

Online Process Optimization toward Sustainability: Application to Wastewater Treatment Plants

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Introduction

- Wastewater treatment plant (WWTP) are structures that have the function of removing the most different types of pollutants present in wastewater.



Fig.1 – WWTP

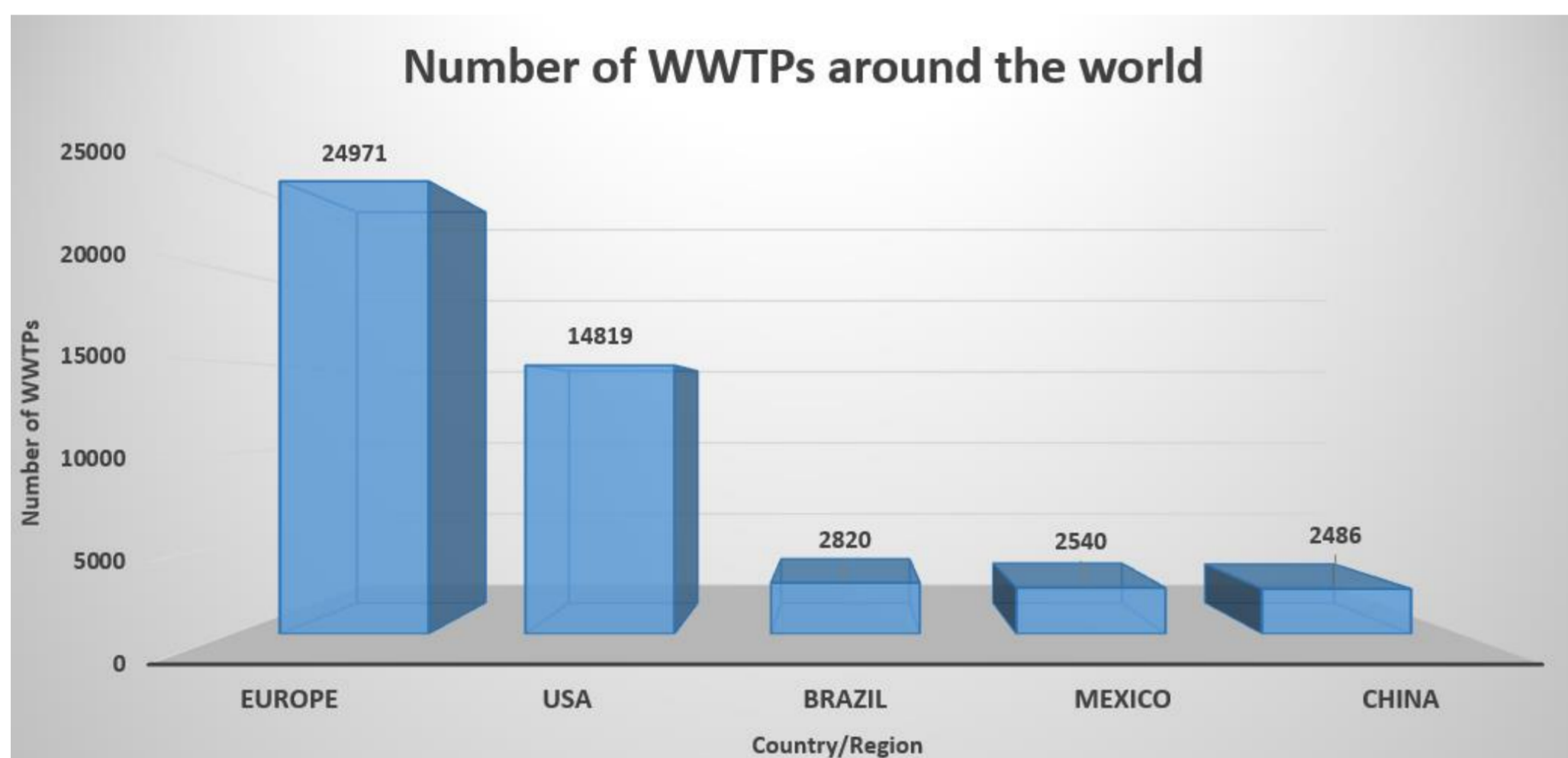


Table.1 – Total number of WWTP by country and region [1]

- WWTPs are responsible for 7% of all global energy consumption [2].
- In Portugal, about 4% of all energy consumed is spent on water distribution and treatment systems, of which 25% is used in WWTP [2].

