SUSTAINABLE WATER REUSE AND PRODUCT RECOVERY FOR FRIESLANDCAMPINA

CASE STUDY I FOOD & BEVERAGE

| The client's needs

In 2012, FrieslandCampina decided to increase the production capacity at their biggest production site in Belgium by 50% with an option of another 50% before 2015, while respecting their commitment to reduce their water usage by 2020.
The extension brought a few challenges in terms of water efficiency. The water treatment system already on site had not been designed to support such increase. Strict governmental regulations limiting ground water extraction forced FrieslandCampina to rely on expensive tap water, which led to higher production costs. The Client had also reached their wastewater discharge capacity.
FriedslandCampina was in need of a new efficient and reliable water treatment system that would not only allow the reduction of their ground and tap water intake but would also reduce their wastewater discharge to ensure sustainable growth.

| The solution

In 2013, FrieslandCampina chose Veolia Water Technologies to build a unique system that would address these issues with three major projects:

• ***Cow Project***

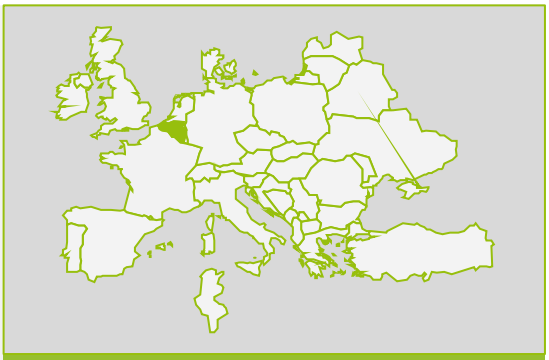
The Cow Project focuses on the treatment of condensate water from milk evaporation process and also the treatment of condensate from direct steam injection sterilizers. The installation is designed to produce up to 50 m3/h of reuse water.

• ***New wastewater treatment plant***

The existing technology at the Aalter site was outdated and needed updating and increased capacity. Veolia Water Technologies implemented a new wastewater treatment system to meet the Client's needs. 60% of the treated wastewater, which represents 1500 m3/d, is reuse via reverse osmosis (RO) and UV treatment.

• ***Caustic reuse***

A third focus was the reduction of the chemical consumption on CIP's. Product recovery was a win-win to reduce caustic consumption, reuse caustic and lower acid dosing on the WWTP.



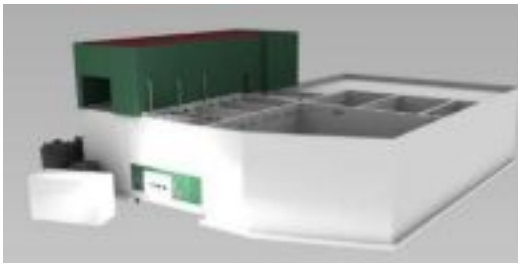
Aalter, Belgium

| The client

Royal FrieslandCampina, is a multinational dairy company wholly owned by the dairy co-operative Zuivelcoöperatie. FrieslandCampina is present in the Netherlands, Germany and Belgium with sales products in more than 100 countries.

Key Figures

- Contract type:
  - Design, Build, Operate & Maintain
- Award date: 2012
- Capacity:
  - Cow Water Reuse: 600 m3/d
  - Wastewater reuse: 1 500 m3/d
  - Caustic reuse: 50 m3/d
- Technologies:
  - Cow Project:
    - BiopROtector® + UF + RO + UV
  - Wastewater Treatment Plant:
    - DAF + aerobic MBR + RO + UV
  - Caustic reuse:
    - Ceramic UF



| The benefits

- Cow project:
- Water reuse: 600 m3/d
- Recovery rate: 80%
- Savings: 450 k€/year
- Pay-back: ca. 2 years

- Wastewater Treatment Plant:
- Water reuse: 1 500 m3/d
- Recovery rate: 60%
- Savings: 1 350 k€/year

- Caustic reuse:
- Installation capacity: 5m3/h
- Recovery rate: 90-95%
- Savings: 200 k€/year

| Process description

• Cow Project
Veolia proposed the combination of the BiopROtector® technology allowing reduction of the organic components and neutralization of the biofouling and by an UF and RO + UV system producing high water quality suitable as CIP or rinse water.

• New wastewater treatment plant with water reuse
The new wastewater treatment plant combines several technologies:
DAF + Aerobic MBR + sludge dewatering system + RO + UV.

• Caustic Reuse
Ceramic UF membranes have been implemented by Veolia. The solution allows to buffer the contaminated caustic, recover 90-95% of the caustic and reuse 25% per week, which represents 15 m3.

| Results

Veolia Water Technologies has provided FrieslandCampina with innovative technologies capable of making a real impact on water consumption.

Since 2013 at least 300,000 m3 of water per day has been reused through the application of new purification technologies. Not only the ground and tap water usage has been reduced but also the level of water discharge to the municipal wastewater treatment plant has been decreased, reducing organic and hydraulic taxes.

Last but not least, the increase of available water supply has contributed to FrieslandCampina's efforts to extend their production capacity by 75% from 2011 to 2016.

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