

Chlorinsitu® business case



Customer	: Industriewater Eerbeek www.iweerbeek.nl
Application	: Waste water treatment and reuse
Type of installation	: Chlorinsitu®-V
Capacity	: 3.500 gram FAC (free available chlorine) per hour
Objective	: Environmentally friendly disinfection of waste water

Industriewater Eerbeek

Industriewater Eerbeek, a waste water treatment company based in Eerbeek (Netherlands) is founded by three paper mills; DS Smith De Hoop, Mayr-Melnhof and NeenaH Coldenhove.

Industriewater Eerbeek processes approx 4 mio m³ waste water. By reusing waste the water consumption of the three shareholder paper mills production chain decreased significant. Furthermore the consumption of wood fiber and excipients is decreased by reuse as well.

By anaerobic purification biogas is produced out of dissolved organic material. After desulfurization and sweetening it (H₂S removal) is suitable as replacement for natural gas for paper mill DS Smith De Hoop.

The sludge deposit is dried by biogas after dehydration. Now it is odourless and not biological active any more. At this moment Industriewater Eerbeek is researching the possible purpose of the valuable material.

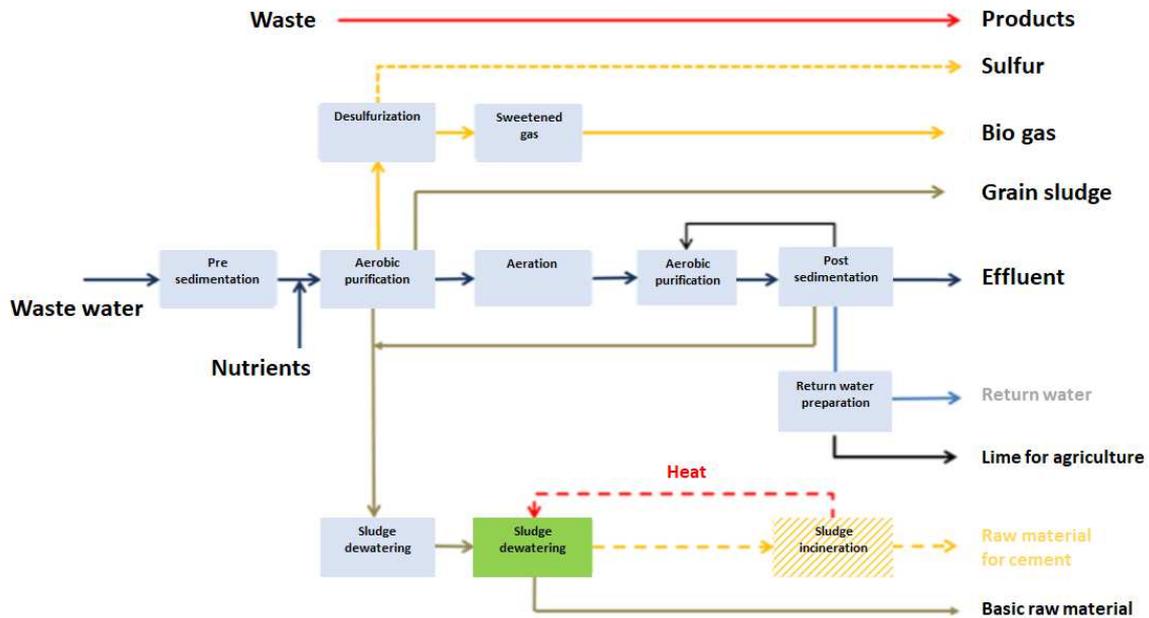
The very low amount of residual waste water is discharged to the IJssel (river).

During the treatment process the following reusable products are extracted;

- | | |
|-------------------|--|
| ✓ Dry sulfur | for grape culture against mould |
| ✓ Lime | nutrient in agriculture (80% dehydrated) |
| ✓ Sludge drying | raw material cement industry |
| ✓ Bacterial grain | raw material for existing and new treatment plants |
| ✓ Process water | return delivery paper mills |
| ✓ Wood fibers | > 80% reused in paper mills |
| ✓ Excipients | > 80% reused in paper mills |

See the flow scheme on the next page.

Flowscheme IWE



Present technologies:

- ✓ Two stage anaerobe ECSB (External Circulation Sludge Bed) reactor
- ✓ Aerobe bio reactor
- ✓ Centrifugal filtration
- ✓ UASB (Upflow Anaerobic Sludge Blanket) reactor
- ✓ Deposit tanks (pre process)
- ✓ Deposit tanks (post process)
- ✓ Aeration tank
- ✓ Sludge drying (cloud dryer)
- ✓ Sludge incineration (pulse burner)

In the process a lot of the latest technologies are combined in order to create the best possible circularity in paper production water cycle. Still Industriewater Eerbeek is continuously looking for improvement. Therefore a Chlorinsitu[®]-V installation is the next step in optimizing the circular paper production.

