"The LIFE programme: funding opportunities & innovative solutions on wastewater treatment"

EIP water conference 2017.
Alfândega Porto Congress Centre. Porto, Portugal.
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BIOCLOC Project

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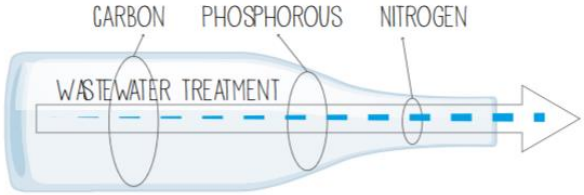
The context

Among the sources that can contribute to the **presence of nutrients in water bodies** is the discharge from wastewater treatment plants. Stringent regulatory limits for discharge in **sensitive areas** have resulted in an **obligation** for water treatment plants to **remove not only organic pollutants, but also nutrients**

Removal of organic substances and nitrogen in treatment plants takes place mainly through **biological oxidation in aerated tanks**. Since in a conventional activated-sludge plant the **energy demand is largely due to aeration**, attention has focused on the development of new technologies for reducing the energy consumed for the transfer of oxygen.

From a technical, economic and environmental point of view, removal of nitrogen is the bottleneck in biological wastewater treatment processes. The **optimisation of nitrification** is therefore fundamental to ensure not only the **quality of the discharged water**, but also the **reduction of energy consumption** and the **decrease of environmental costs.**



The BIOCLOC Project

This is the context in which the Project BIOCLOC was developed.

BIOCLOC Project
(BIOprocess ControL through Online titrimetry to reduce Carbon footprint in wastewater treatment)

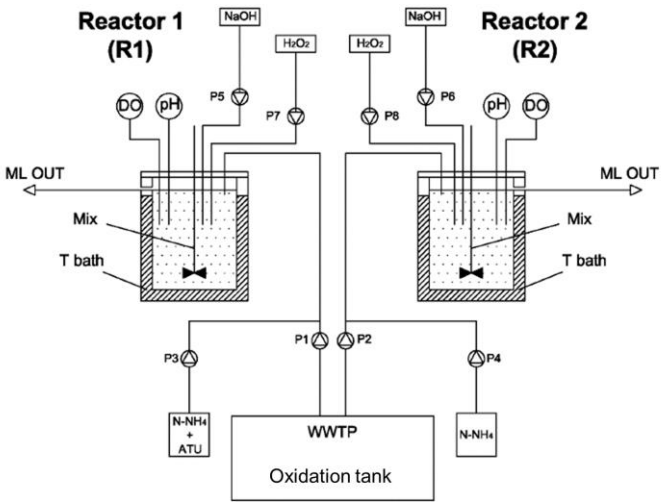
biocloc European Commission Programme LIFE+ Environmental Policy and Governance | LIFE 12 ENV/IT/000120
BIOprocess ControL through Online titrimetry to reduce Carbon footprint in wastewater treatment

The objective is demonstrate the validity of an **innovative tool** (**differential titrimeter**) to control the activated sludge processes based on **continuous measurements of the nitrification rate**.

A continuously fed online differential titrimeter was designed, manufactured and installed within Calice WWTP

