

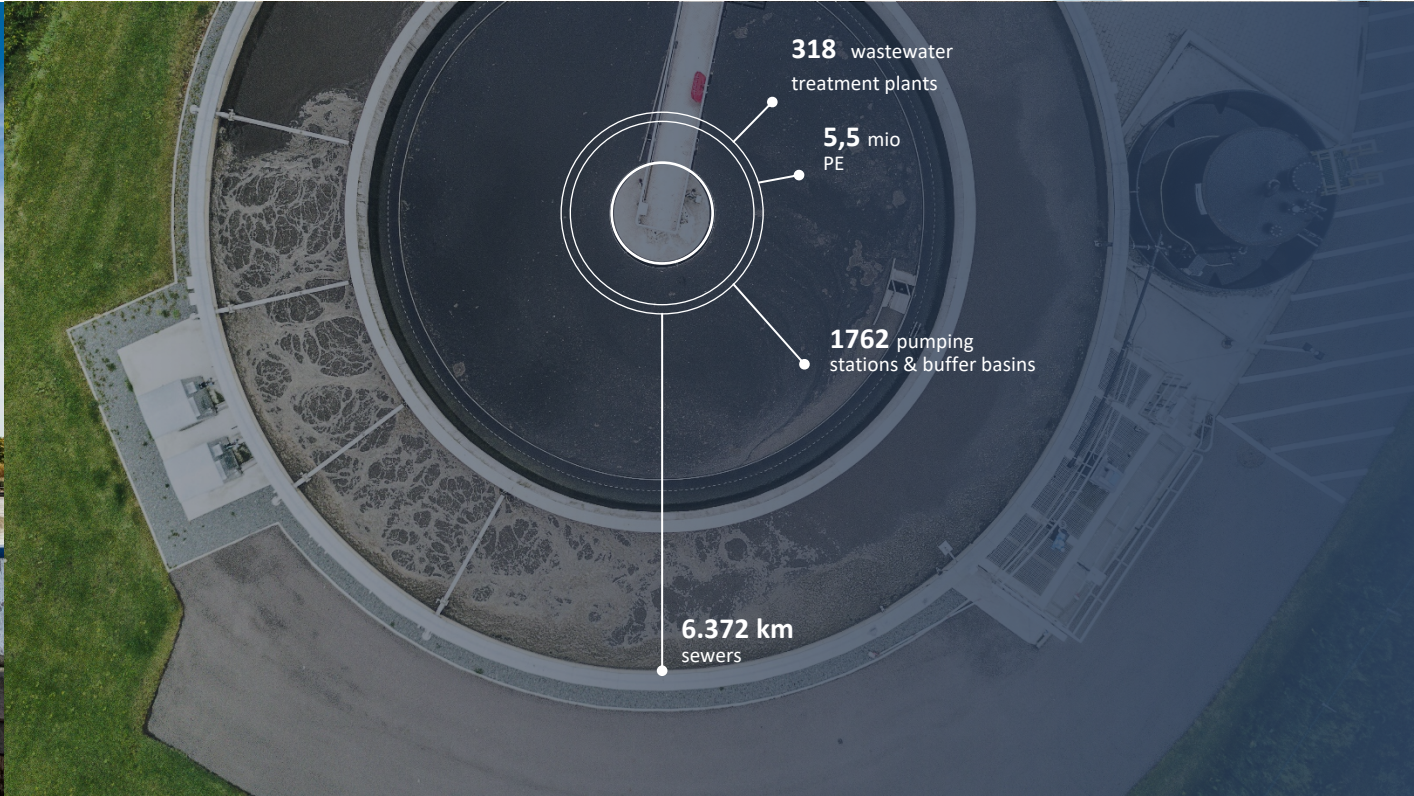
Beat the micropollutants

Case Flanders

Marjoleine Weemaes

Aquafin nv

Who is Aquafin?



