Waterfactory Wilp

EffiSludge Closing Event

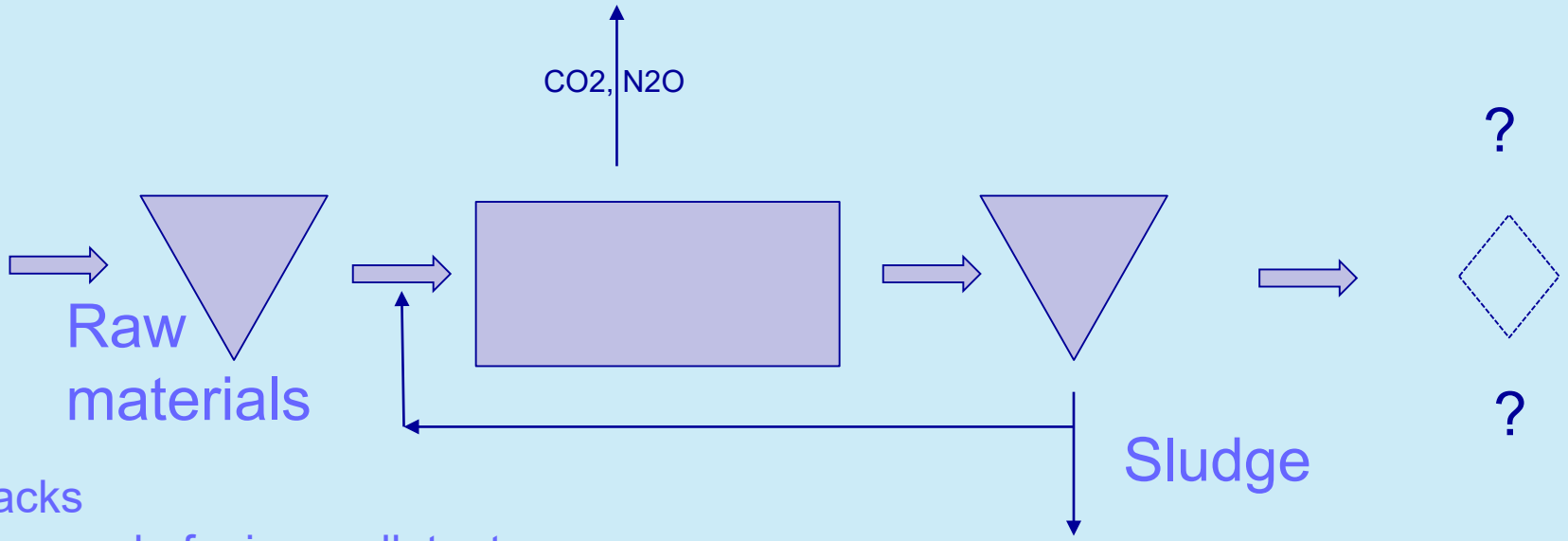
2021 - Program

2 December 2021

Frans Visser

Why a Waterfactory ?

Conventional activiated sludge:
- Reduction of Oxygen consumption
- Removal of Nutrients N an P



Lacks
Removal of micro pollutants
Removal of micro plastics

Degredation of good materials CO2 and N2O emission

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New purification concept

Highly innovative physical sewage treatment process (*electro-chemical conditioning and physical separation*).

Crystal *clear water* is made to combat freshwater shortage.

Raw materials are extracted without a negative impact on the living environment.

Aim:

- to produce '*fit for use' high-quality water*
- *over 85 % recovery of value resources*
- creation, valorisation and improvement of *value chains*
- become the stepping stone for *replication*

