

# Development of Streamlining/Sophistication/Automation Technology for Facilities Operation Management

(Research of FY 2017-2021)

## 1. Purpose

Wastewater treatment facilities have management issues caused by weak management with population decline, further energy saving, and cost reduction. This study aims to streamline, sophisticate, and automate the operation management of wastewater treatment facilities.

The research deals with ICT, IoT, AI, and robot technology, which are aggressively introduced innovations and investigates and considers their adaptability to the wastewater business and practical application.

## 2. Outcomes of This Year

(1) Demonstration of facilities' operation management technology using ICT and AI

The following two technologies adopted by the Breakthrough by Dynamic Approach in Sewage High Technology (B-DASH) Project were demonstrated at the full-scale demonstration facility.

- Advanced treatment technology by controlling single tank nitrification/ denitrification process with ICT and AI (B-DASH project full-scale demonstration, 2019-20)
- Efficient operation management technology for wastewater treatment by ICT-based process control and remote diagnosis (A follow-up study of B-DASH demonstration, 2016-20)

(2) Developing a new wastewater treatment operation support/control technology using AI

Figure 1 describes control support technology for the wastewater treatment conducted FS in the B-DASH Project 2018-19. This year, the researchers studied the AI technology's adaptability to the wastewater treatment automatic control operation and its issues.

In this technology, AI guides operators to set control values for wastewater treatment, and operators make a final decision. The study was conducted at JS R&D Experiment Center using an activated sludge treatment test plant with two trains with a maximum daily capacity of 50m<sup>3</sup> (Figure 2.) The test plant was automatically operated by AI-controlled set values to study the AI technology's adaptability to wastewater treatment automatic control operation. The test plant started the process in January 2021 to obtain learning data for AI prediction model establishment.

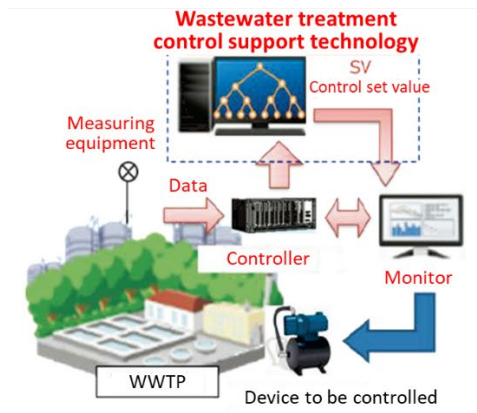


Figure 1. Summary of the wastewater treatment control support technology

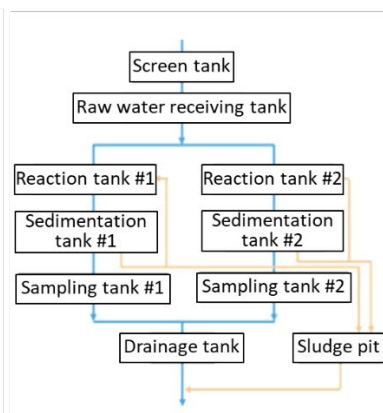


Figure 2. Summary of the activated sludge process test facility

### 3. Future Schedule

Demonstrating the Advanced treatment technology by controlling single tank nitrification/denitrification process with ICT and AI will continue next year as independent research. For developing the new wastewater treatment operation support/control technology using AI, AI-controlled automatic

operation of the test plant will continue to study AI technology's adaptability to wastewater treatment automatic control operation and its practical application.

Keywords: ICT, IoT, AI, wastewater treatment operation support, wastewater treatment automatic control