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Integrated Approach for Dissemination of Decentralized Domestic Wastewater Treatment System in Southeast Asia

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Although effluent standards for domestic wastewater have been established, there is no adequate institutional arrangement ensuring that the performance of wastewater treatment facilities complies with effluent standards in many ASEAN countries. Therefore, development of a performance test and certification system for wastewater treatment facilities is crucial for ensuring the reliability of treatment facilities on the market. To address this urgent issue, meetings were held with all of the stakeholders including central/local governments, research institutions, NGOs and manufacturers in Indonesia.

Through this series of stakeholder meetings, we drafted a performance testing method for decentralized domestic wastewater treatment facilities in Indonesia. Some key factors in the testing conditions, such as wastewater composition and hourly fluctuation of wastewater volume, were investigated and considered. A trial was conducted with the testing method to confirm the availability of equipment for the test and the feasibility of the testing procedure. The resultant draft testing method is in the process of national standardization in Indonesia (Fig. 1).

We also strove for localization of Japanese wastewater treatment technologies in ASEAN countries. A pilot test of a full-scale *johkasou* was conducted to tailor the technology to the conditions of high temperatures and inflow patterns characteristic of Indonesia. The pilot test revealed higher treatment efficiencies and lower sludge generation in the ASEAN region. These will be advantagious in reducing capital and operating expenses. Lab-scale tests also corroborated these advantages in detail (Fig. 2). We also evaluated another unique technology, the down-flow hanging sponge (DHS) process, in an apartment building in Bangkok, Thailand. No significant negative effect of hourly fluctuation of wastewater volume on the treatment performance was observed. Compared with the current activated sludge process at the test site, the DHS process showed higher removal efficiencies, especially for ammonium nitrogen and *E. coli*. Furthermore, it is estimated that the DHS system has the advantanges of a remarkable decrease in energy consumption and space requirements.

Development of a domestic wastewater inventory in Bangkok revealed that 75% of BOD discharged in areas that had sewage works did not reach the centralized sewage treatment plants. This implies a need for integrated approaches with domestic wastewater, utilizing both centralized and decentralized treatment systems.

Because appropriate sludge management is also an important issue, we conducted investigations into sludge flow in two model cities in Indonesia. Based on our findings and consultations with the stakeholders, we proposed an economically sustainable business model to which both local governments and private sectors have agreed. This business model requires sludge collection companies to collect fees when they transport the collected sludge to the sludge treatment plants, rather than from the households so that no one is motivated to discharge the collected sludge into the environment illegally. The proposed business model for sludge collection and treatment would be a good practice for other cities in Indonesia and also for other ASEAN member states.

Development of a strategy for regional standardization in ASEAN countries was considered for the performance testing method, and four major approaches were identified as having a high possibility of use through organizations such as the ASEAN Consultative Committee on Standards and Quality (ACCSQ).

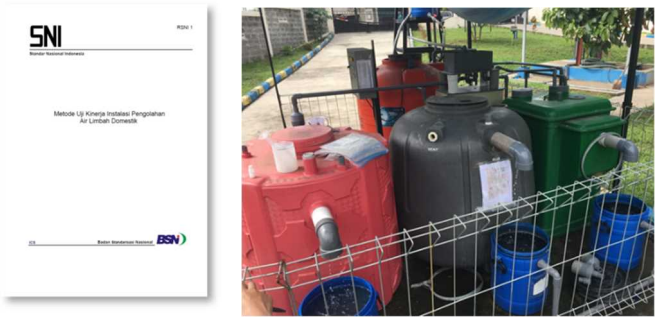

Fig. 1 Indonesian National Standard (SNI) draft for the decentralized domestic wastewater treatment facility performance testing method (left) and the testing method trial site (right).

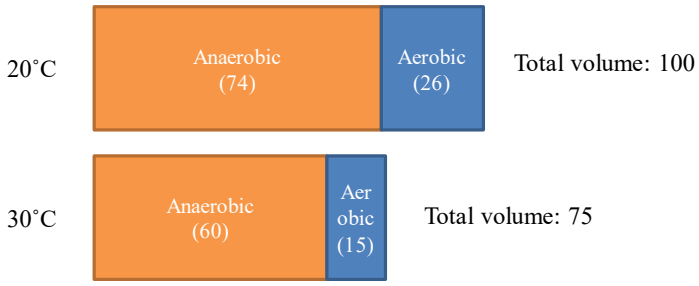

Fig. 2 Effect of higher temperature on the required working volume for domestic wastewater treatment.