

Demonstration site at Clariant in Tarragona, Spain

End-of-pipe recovery of challenging chemical wastewater

The demonstration case CLARIANT is carried out at the Clariant Ibérica production site in Tarragona, Spain. Here, specialty chemicals are produced, like healthcare products, non-ionic surfactants, additives and cosmetic compounds. A full-scale wastewater treatment plant is part of the infrastructure, where the wastewater of Clariant and neighboring chemical companies is treated. The wastewater treatment consists of buffer tanks, flocculation

and coagulation, primary clarifier, an aeration tank for activated sludge treatment and a secondary clarifier.

In 2016, the water intake from River Ebro to produce water for Clariant's production site summed up to about 200k m³. At the same time, about 140k m³ water was discharged. At full water reuse, this presents an **opportunity to save about 70 % of fresh water**, which corresponds to great potential environmental benefits in a water stressed location like Tarragona.



Figure 1: Clariant production site at Tarragona, Spain (left), and its wastewater treatment plant (right).

Objective in INSPIREWATER

The demonstration activities aim at end-of-pipe solutions for water recycling for high-grade purposes, e.g. process water. This includes the following specific objectives:

- ▶ Demonstrate water reuse and concentrate treatment towards zero liquid discharge (ZLD) for secondary effluent with high fouling potential at Clariant's Tarragona site
- ▶ Optimize the interplay of existing and new treatment units towards minimized energy consumption and chemical use
- ▶ Demonstrate ultrafiltration (UF) / reverse osmosis (RO) treatment in water reuse for high fouling feed solutions with suppression of biofouling by an innovative catalyst solution
- ▶ Demonstrate Forward Osmosis (FO) coupled with High Brine Reverse Osmosis (HBRO™) and/or Membrane Distillation (MD) for water reuse and concentrate treatment
- ▶ Demonstrate recycling of water back into the production process

Technologies used for the treatment in the INSPIREWATER case study:

- ▶ UF type IntegraFlux™ SFP-2880XP by DuPont Water Solutions
- ▶ RO type FILMTEC™ FORTILIFE™ CR100 by DuPont Water Solutions
- ▶ FO in combination HBRO™ or MD by BLUE-tec BV
- ▶ Catalyst MOL®LIK type M600 RS by MOL Katalysatortechnik GmbH



Figure 2: INSPIREWater Pilot plant WP 5 at Clariant Tarragona site

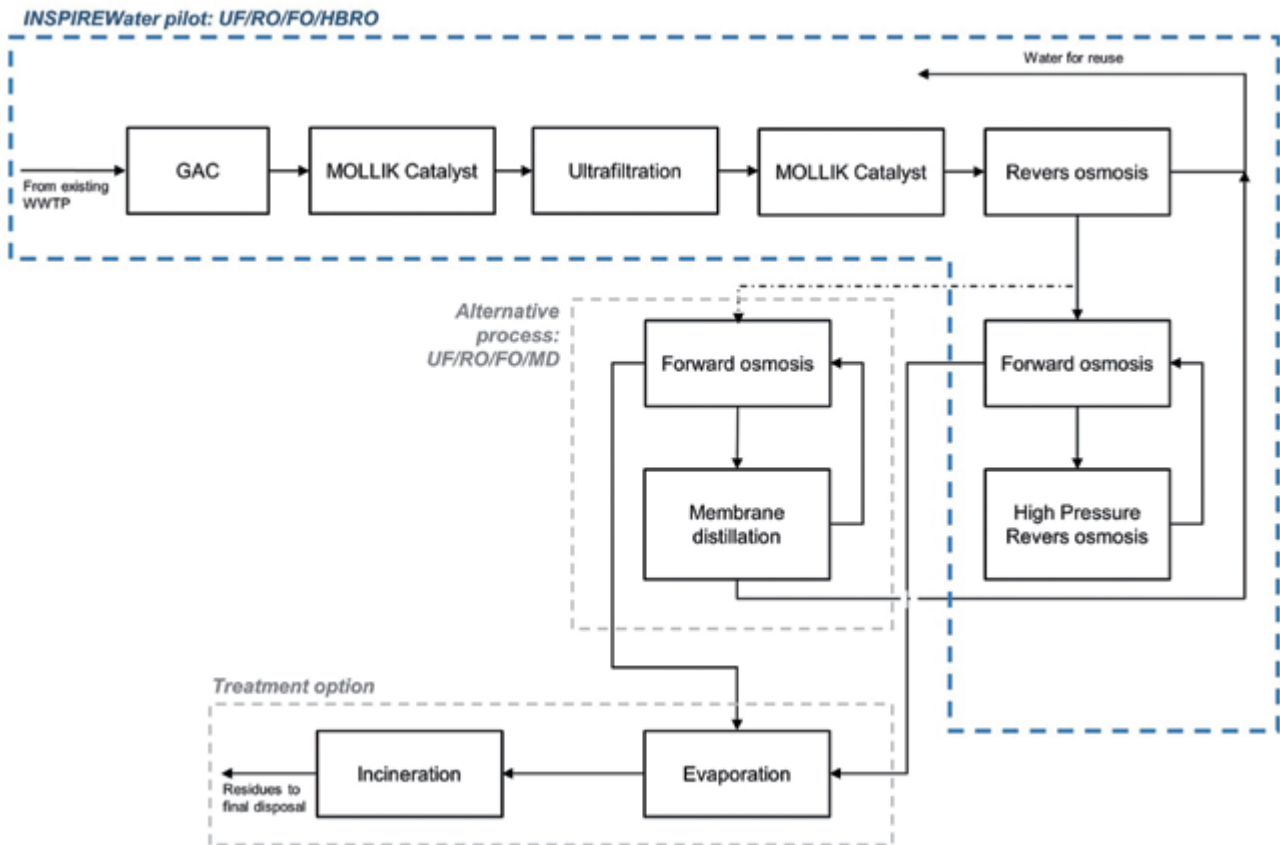





Figure 3: The demonstrated treatment chain at the CLARIANT demonstration case.

INSPIREWATER activities and results

	>80 % wastewater reduction demonstrated with membrane technologies >70 % less freshwater consumption possible	LCA	By reducing the water intake, the total environmental impact is reduced by >40 %
	>75 % less new energy consumption + use of waste heat, compared to conventional ZLD approach	LCC	Operational cost are expected to be reduced due to less resource and energy consumption
	UF-RO: permeate quality in range of TOC 2 mg/l, electrical conductivity 350 µS/cm FO-HBRO: permeate quality in range of TOC 5 mg/l, electrical conductivity 3500 µS/cm. TRL lifted from 4 to 5 MOLLIK performs ETV verification on another industrial application where the operating conditions for the catalyst are more suitable. The results are still pending. The verification will be completed by the end of 2019. Recycling water produced in quality for use as cooling and cleaning water purposes		
Technology			

Summary

End-of-pipe water recovery by membrane technologies is a suitable option, especially in water scarce regions

Contact

FHNW: Robin Wünsch

robin.wuensch@fhnw.ch

DuPont Water Solutions: Claudia Niewersch
Sonia Vila

Claudia.niewersch@dupont.com
sonia.vila@dupont.com

Clariant: Friedhelm Zorn
Jozef Kochan

Friedhelm.Zorn@clariant.com
Jozef.Kochan@clariant.com

BLUE-tec BV: Lex van Dijk

Lexvandijk@blue-tec.nl

MOL Katalysatortechnik GmbH: Jan Koppe

jan.koppe@molkat.de