Flemish policy on micropollutants

**VMM: Flemish
Environment agency**

Vlarem II art 3 annex 2.3.1

EQS for > 100 substances:
P(P)S + RBSP

Source control for industrial
emissions (permits)

WWTP: not (yet) regulated



Flemish policy on micropollutants: approach

1 

Monitoring
programs

2 

Full scale
experience

3 

Research &
development

Flemish policy on micropollutants: approach



Monitoring programs

Program on micropollutants: inventory WWTP emissions

VMM: Weiss
Life+ project
2010-2013

Microplastics
Inventory WWTP
effluents

Aquafin
iDRIP
Global Sewage Survey
R&D projects



Program on micropollutants: inventory WWTP emissions

Substances of relevance for Aquafin

- ⊕ Pharmaceuticals
- ⊕ Nonylphenol and octylphenol
- ⊕ Alachlor – atrazine – chloorpyrifos – DEHP – 1,2-dichloorethane – diuron – fluoranthen – isoproturon – simazine – trichloromethane
- ⊕ Zinc (RBSP)

Microplastics: monitoring campaign



Flemish Environmental Agency

Surface water- Drinking water- Biota-Sludge
Wastewater (6 WWTP's)

Monitoring of dry and wet weather flow

Receiving surface water (3 WWTP's)

24h composite samples

⇒ WEISS (Water Emissions Inventory Support System)

