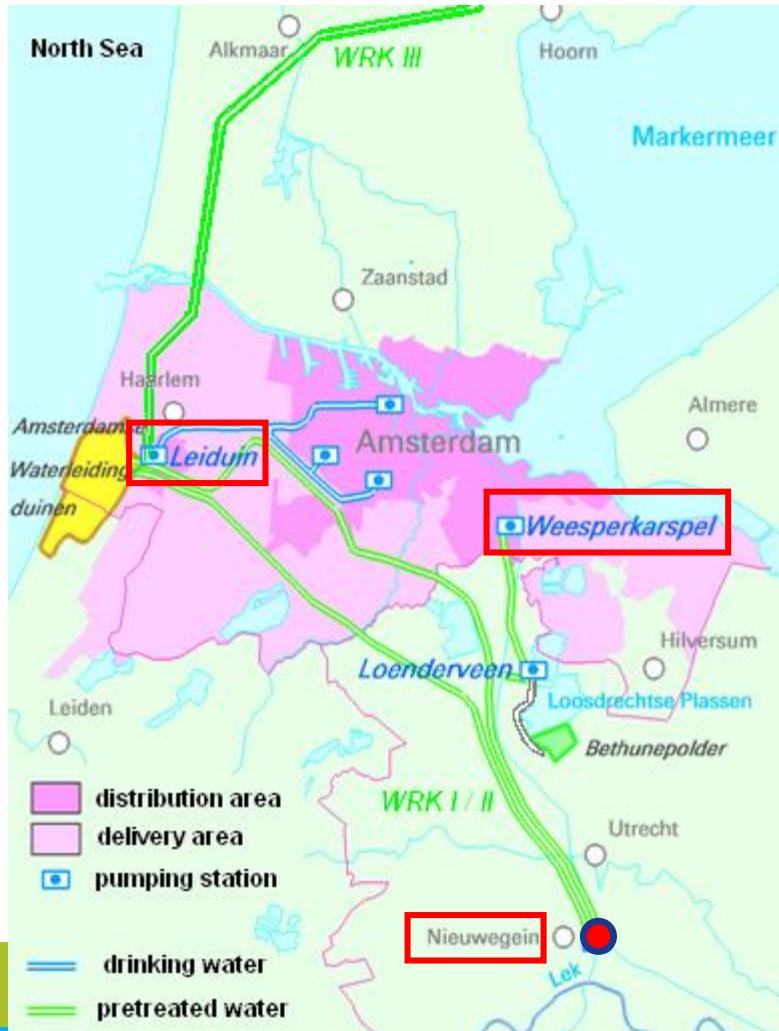
- Customers 1,2 million
- Municipalities 20
- Employees 1800
- Annual budget € 400 million = \$ 520 million
- Drinking water 90 million m<sup>3</sup>/y
- Waste water 125 million m<sup>3</sup>/y
- Waste water treatment plants 12
- Sewage 4000 km, almost 100% connections
- Dikes 800 km
- Nature (resources) 4200 hectares = 10,400 acres



# Drinking Water Production Plants

**Leiduin**  
Capacity: 70 Mm<sup>3</sup>/year

Primary resource:  
- Lek canal (branch river Rhine)



**Weesperkarspel**  
Capacity: 31 Mm<sup>3</sup>/year

Industrial water production plant  
**Nieuwegein**  
Capacity: 150 Mm<sup>3</sup>/year

## Artificial infiltration and recovery (Amsterdam Dunes) since 1850



- Freshwater store for 2 - 3 months
- Improvement hygienic and chemical water quality
- Reduction of peak concentrations and temperature due to variation in residence time

