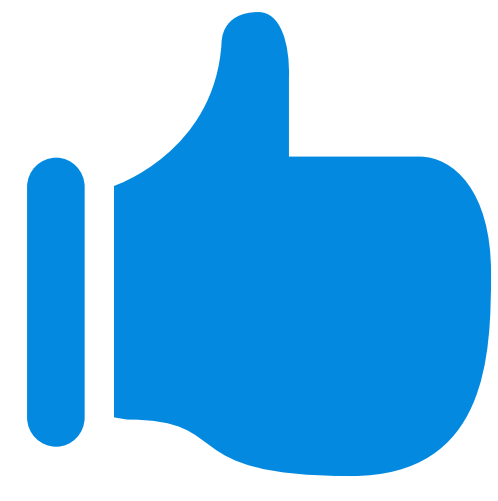


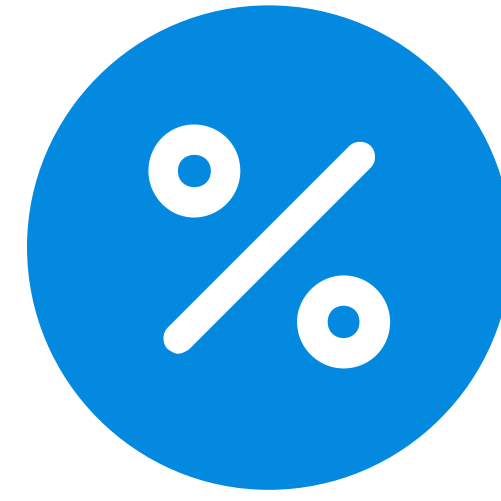
Replication of the art-ICA controllers for improving the eco-efficiency and sustainability of nutrient removal in wastewater treatment plants

www.artica4nr.eu



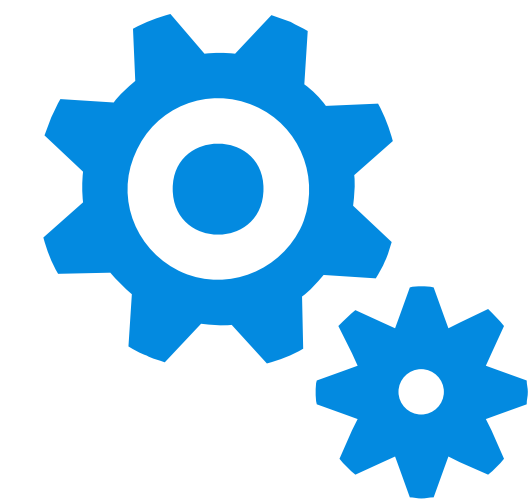
Quality of the Treated Water

Lower levels of pollutants in treated effluents, reducing total nitrogen emissions by **-10 %**



Savings in Operational Costs

Reductions in energy and reactants costs, reducing operational costs by **-20 %**



Process Stability

Optimisation of the aeration and pump units, achieving **superior** overall plant stability

The objective

The artICA4nr (art-ICA controllers for nutrient removal) project aims to

“Promote the use and encourage the market penetration of the art-ICA controllers”

a novel advanced control solution for biological nutrient removal wastewater treatment plants.

The art-ICA controllers will be installed in three WWTPs in Spain and Portugal:



The Navarrosillos WWTP (Spain): 113 kPE
Canal de Isabel II Gestión, SA

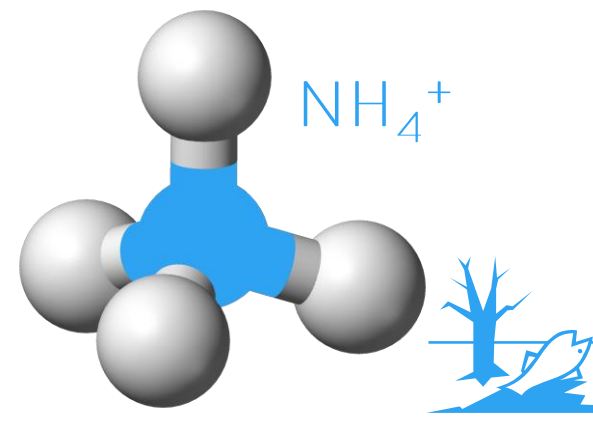


The Velilla WWTP (Spain): 123 kPE
Canal de Isabel II Gestión, SA



The Chelas WWTP (Portugal): 210 kPE
EPAL

The art-ICA impacts



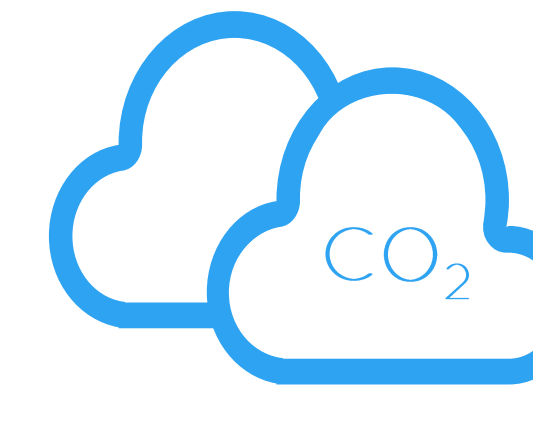
Water Nitrogen Emissions

115 t N/year (-10 %)



Electricity Energy Costs

400 MWh/year (-20 %)



Gas CO_{2e} Emissions

116 t CO_{2e}/year (-20 %)

The solution: art-ICA controllers

The art-ICA controllers are an **advanced process control solution** that combines online sensors with control technology to automatically optimise the operation of the key unitary process of wastewater treatment plants: **secondary treatment**.

In a conventional operation plant operators modify the set-points for the dissolved oxygen concentration, for the internal recirculation flow-rate, and for the wasted sludge flow-rate. With the art-ICA controllers the above set-points are automatically and continuously adjusted so that the three following objectives are always satisfied:

1. Process stability
2. Compliance of the water quality requirements with minimum consumption of energy
3. Optimum removal of nitrogen

Full-scale experiences

	The Galindo-Bilbao WWTP	The Mekolalde WWTP
WWTP size (Population Eq.)	1.5 MPE	50 kPE
Reduction of N discharges	13 → 10 mg N/L (25 %)	11 → 8 mg N/L (30 %)
Electricity energy savings	1314 MWh/year (13 %)	70 MWh/year (20 %)
Gas CO ₂ emission savings	381 t CO _{2e} /year	20 t CO _{2e} /year

The Project

Acronym: artICA4nr (www.artica4nr.eu)

Title: A multivariable control solution for sustainable operation of nutrient removal urban wastewater treatment plants

Funding scheme: CIP-Eco-Innovation-Pilot and market replication projects

Duration: 01/07/2014 – 31/12/2016

Overall budget: 1,440,143.00 € (European contribution: 50 %)

The Partners



Private multidisciplinary non-profit research centre

artICA4nr project coordinator



Automation and electrical engineering company

Owner of the art-ICA controllers



Utility company responsible for the water cycle in Madrid

Operator of the Spanish WWTPs



Utility company responsible for the water cycle in Lisbon

Operator of the Portuguese WWTP



Biochemical and Process Engineering university group

Evaluation of the art-ICA controllers