Main objectives of Industriewater Eerbeek;

- ✓ Increase water reuse
- ✓ Environmentally friendly
- ✓ Purification of the process
- ✓ Lower commodity consumption
- ✓ Cost savings

About 180 m³/h of the waste water is reused (225 m³/h in near future) by the three shareholders. After the treatment the water has to be safe and protected against decontamination.



The pipeline for treated water from Industriewater Eerbeek (IWE) to Ds Smith De Hoop (DSS) is a long distance and the water is also used in working environments. Due to the requirements the paper production process has to be as clean as possible.

The reused water is disinfected with bleach 15% in order to prevent contamination. Because of the length of the pipeline approx. 12 ppm Cl₂ is dosed initially.

The replacement of Bleach (15%) for a Chlorinsitu[®]-V machine for disinfection purpose provides the following benefits;

- ✓ Most pure chlorine disinfection
- ✓ Lowest possible by-products (THM's, chlorate and chloride)
- ✓ Approx. 2.5 times fewer transports and unloading movements towards Industriewater Eerbeek (Bleach vs electrolysis)



Salt bulk tank 7 m³
approx. 4,5 tons salt

But there is more...

Industriewater Eerbeek is using a membrane bioreactor within the purification process. Approx. 200 liter (154 kg) caustic 50% per day is used for desulphurization.



In ratio to a chlorine production of 2.700 g/h (based on 12 ppm @ 225 m³/h) the related caustic soda production is 3.420 g/h. The equivalent is 76 liter (59 kg) caustic soda (50% concentration) per day. The caustic soda temporarily is collected in IBC's in order to fill up the existing caustic soda tank. Later on a fixed pipeline will be implemented. Yearly savings approx. € 9.000,- at € 42,- /100 kg NaOH



Within the water treatment process a CO₂ absorber is present for decreasing pH. The Chlorinsitu[®]-V is producing approx. 25 l/h anolyte (acidic, approx. pH 3-4). The anolyte is used for pH decrease in the CO₂ absorber. Due to this the consumption of CO₂ will decrease.

Results:

- ✓ Increase water reuse
 - ✓ Lowest possible by-products in chlorine based disinfection
 - ✓ Disinfection with hypochlorous acid is more effective than commercial bleach
- ✓ Environmentally friendly
 - ✓ Approx. 2.5 times less transport movements compared to commercial bleach
- ✓ Purification of the process
 - ✓ Lowest possible by-products in chlorine based disinfection
 - ✓ No deterioration due to direct consumption (lower product use and less by-products)
- ✓ Lower commodity consumption
 - ✓ Only salt and electricity against commercial bleach
 - ✓ 40% less caustic soda purchase
- ✓ Cost savings
 - ✓ Salt and electricity is approx. half the costs of commercial bleach
 - ✓ Savings on caustic soda approx. € 9.000,- per year
 - ✓ Small saving on CO₂
 - ✓ Off balance financing (Rent Buy)
 - ✓ Overall costs slightly lower than before despite increased process value

VDH water technology scope:

- ✓ Chlorinsitu®-V 3.500 g/h FAC (required capacity 2.700 g/h @ 225 m²/h)
 - ✓ 1* CL₂ dosing
 - ✓ Caustic soda collection, temporary in IBC's, piping to bioreactor in later stage
 - ✓ Anolyte (anode residue) dosing to CO₂ absorber
 - ✓ Future proof (max 290 m³/h @ 12 ppm)
- ✓ Calcium hypochlorite installation 2.500 g/h FAC
 - ✓ 1* CL₂ dosing by own dosing pump
 - ✓ Back up technology in case of emergency
 - ✓ 100% autonomous operation
- ✓ Rent Buy by VDH water technology
 - ✓ Closed contract 10 years duration, 5,4% interest
 - ✓ After 10 years property of Industriewater Eerbeek
 - ✓ Every year Industriewater Eerbeek can buy the machine (linear depreciation)
- ✓ All-in maintenance contract during Rent Buy period
 - ✓ After paying off free choice of maintenance by Industriewater Eerbeek

Order:

Total lead time from first contact to order	: approx. 2 years
Total order amount	: € 200.000,- net
Yearly rent buy amount for 10 years	: € 23.730,- net
Yearly All-in maintenance contract	: € 14.750,- net

- ✓ Each 12 months Industriewater Eerbeek can decide to buy the Chlorinsitu®-V against linear depreciation.
- ✓ During rent buy period All in maintenance contract is required. After buying Industriewater Eerbeek can decide themselves.

In case you do have questions or do need support please contact VDH water technology:

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Chlorinsitu[®]-V on site



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Back up calhyppo dosing