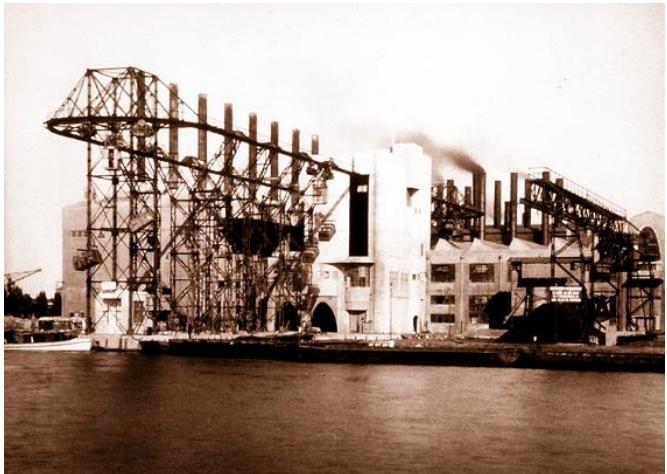
# Waste to Energy Company



- Owned by Local government
- Partners: City of Amsterdam, 16 municipalities
- 400 employees
- Situated in harbor area Amsterdam
- Largest WtE plant in the world

# AEB Amsterdam

1st Generation 1917-1969



2nd AVI Noord: 1969 -1993



3rd AVI West 1993 - present



4th WFPP 2007 - present



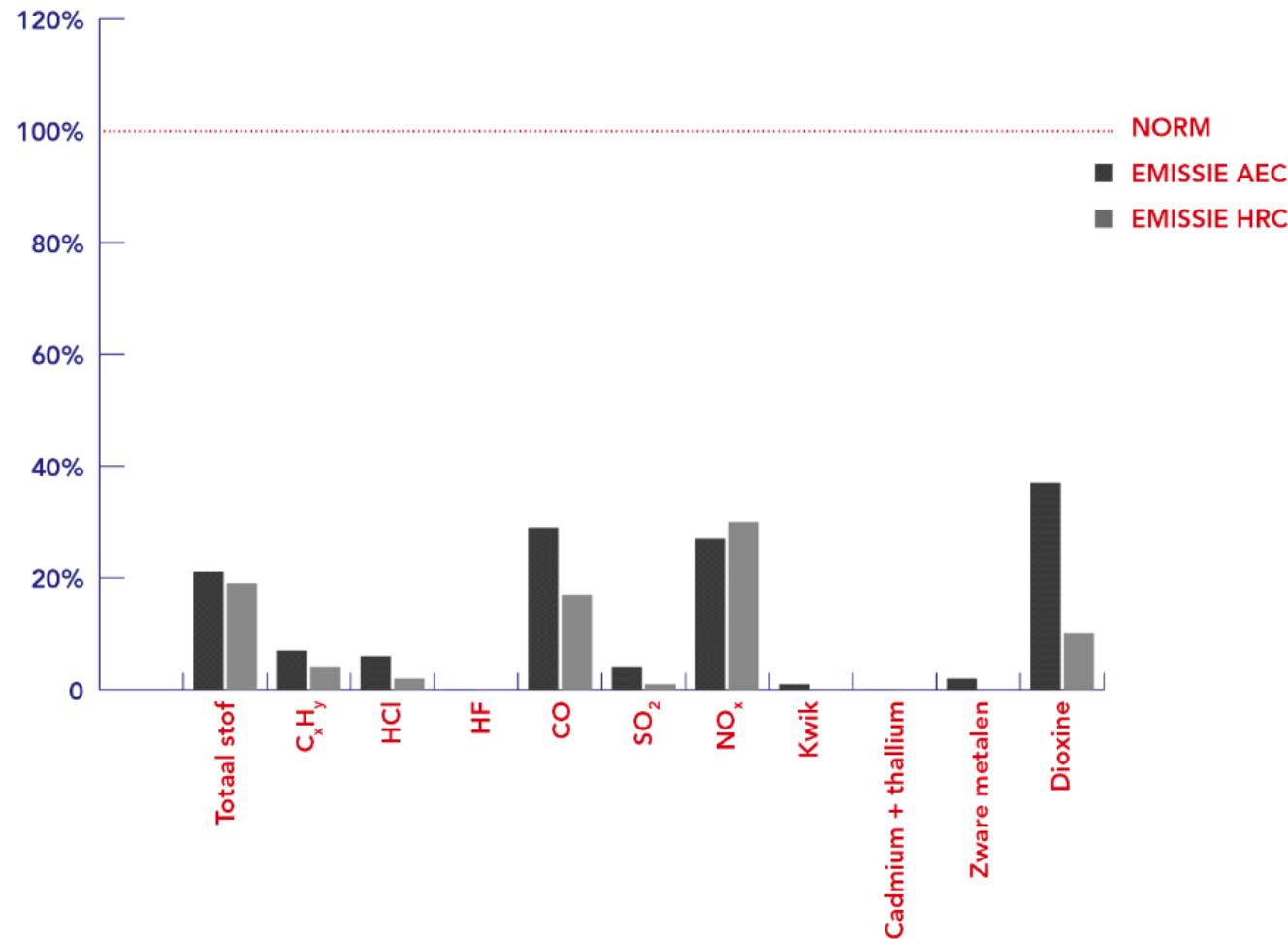
20 januari 2014

# WFPP



# Emissions

LUCHTEMISSIES AEC EN HRC 2012