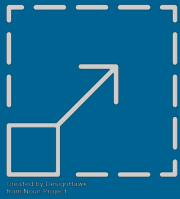
Aquafin

Disc filter post filtration

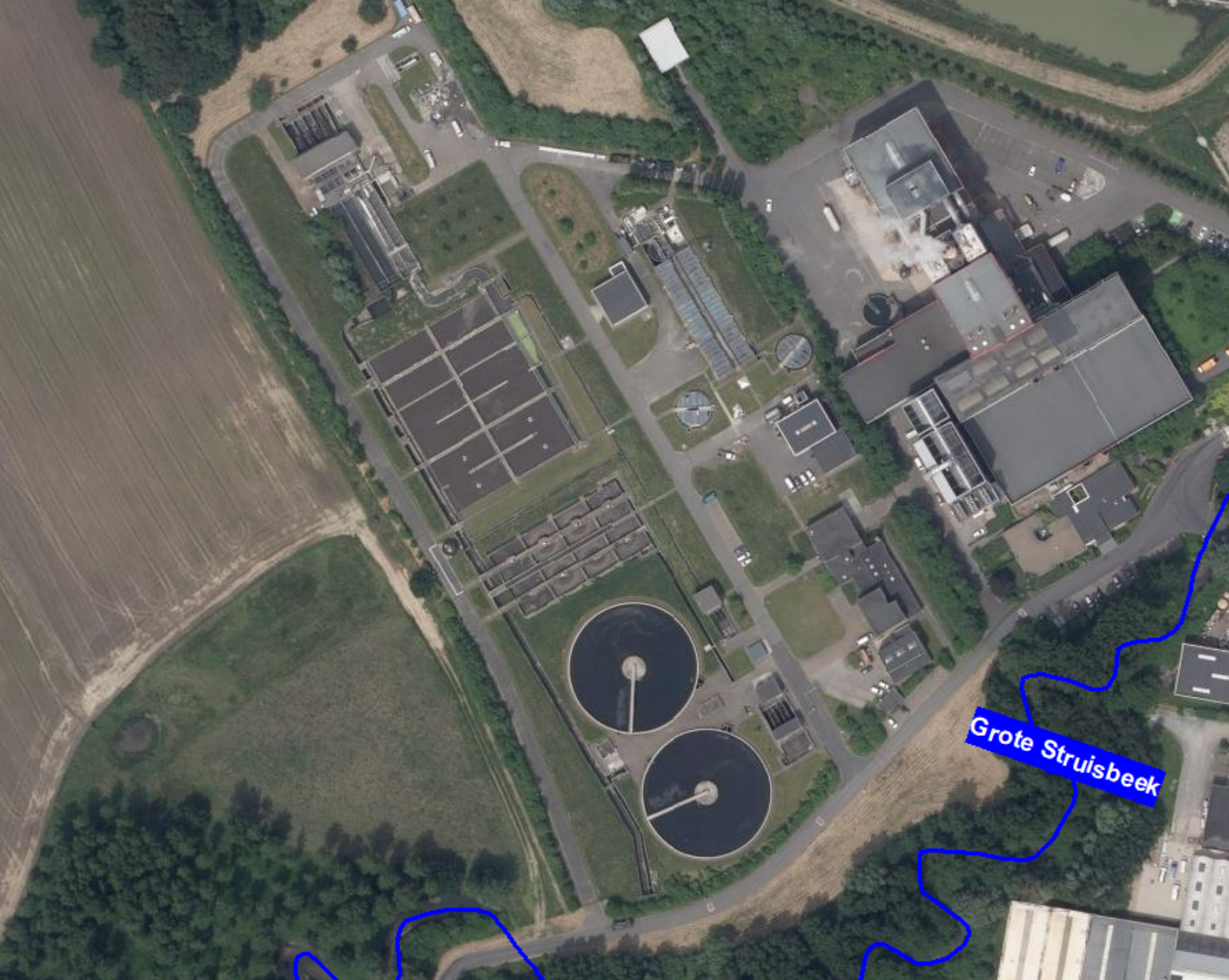
Influent – effluent and backwash

Flemish policy on micropollutants: approach

2



Full scale experience



Full scale experience

Case Aartselaar

- Frequent flush of SS
 - Need to build up experience on micropollutant removal
- ⇒ Combined approach

Study

Design capacity?
MP selection?
Technology?
Research?

Full scale project Aartselaar

Technology selection:

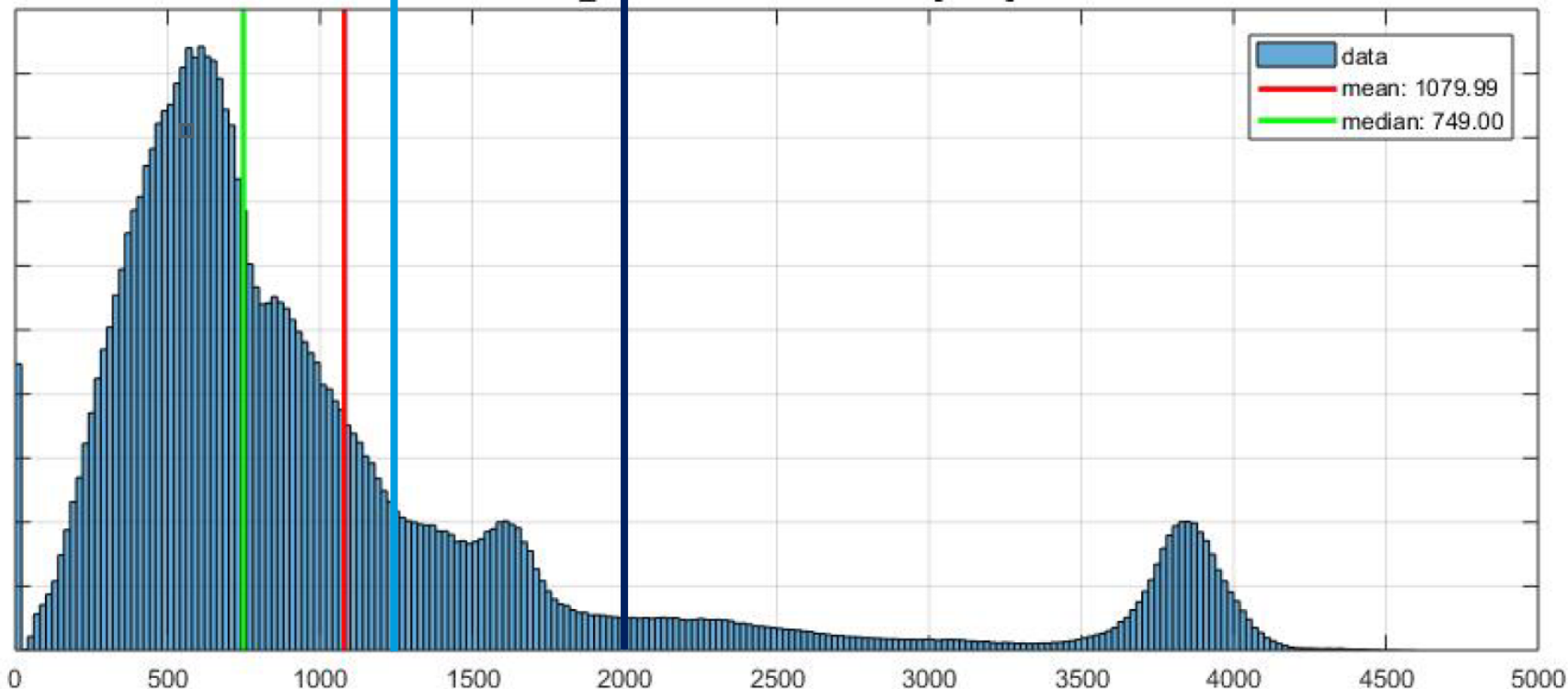
Literature survey

Disc filters + ozone + activated carbon

Advanced treatment

Disc filter

HT_25170 : Debiet effluent [m³/h]



Target pollutants?

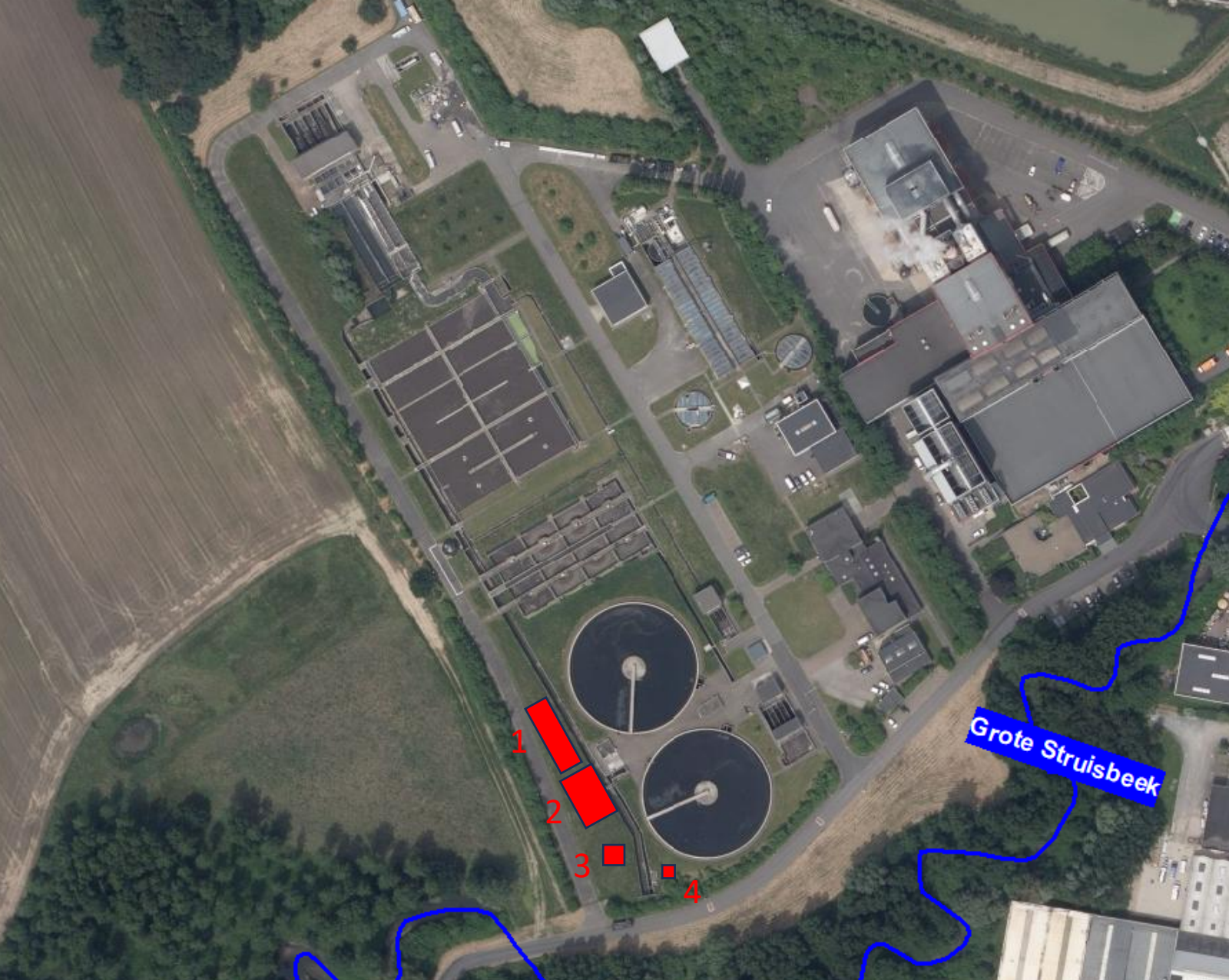
pollutant presence:

💧 Aquafin database

> 25%

💧 Aartselaar database

> LOD



1. Granular Activated Carbon
2. Disc filters
3. Ozone contact tank
4. Ozone generator

Full scale project Aartselaar: costs

Indicatieve kosten

Kosten (investering + exploitatie) per m³ RWZI-effluent voor verwijdering microverontreinigingen > 60-80% excl. persistente stoffen zoals röntgencontrastmiddelen (STOWA, 2015)

Capaciteit rwzi	20.000 i.e.	100.000 i.e	300.000 i.e.
Ozonisatie + zandfiltratie	€ 0,26 ± € 0,05	€ 0,22 ± € 0,04	€ 0,19 ± € 0,03
PAK + zandfiltratie	€ 0,30 ± € 0,04	€ 0,23 ± € 0,04	€ 0,21 ± € 0,03
GAK	€ 0,33 ± € 0,05	€ 0,31 ± € 0,04	€ 0,30 ± € 0,04

* De onnauwkeurigheid van ± € 0,03 - € 0,05 in deze tabel geeft de invloed weer van een DOC concentratie in het rwzi effluent van 7 of 15 mg/l ten opzichte van de aangenomen 11 mg/l

Based experiences abroad

Total CAPEX costs:

4,9 mio €

OPEX costs?

Estimation= 330.000 €./jr
~ 5,4 €/PE.yr

Goals of the full scale project:

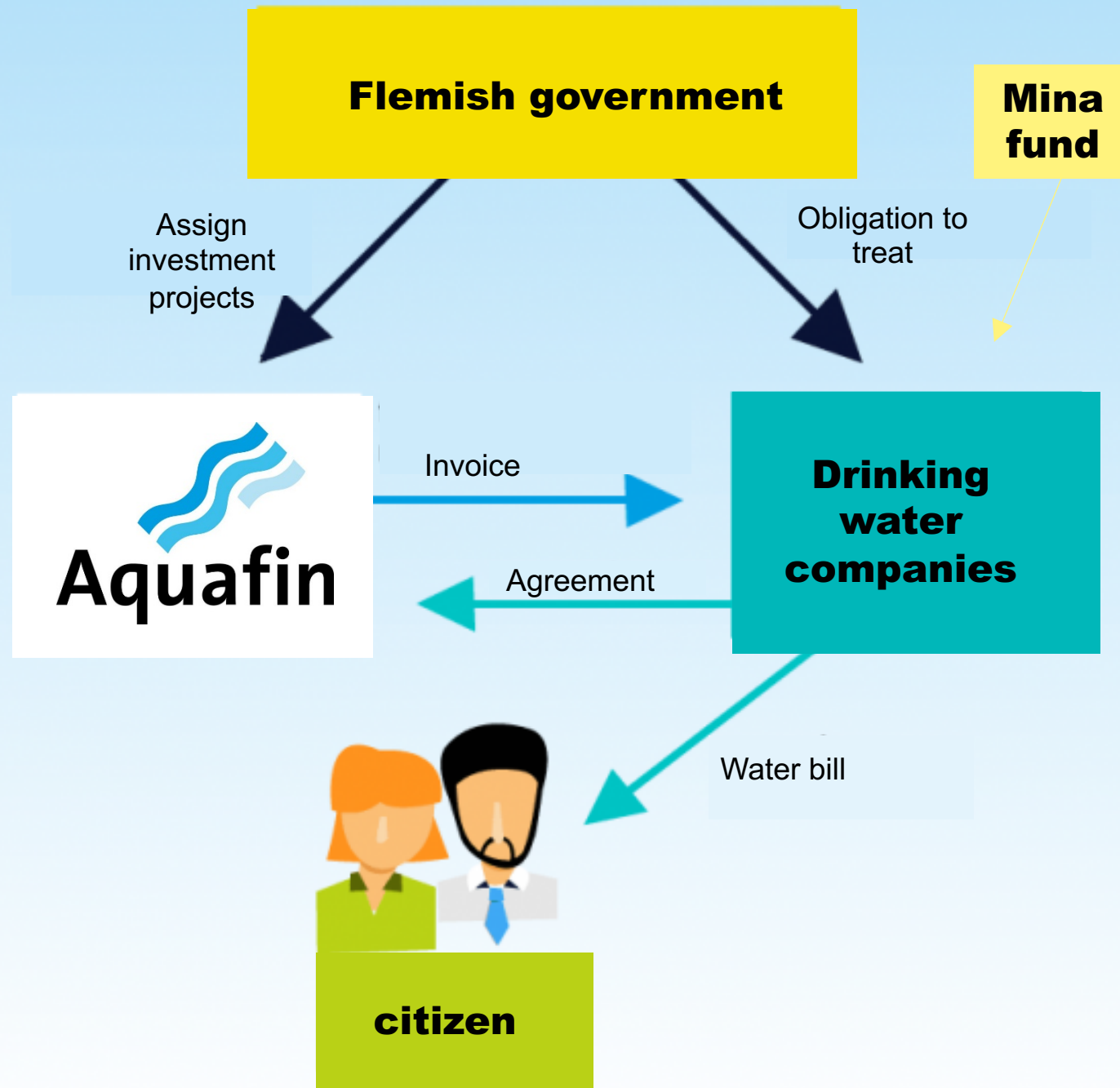
Refine opex costs based on

- GAC Lifetime
- Optimale ozone dosing strategy
- Removal efficiencies

Additional benefits?

Effluent re-use

How is this financed?



What about source control?

Sustainable and intrinsically safer than end-of-pipe

e.g. Registration and regulation of products

Green chemistry

Behavior of consumers – information of public

Use and disposal of substances

Complex (dispersed competences)



Flemish policy on micropollutants: approach

3



Developed by Aquafin, financed by the Flemish Government

Research & development

Research & innovation

Site open for testing of (ao)

- ⊕ New removal technologies
- ⊕ Control algorithms
- ⊕ Effect related testing



Previous research projects: TreatRec

BioMAC: biological assisted membrane carbon filtration

- ⊕ Overall 80% removal after 9 months
- ⊕ Quantification of biology contribution in removal efficiency
- ⊕ Improved removal for