https://www.youtube.com/watch?v=Tb4fzjCTdsU

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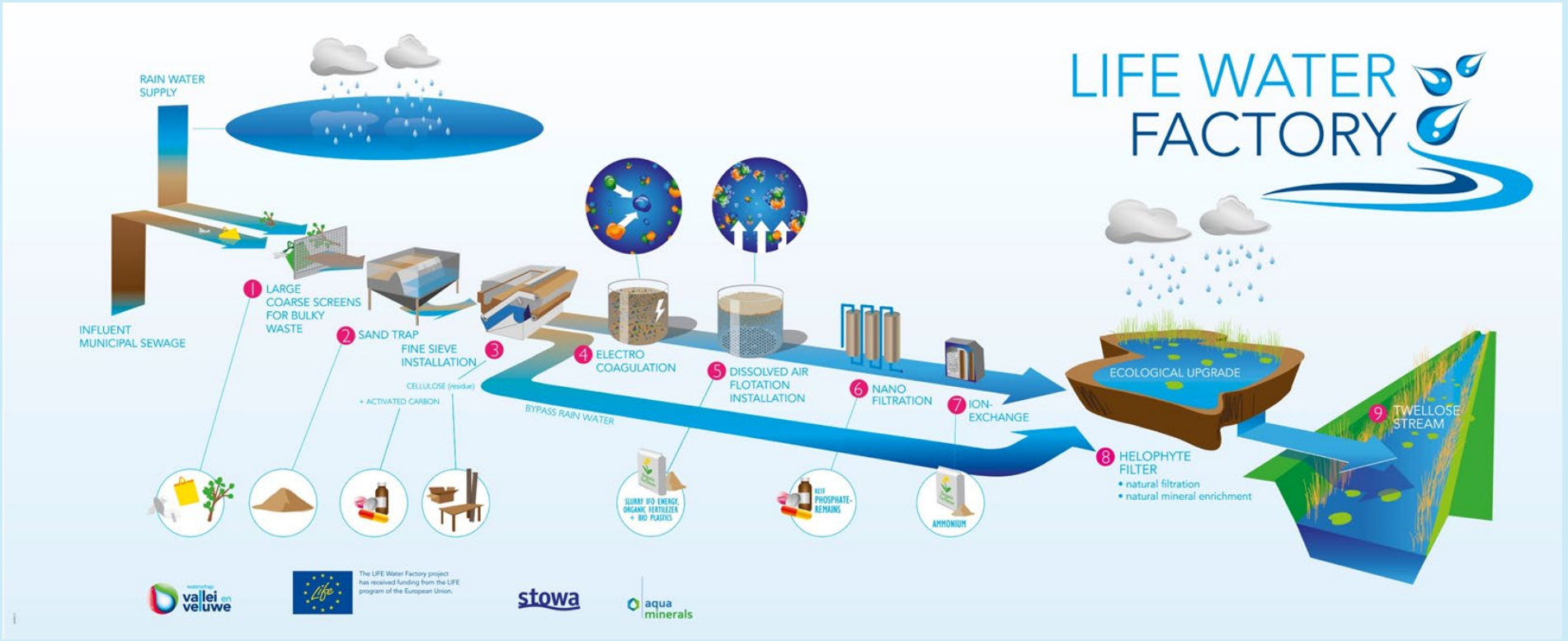
Proces Waterfactory Wilp



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Pilot WFW

Total capacity of 5 m3/h: 50% sewage and 50% recycle

- 2 periods
  - first with Electro Coagulation (EC)
  - second with FeCl3 dosing

First period

- With EC no stable operations of the plant. Clogging of the NF
- Due of insufficiant formation of Fe3+

Second period

- Stable operations and Proof of Concept
  - *Still a lot of research questions*

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Effluent quality macro pollutants

Macro pollutants				
Parameter	Unit	demand	average	max.
Suspended solids	mg/l	<3	0,0	<5[1]
COD	mg/l	<125	74,2	79
BOD	mg/l	<20	30	53
P-total	mg/l	<0,15	0,01	0,05
N-total	mg/l	<4,8	0,87	1,27
NH4-N	mg/l	<1,0	0,26	0,63

BOD levels sensitive for longer retention time and higher temperatures in the sewer system: forming of fatty acids

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Effluent quality heavy metals

Heavy metals				
Parameter	Unit	Demand	Influent	Effluent
Arsenic As	ug/l	0,5	2,7	<1*
Cadmium Cd	ug/l	0,08	0,2	0,077
Chroom Cr	ug/l	3,4	6,3	1,6
Copper Cu	ug/l	2,4	87,5	1,0
Mercury Hg	ug/l	0,00007	0,1	<0,05*
Lead Pb	ug/l	1,2	13,6	0,8
Nickel Ni	ug/l	4	6,4	0,9
Zink Zn	ug/l	7,8	241,7	5,2

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Effluent quality micro pollutants

Micro pollutants: 11 guide materials (2020)			
Parameter	Influent (µg/l)	Effluent (µg/l)	Rendement
1,2,3-benzotriazool	8,58	4,12	52%
som 4- en 5-methyl-1H-benzotriazool	1,5	0,668	51%
Carbamazepine	1,13	0,768	32%
Claritromycine	0,146	<0,01	100%
Diclofenac	0,926	<0,088	90%
hydrochloorthiazide	3,6	3,06	15%
Metoprolol	4,14	0,164	96%
Propranolol	0,152	<0,01	100%
Sotalol	1,68	0,05	97%
Sulfamethoxazol	1,7	<0,202	88%
Trimethoprim	0,188	<0,01	100%
Average: 7 best of 11 guide materials			96%

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Next step

- Build a demonstration plant with a capacity of 50 m3/h
- Research & development (3 years)
  - Scale up
  - EC (make it work)
  - Effect of the seasons on the performance of the plant
  - Performance of the NF-membranes and IX-units:
    - *determine where the pollutants are*

- Complete CO2-footprint comparison Fysisch-chemical vs Activated sludge plant
- Aspects
  - Construction
  - Operation (chemicals/energy)
  - Proces emissions
  - Recovered re

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Questions