## Amsterdam: a different energy

2040 Energy Strategy



→ 40% reduction of CO<sub>2</sub> emissions in 2025, compared to 1990

→ Vision 2040: economically strong and sustainable

→ In 2040 waste 100% recycled



→ New buildings climate neutral in 2015

# Today, we need to look at our city differently



amsterdam  
economic  
board

amsmartsterdam  
city

water<sup>net</sup>

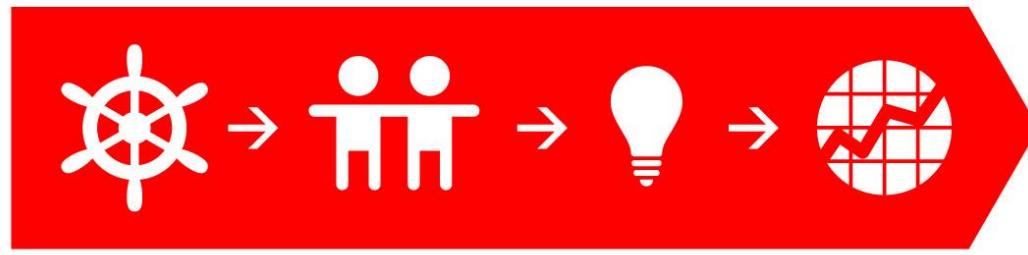
Gemeente Amsterdam  
Afval Energie Bedrijf

