



Feasibility of the Arvia Nyex™ System

Assessed by Isle Utilities based on data provided
by Arvia Technology

arvia



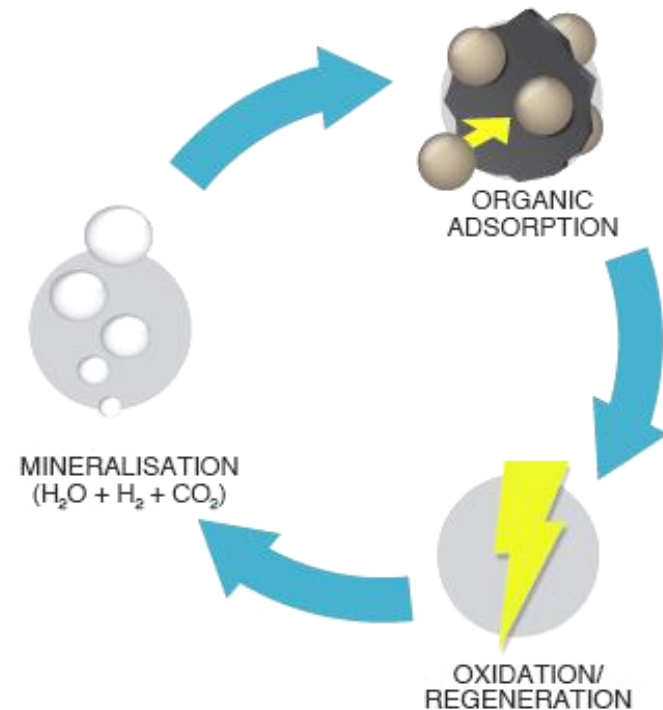
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**Dutch Innovation on Micropollutants
Removal from Municipal Wastewater**
November 7th 2019 Aquatech Amsterdam

Nyex™ Technology

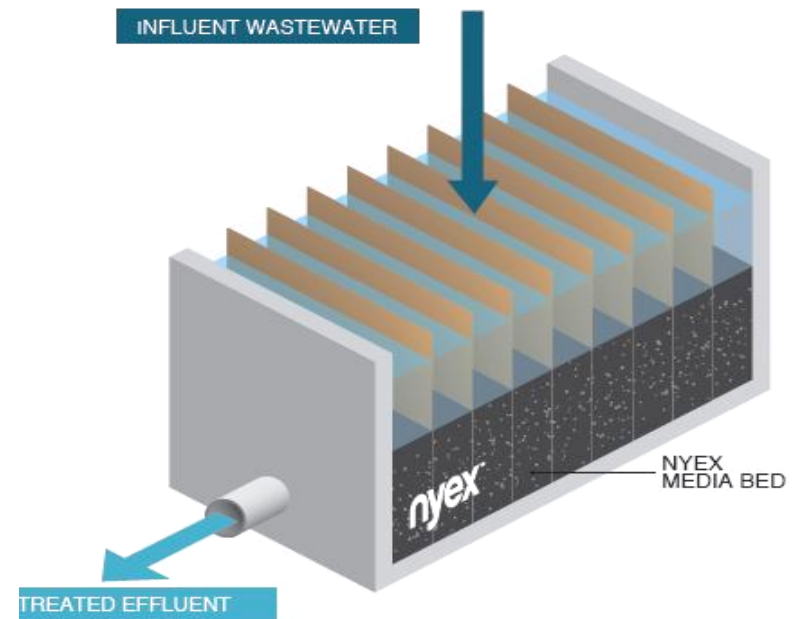
Combines adsorption & in-situ electrochemical regeneration:

- Carbon based adsorption medium: Nyex™
- Primarily surface adsorption
- Nyex™ conducts electricity
- Current applied forms OH⁻ radicals
 - Radicals oxidise adsorbed pollutants
 - Complete mineralization to CO₂, H₂O and H₂



Important design parameters

- Removal influenced by:
 - Adsorption: Empty bed contact time (minutes)
 - Oxidation: Applied electrical power (kWh/m^3)
- Pulsing electrical current:
 - Pulsing 50%; no reduction in removal efficiency
 - Further reductions possible?
 - Potential reduction in energy used



Approach

- Assessment of Pilot & Lab data:
 - 4 WWTP effluent studies in NL, DE, UK
 - Estimate removal of 11 indicator substances
 - Estimate EBCT & energy requirements
- Design 100 000 p.e. tertiary treatment step:
 - CapEx & OpEx
 - CO₂ footprint

Results

Criterion	Score in respect to ozonation + sand filtration
Removal of micropollutants	0
CO ₂ footprint	--
Costs	-
Ecotoxicity	0

- *Removal:* 9 of 11 substances proven
 - *CO₂ footprint:* Driven by C-based media and energy
 - *Cost:* Driven by energy demand
 - *Ecotox:* Full mineralization possible, good results on bromate
- Optimizing pulsing strategy can bring further benefits



Thank you for your attention!



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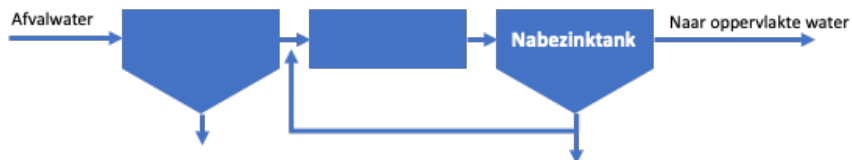


More info? Visit Arvia at booth: 02.116

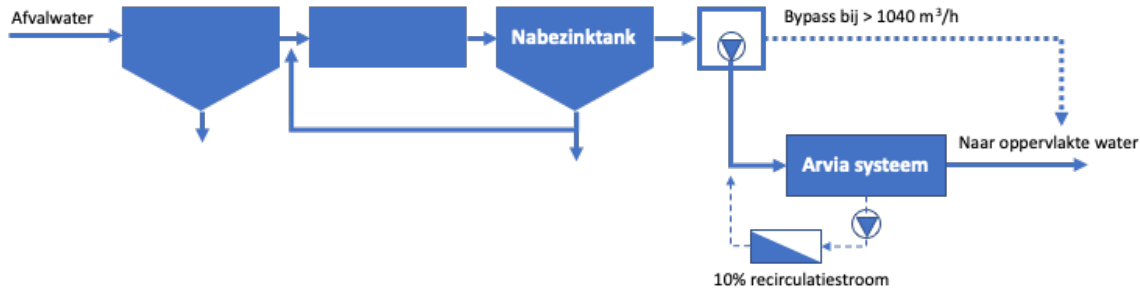
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Situatie zonder nageschakelde techniek



Situatie met nageschakelde techniek



Substance	Anglian Water	Nersingen	PWNT	Bülach	Range
Benzotriazool		89		96	89 – 96
Clarithromycin	82.5			96.3	82.5 – 96.3
Carbamazepine	70.6			98.6	70.6 – 98.6
Diclofenac	91.1	97		98.7	91.1 – 98.7
Metoprolol		98	Below LOQ	94.3	94.3 – 98
Hydrochlorothiazide		96		95.7	95.7 – 96
Mixture of 4- and 5-methylbenzotriazole	84.1	95		96	84.1 – 96
Propranolol	92.1		Below LOQ		92.1
Sotalol			Below LOQ		n.d.
Sulfamethoxazole		95	89	99	89 – 99
Trimethoprim			Below LOQ		n.d.