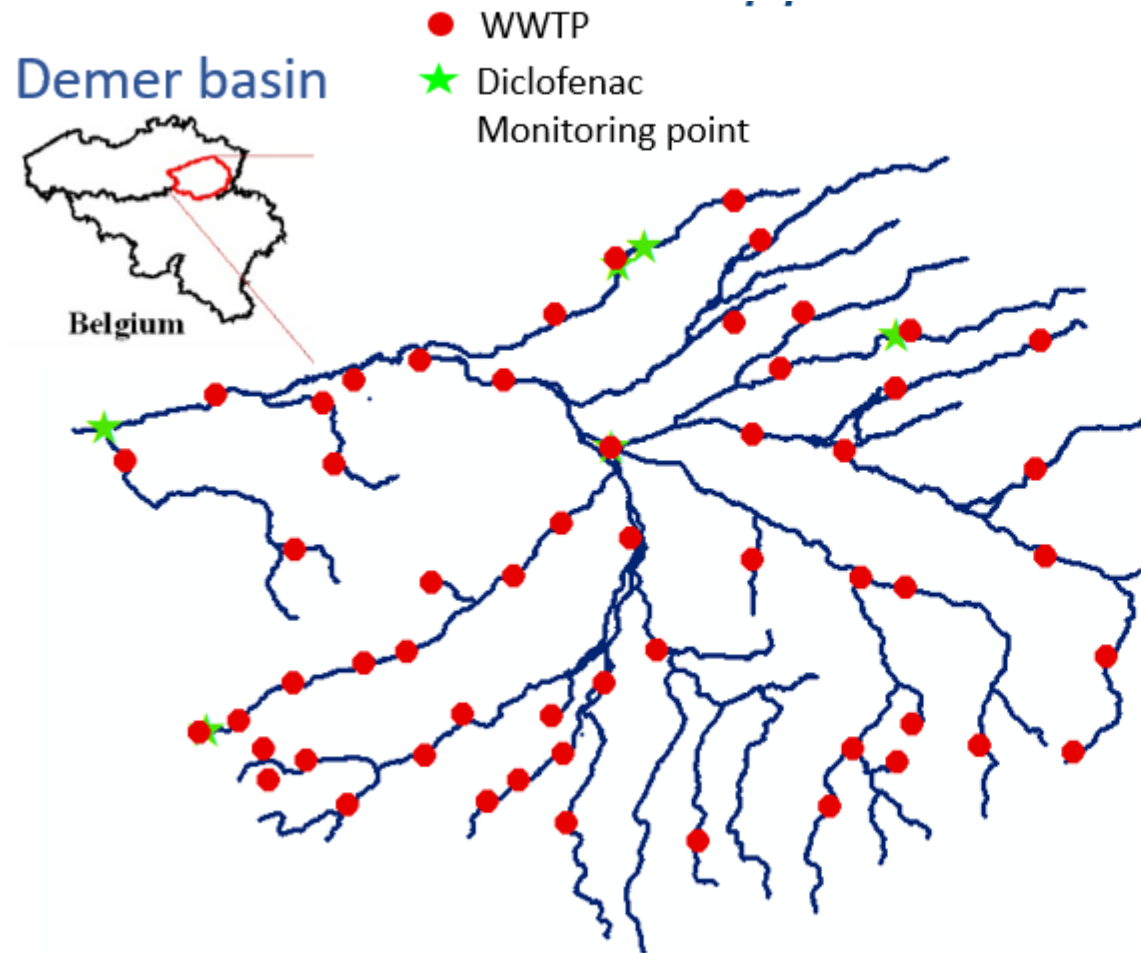
Irbesartan *Ciprofloxacin*

Bezafibrate *Ofloxacin*

Azithromycin *Sulfamethoxazole*



Previous research projects: TreatRec



Decision support tool: Diclofenac

- ⊕ WWTP + river model Demer basin
- ⊕ Model development Diclofenac removal efficiency (incl costs)
- ⊕ Optimisation function (g DF removed/€ inv)

⇒ Selection of WWTP's for advanced treatment

More information?

Marjoleine.weemaes@aquafin.be

+32475650601



www.aquafin.be