# Amsterdam trends: a city in motion



# Amsterdam Metropolitan Area

## amsterdam economic board



strategy  
Amsterdam  
metropolitan area

collaboration

innovation

growth

government  
organisations

amsterdam  
economic  
board

businesses

knowledge  
institutes

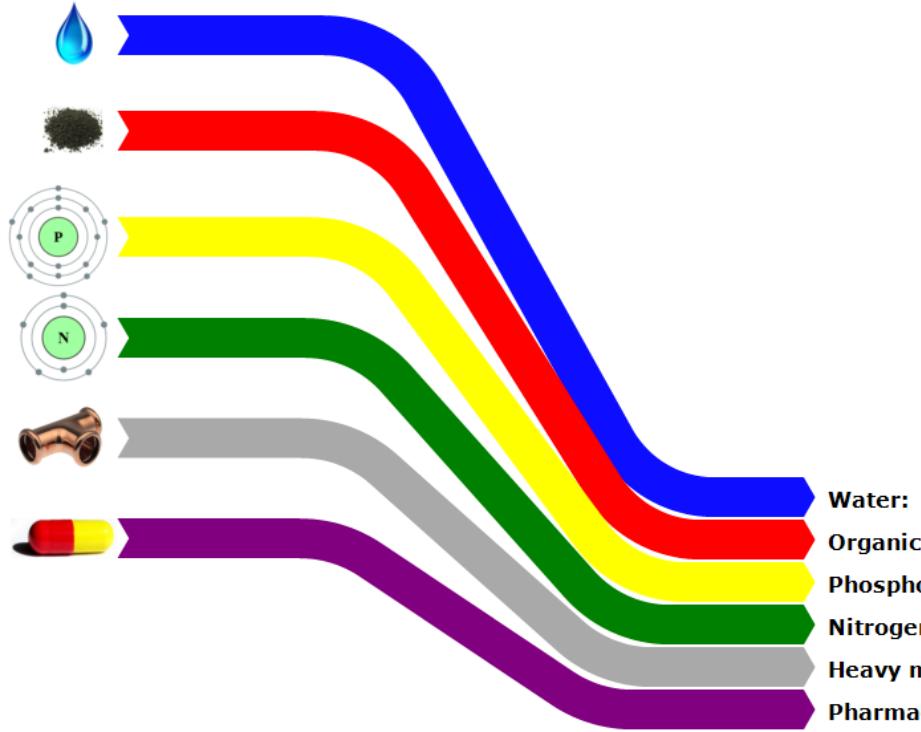


AMS  
AMSTERDAM INSTITUTE FOR  
ADVANCED METROPOLITAN SOLUTIONS

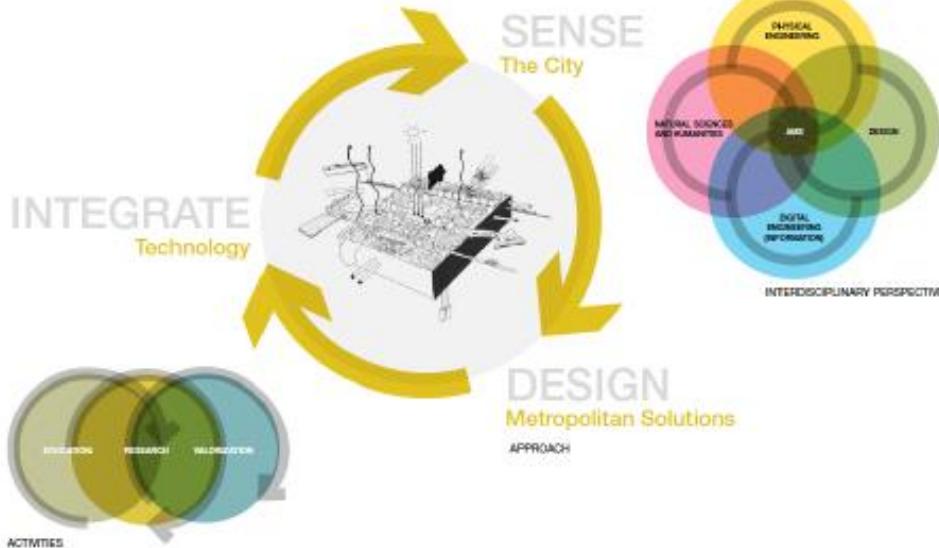
*"AMS aims to become an internationally leading institute where talent is educated and experts jointly develop and valorize interdisciplinary metropolitan solutions."*

from AMS website

TU Delft, Wageningen UR, MIT  
ACCENTURE, ALLIANTIER, AMSTERDAM  
SMART CITY, CISCO, CITY OF BOSTON,  
ESB, IBM, KPN, SHELL, TNO, WAGG SOCIETY,  
WATERNET



# AMS: Research Approach



## URBAN PULSE: Metabolism

### LINEAR METABOLISM



### CIRCULAR METABOLISM



Figure: Conceptualisation of linear and circular urban metabolism (Girardet, 1999).

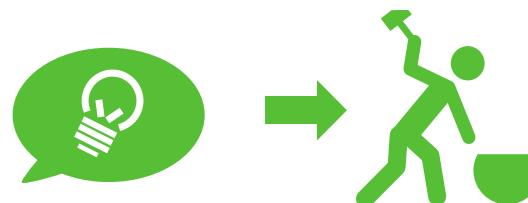
## Project example:



**Goal:**  
**business cases in**  
**Amsterdam**  
**metropolitan area for**  
**the biobased and**  
**circular economy.**



**Connecting various  
organisations and institutions  
creating synergy: cross overs  
and acceleration of innovations**



