Demo Case Update

From Waternet – Wastewater Treatment Plant Amsterdam West

17 December 2020

Waternet has dedicated one of the seven treatment lanes of wastewater treatment plant (WWTP) Amsterdam West to investigate AI based process control strategies for energy optimization and N_2O reduction. In the past months Waternet has worked on finalizing of the sensor installation and integration of the data signals into the process automation (PA) for the 'Research lane', see Figure 1.

Fig. 1 Impression of the research lane at WWTP Amsterdam West. (A) Research room under primary settler for influent and Nitrous Oxide (N2O) measurements; (B) Influent flow-through vessel (C and D) Installation of sensors in the Aeration Tank (AT); (E) Installation process airflow measurement ; (F) Effluent analyzers.

Most of the signals are now available in the PA and commissioning will soon be completed by performing Site Acceptance Tests (SAT). For the influent parameter measurements (Ammonia and Phosphate) filtration of the pre-settled influent is required. An ultrafiltration (UF) skid will be installed by the end of 2020. With the installation of the UF, the research lane is completed. More than 20 extra sensors and analyzers that will aid in reaching the research objectives have been installed at different locations in the treatment, an overview is given in Figure 2.

With the new sensor data being available, Waternet has started to work on dashboards in its legacy system that will be used for visualization and data analysis, an example is shown in Figure 3. Whether the developed dashboards is sufficient for more elaborate data analyses will be further explored in coming iterations.

By the end of January, the research lane is expected to be fully operational. Data of existing and new sensors will be collected for training of the AI environment model, an Artificial Neural Network that describes the behavior of the treatment plant. Up till now the environment model was developed and trained on a historical data set with the already existing sensors. In order to estimate the length of the period necessary to collect data for training of the environment model including the new sensors, an exercise was performed with the historical data set. The environment model was subsequently trained on 1 week, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 months of data. The results showed that the performance of the environment model did not significantly increase when more than 3 months of training data were included. This means that first training of the environment model on the data of the new and existing sensors of the research lane can be done at the beginning of May 2021.

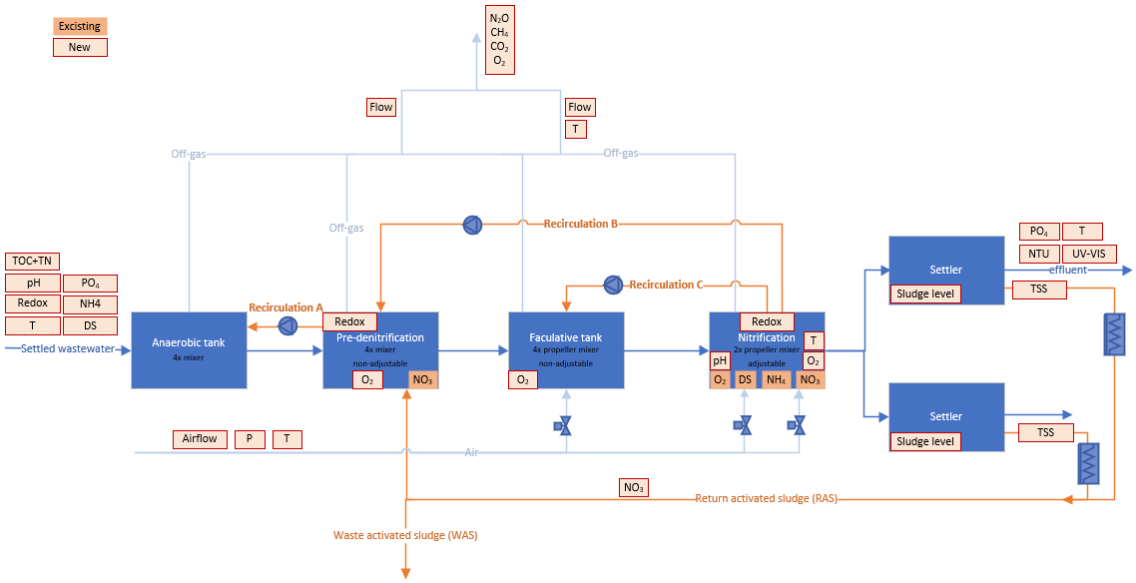

Fig. 2 Sensor and analyzer layout of the research lane, orange boxes represent existing sensors and red outlined boxes represent new sensors and analyzers.

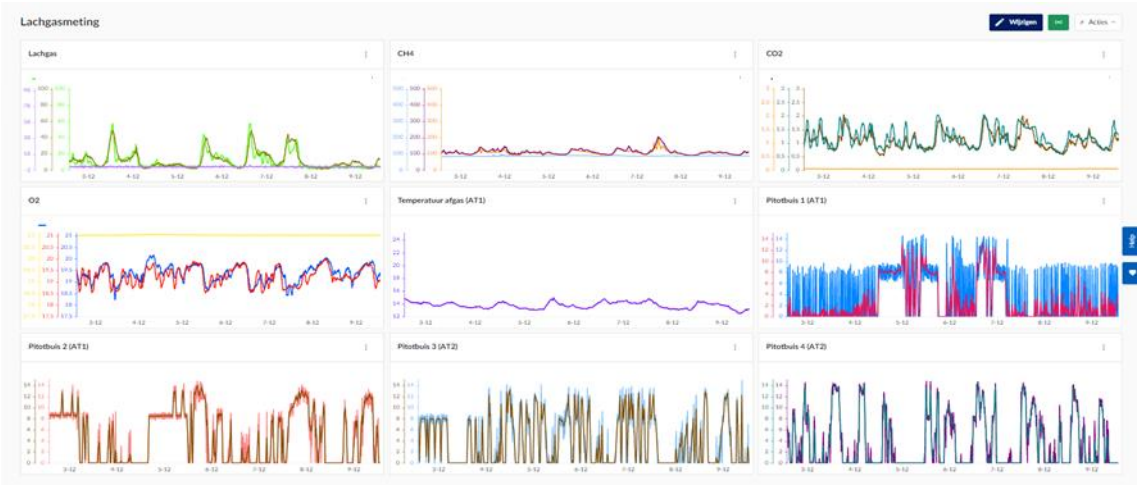

Fig. 3 Dashboard example with off-gas measurements (Nitrous oxide, methane, carbon dioxide and oxygen) and parameters relevant for off-gas measurement.

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Project Consortium

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