

# UNCOVERING THE HIDDEN POTENTIAL OF ONLINE DATA TO IMPROVE OPERATION OF REVERSE OSMOSIS PROCESSES

## Introduction

In industrial plants, data on water quality and processes is collected continuously. However, unless something goes seriously wrong, this data is never looked at. In this thesis, we will uncover the value that is hidden in data from reverse osmosis (RO) processes collected at full-scale and use it to enable industry to improve their operational strategy, i.e. optimizing recovery while prolonging membrane lifetime. Therefore, a mathematical model for RO is being further developed in order to aim for a “digital twin” which uses real-time data as input.

## Methodology

Online data was collected at a full-scale RO installation operated by the water utility FARYS and a mechanistic model that predicts the performance of the process was built. The main bottleneck to further improve the predictive power of the model remains the prediction of fouling and its influence on the membrane permeability over time, based on online data. Hence, a data-driven model will be developed to predict the influence of fouling on the RO process, and combined with the existing mechanistic model.



Figure 1 – Reverse osmosis system of FARYS where online and offline data was collected.

## Objectives of the thesis

The purpose of this thesis is to further extend the model for RO with a data-driven approach (data-driven models including machine learning). Therefore, the student should have a basic knowledge of programming and a motivation to learn about data-driven models.

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