CASE STUDY



Createch360 provides an operational intelligence platform for water and wastewater facilities that supports real-time control and decision making to reduce operational costs, enhancing reliability and achieving quality consent limits.

With over 100 installations worldwide, experience and continuous innovation guarantees high addedvalue solutions enabling utilities and industrial users to achieve efficiency and facilities performance. Small-medium plant for nutrient removal Blowers and turbines

# SERZEDELO STW (Portugal)

### SUMMARY

#### Serzedelo STW (Portugal)

- Small-medium plant
- 2 biological lines
  - 4 Plug flow reactors
    2 Carrousel reactors
- Nutrient removal

#### Challenge

To **reduce the aeration costs** whilst **ensuring the effluent quality**.

#### Results

- 100% quality requirements
- **13%** reduction of total plant consumption

### **PLANT CHARACTERISTICS**



- Design Flow: - 40.697 m³/d (271.313 P.E.)
- Biological reactor: - 4 Plug-flow units (Serzedelo I) - 2 Carrousel units (Serzedelo II)
  - Z Carrouser units (Der Zedelo II)
- Aeration system:
   Plug flow line: 6 turbines/ reactor (25 kW/Ut)
- Carrousel line: 2+1 radial blowers (400 kW/Ut)

#### • Effluent discharge consent:

- TN < 15 mg N/L
- TSS < 35 mg/L
- $-COD < 125 \text{ mg O}_2/L$
- BOD<sub>5</sub> < 25 mg O<sub>2</sub>/L
- TP < 10 mg P/L

### • Measurement equipment:

- Dissolved oxygen in bioreactors
- Ammonium in biorreactors
- Nitrates in final effluent
- Turbidity in final effluent





🖂 info@createch360.com - 🕻 +34 93 782 84 37 - 🛅 createch360° - 🗵 @CREAtech360

Costa d'en Paratge St. 22, 2nd - 08500 Vic (Barcelona) - SPAIN

# SERZEDELO STW (Portugal)

# **IMPLEMENTED SOLUTION**

### N-CONTROL (intermittent cycles)

### How it works?

This module is based on **N-NH<sub>4</sub>**<sup>+</sup>, **N-NO<sub>3</sub>**<sup>-</sup>, **NTU and DO** to optimise:

- a) DO levels to achieve the effluent quality requirements (Dynamic DO SP strategy)
- b) Blowers working frequency and performance
- c) Turbines performance (N° of equipment activated and rotation management according to engines energy efficiency)
- d) Nitrification/Denitrification cycles duration according to nitrogen removal rate
- e) Energy price thanks to implementation of tariff strategy (figure 3), taking into account this variable, and using it to displace energy consumption peaks (effluent quality requirements are based on a 24 hour average value of nitrogen)

Ammonium (Average 24h) Aeration power Ammonium ..... Ammonium Set point Reduces [N-NH<sup>+</sup>] Increases  $[N-NH_4^*]$  during day-time Increases  $[N-NH_4^*]$  during day-time during night-time 10,0 500 9,0 450 8,0 400 Ammonium concentration (mgN/L) 7.0 350 Power (kW 300 6,0 5,0 250 Blower F 4,0 200 3,0 150 100 50 1,0 0,0 20:00 16:00 8:00 12:00 16:00 0:00 4:00 8:00 12:00 20:00 0:00 Maintains  $[N-NH_4]$  composite levels stable according to client settings Fiaure 1

# SERZEDELO STW (Portugal)

## RESULTS

This section presents the differences in operation between a reference period (January 2013 – April 2015) and a period of 28 months operated with the control platform.

### Differences in inlet load

	Reference period	Control platform	Difference
Treated flow (m <sup>3</sup> /month)	1.016.021	976.733	-4 %
Treated load (KgDQO/month)	743.005	845.948	14%
Treated load (KgN/month)	39.964	53.297	33%

Data provided by the client; TRATAVE.

### Average effluent quality



Data provided by the client; TRATAVE.

### Difference in performance

Consumption baseline agreed with the plant manager before the project began.





00%

Robustness and reliability

00%

Fulfilment of water

quality

26%

**Reduction of** 

the aeration

system energy

consumption

### Consumption indicators

	Reference period	Control platform	Difference
kWh/month	754.946	658.516	-13 %
kWh / month (only aeration)	377.473	281.042	-26 %
kWh/m³	0,773	0,700	-9 %
kWh / Kg COD removed	0,973	0,855	-12 %
kWh / KgN removed	16,186	14,373	-11 %
GHG emission ( $Tn CO_2 / month$ )	228	199	-13 %

Data provided by the client; TRATAVE.

Small-medium plant for nutrient removal Blowers and turbines

# **CLIENT CONCLUSIONS**

# SERZEDELO STW (Portugal)

**Claudio Costa** GENERAL MANAGER TRATAVE TRATAMENTO DE ÁGUAS RESIDUAIS DO AVE, S.A.



"The platform has been installed in 5 plants within the project, and the investment cost has been 0,00€ for us . The project has been financed by "Createch360", and savings sharing has allowed direct benefits.

Each solution is fully customized to each facility, which has produced savings from day one. As soon as the project finishes, 100% of the savings will be for us!"



🖂 info@createch360.com - 🗓 +34 93 782 84 37 - 🛅 createch360° - 🗵 @CREAtech360