**Execution of  
innovative projects**



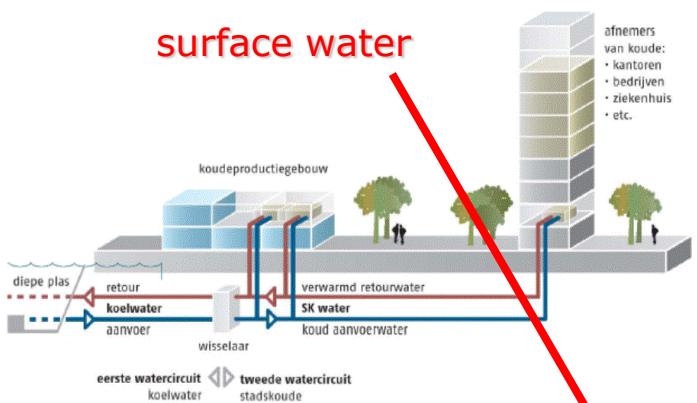
**Towards a circular  
economy**

# Smart projects in the Amsterdam Metropolitan region

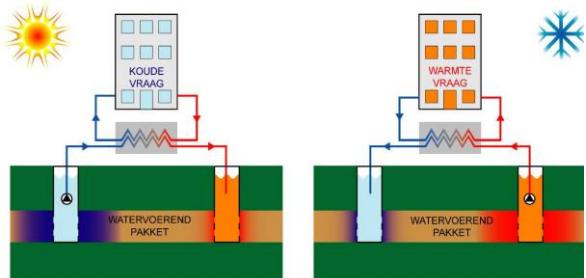


# Energy and Water

surface water



ground water



robust  
combinations

wastewater



Douche-  
afvalwater

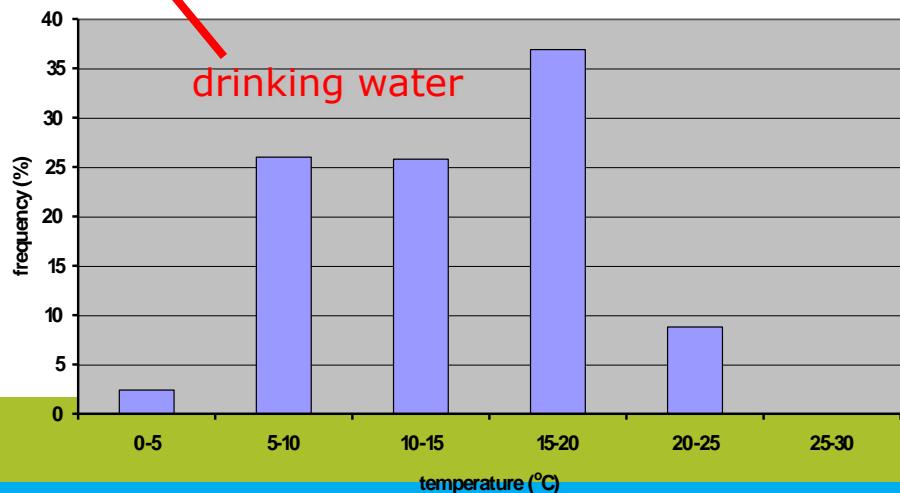
Voorverwarmd  
schoon water

Afvalwater stroomt als een dunne film aan de binnenzijde van de warmtewisselaar

Koud schoon  
water

Naar  
riolering

Drinking water temperature in distribution area (2006)



# Waste Water Treatment

- 12 waste water treatment plants
- Top 5 purification performance  
(89,3% vs. 86,4% country average)
- Warm cooperation with the waste to energy plant





Avoided natural gas usage: 1,8 M m<sup>3</sup>/year

Avoided greenhouse gas emissions: 3.200 ton CO<sub>2</sub>-eq/year

# Waste to Energy: Green Gas Hub Amsterdam

## Biogas cycle

Steamcracking of sludge  
Co fermentation organic waste

Production of biogas  
from waste water



water<sup>net</sup>

Amsterdam waste and  
waste water resource



Waste trucks  
tank biogas at BASE

700 waste trucks  
per day

Gemeente Amsterdam  
Afval Energie Bedrijf



CO2 reduction and decrease  
of particle emissions

# Biogas as transport fuel

60 company cars of Waternet



# WWTP works as a resource-factory

Solving operation problems leads to a new resource (struvite/fertilizer)



- Higher energy production Waste to Energy Plant
- Lower costs maintenance
- Production 1000 ton P for fertilizer (3 ton/day)