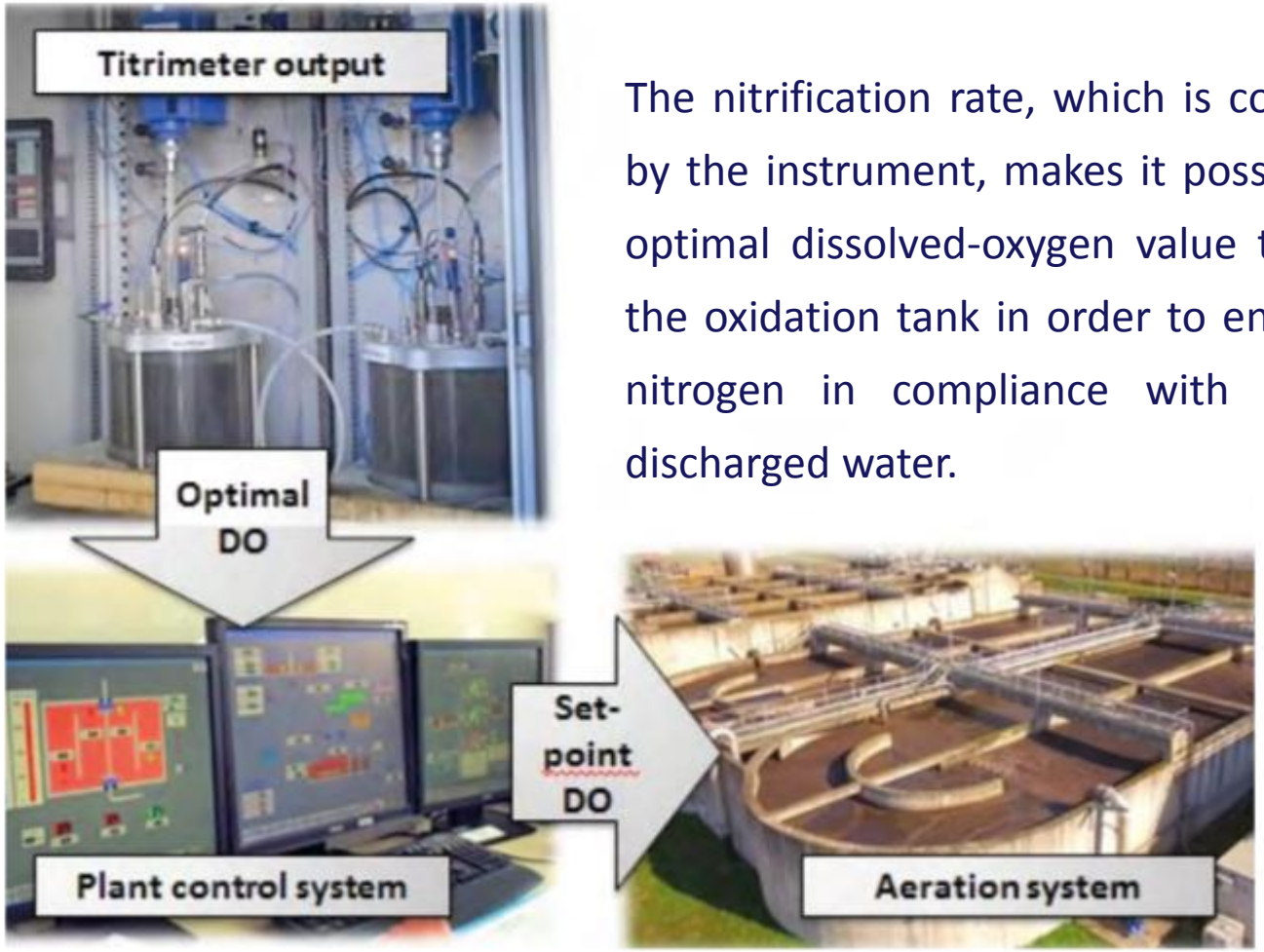
The prototype

Calice WWTP treats about 39000 m^3/d from sewage (30% domesric, 70% textile) and about 700 m^3/d of truck-transported liquid wastes



Application fields of the instrument

✓ **CONTROL OF THE AERATION SYSTEM**



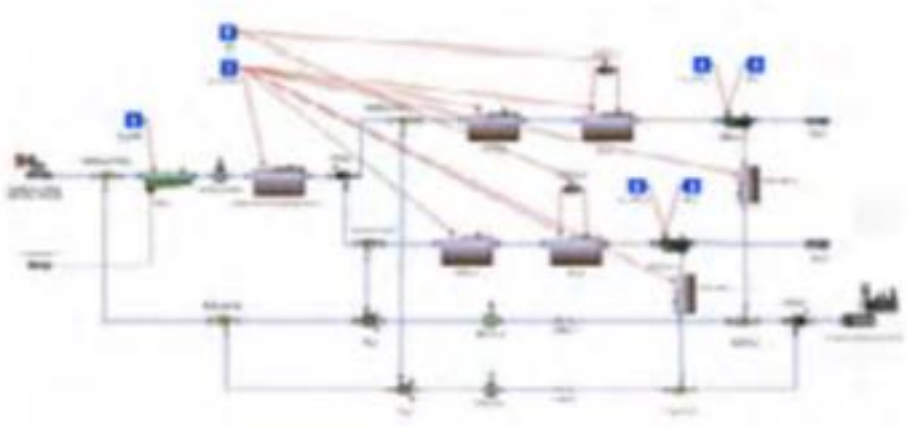
The nitrification rate, which is continuously returned by the instrument, makes it possible to calculate the optimal dissolved-oxygen value to be maintained in the oxidation tank in order to ensure the removal of nitrogen in compliance with the limits for the discharged water.

Application fields of the instrument

✓ **TIMELY IDENTIFICATION OF INHIBITION PHENOMENA**

The trend of the nitrification rate permits the real-time detection of the effects of any compounds that are toxic or inhibit the nitrification process and that may influence the plant.

✓ **INNOVATIVE PROCEDURE FOR THE CALIBRATION OF THE KINETIC PARAMETERS OF THE NITRIFYING BIOMASS**



The maximum nitrification rate, measured continuously, permits a more precise calibration of the kinetic parameters of the nitrifying biomass compared to the calibration carried out with conventional batch kinetic tests.

Results obtained

II. The **differential titrimeter** is an instrument **suitable for the continuous, real-time measurement of the nitrification rate** in a complex wastewater treatment plant such as the Calice plant, which treats both urban wastewater (mostly industrial) and liquid waste.

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III. The new control strategy **overcomes the disadvantage of** a delayed reception of information on the nitrification activity caused by the performance of **offline tests and** by the limited area of application of specific **sensors** for direct (ammonia sensors and nitrate sensors) or indirect (pH, redox) measurements.

Results obtained

IV. The application of the tested method **ensures the desired removal of nitrogen** and at the same time the **minimisation of energy consumption and CO_2 emissions** through control of the DO concentration. It is estimated respectively a **energy consuption reduction of 27%** , with a **saving of about 130 tons of CO_2 in one year**.

V. The differential titrimeter permits the **immediate detection of inhibition phenomena**, making it possible for operators to **implement prompt countermeasures and thus to optimise the management of the plant's operation**. This is an enormous advantage for plants such as the Calice plant that in addition to municipal wastewater also treat industrial sewage and truck-transported liquid waste, which have a variable composition and could contain inhibitors of the nitrifying biomass.

VI. The calibration procedure based on the tetrameter measures offers considerable **benefits for the modelling of wastewater treatment plants** for process simulations and scenario analyses.

Networking and dissemination in numbers

- 1 website (www.bioclocproject.eu)
- 1 video
- 1 guide book
- Organisation of 4 seminars/workshops/ conferences
- Organisation of 2 networking events with exhibition stands (Ecomondo 2015 and H_2O 2016)
- Presentation of the project's results at 17 national/international conferences
- Participation in 5 national/international networking events
- 5 publications in conference proceedings/scientific journals
- 4 press articles
- Permanent collaboration with 11 research projects (LIFE projects, Horizon 2020)
- Organisation of 3 guided visits to the prototype
- Transmission of 6 newsletters to over 500 stakeholders
- Distribution of 1200 brochures
- Creation of 4 information panels installed at the facilities of the partners

Thank you for your attention

www.bioclocproject.eu

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