Related Literature

- WWTPs must be efficient in carrying out their tasks. Many studies have already been developed with the aim of making WWTPs more sustainable.
- Methods used to optimize WWTPs:
 - Principal Component analysis, Monte Carlo Method, Gaussian Mixture Model, Deep Learning, Fuzzy Logic, Life Cycle Assessment, Metaheuristic, AutoRegressive Integrated Moving Average, etc.

WWTP Online Optimization

- A WWTP optimization and monitoring system must be online.
- Assessment criteria should include circular economy indicators



Fig.2 – Circular economy: concepts that must be considered in optimization processes[3].

- Each control and optimization action must have its impacts evaluated in real time

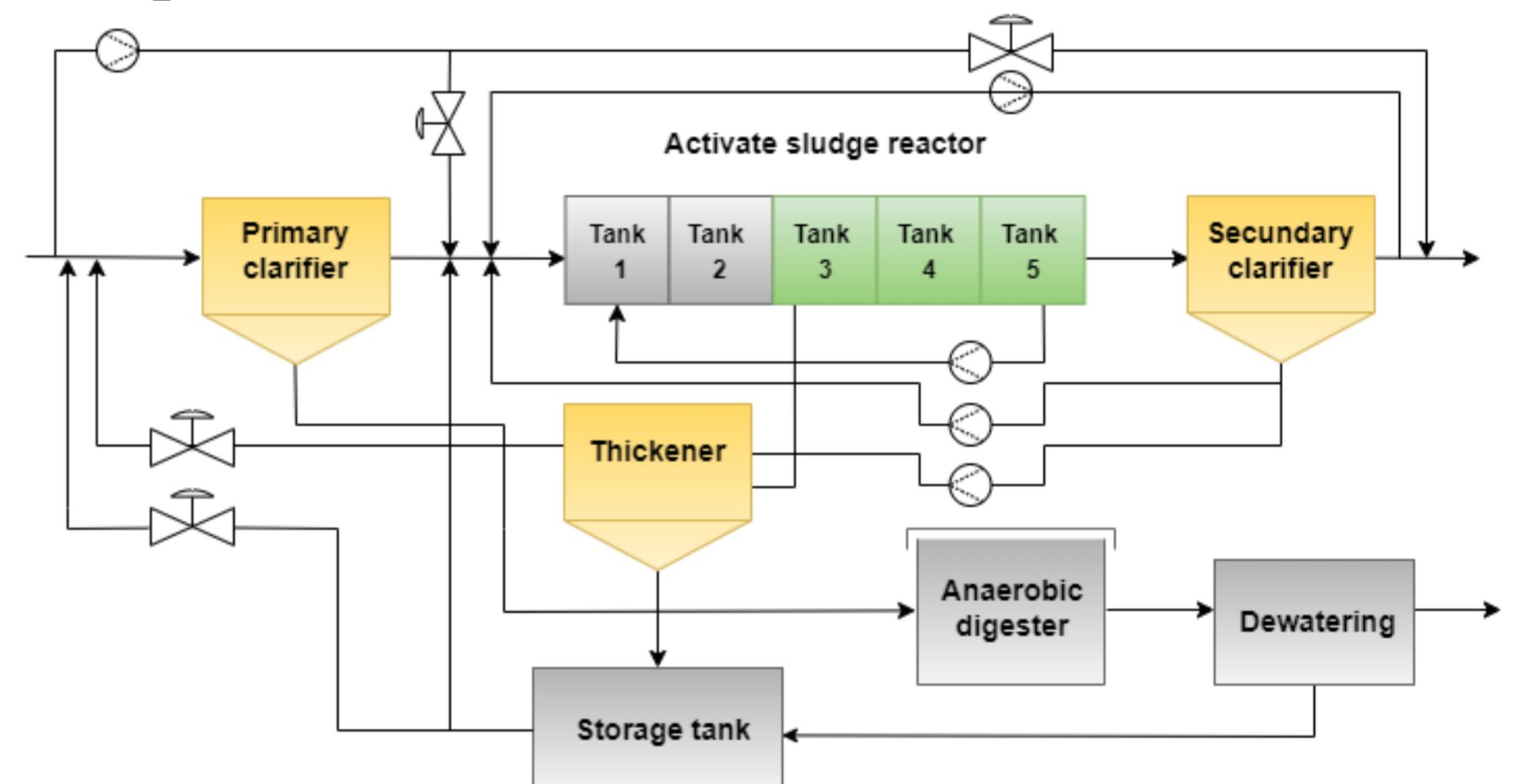


Fig.3 - Benchmark Simulation Model N°2 – BSM2

- The tests and evaluations of the proposed methods are carried out with the help of the BSM2 simulator.
- An WWTP online optimization system toward sustainability is a project of great importance to face current and future water problems.

References

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