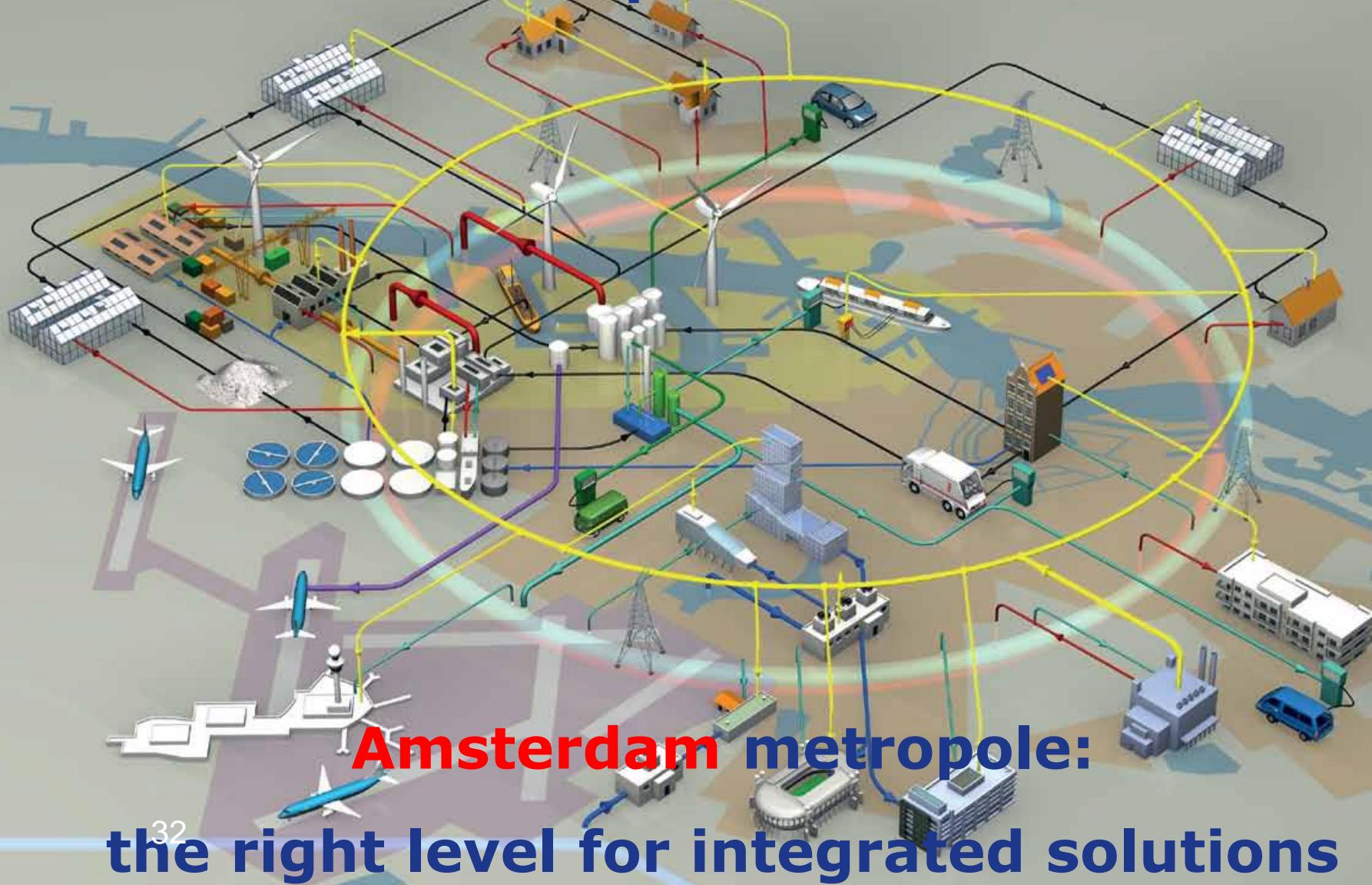
## Cellulose

Dutch toilet paper consumption:  
1 kg/person/month

Sieve wwtp Blaricum (30.000 pe)  
treats 30-80% of influent  
dried sievings 80% cellulose



## Green Metropolitan Solutions



# Green Metropolitan Solutions

