The Decade and Future of B-DASH Project

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1. Introduction

The Breakthrough by Dynamic Approach to Sewage High Technology Project ("B-DASH Project"), launched in 2011, marked its tenth anniversary this year. Over the decade, the B-DASH Project has greatly contributed to the development and dissemination of new technologies concerning sewerage, adopting a total of 45 technologies and publishing 24 guidelines for technology introduction (as of Dec. 2019). Compared with earlier technical development projects concerning sewerage, the B-DASH Project surpasses any of them in terms of project period, budget, variety of target technologies, etc.

The Water Quality Control Department at NILIM has been overseen this project as the executive agency since the promotional system was established. This paper looks back at the trends, results and purpose of this Project over the past ten years.

2. Circumstances and aim of system establishment

As is roughly explained as follows, the B-DASH Project aims to "substantially reduce the costs of and create renewable energy in sewerage projects through the acceleration of R&D and practical use of innovative technologies, and to support overseas development of the water business by Japanese enterprises".

Since sewerage projects are not under the direct control of the central government but are, instead, initiatives promoted by local governments, it is difficult to demonstrate, disseminate, or otherwise apply new technologies when spearheaded by the central government. In the field of sewage and sludge treatment, the development of new technologies is highly anticipated, but the minimal exposure that technologies developed by private sectors receive and the lack of adequate engineering data and information for cost estimations have been cited as impediments to introduction. Because past technology development projects have run into these troubles, the B-DASH Project aims at more quickly disseminating new technologies by promoting development via pilot tests in actual-size facilitates, having the central government formulate guidelines for technology introduction, and building a development system with the cooperation of private enterprises, local governments, etc.

With respect to actual-scale demonstrations, there were advanced examples in the Advance of Japan Ultimate Membrane Bioreactor Technology Project ("A-JUMP"), which was started in 2008 for the purposes of applying Japan's world-leading membrane processing technology and know-how to sewerage and overseas development by domestic enterprises. In the B-DASH Project, technologies have been demonstrated in more fields by applying the A-JUMP model. As a side note, the author has heard that this project was named "B-DASH" because "B" comes after "A."

3. Trends of adopted themes

In the B-DASH Project, a preliminary survey was conducted into the needs and technical seeds of the project entity before public solicitation of development technologies. The recent themes for public solicitation are mainly related to the technologies classified below (see the figure), which shows the rising needs for the technologies by project entities.

- ICT/IoT utilization, AI-equipped system (13), (14), (26), (27), (30)-(32)
- Downsizing, water treatment technology for small-scale entities
  (12), (22), (25)
- Technologies for effective use of sewage resources and energy for small to medium-sized cities

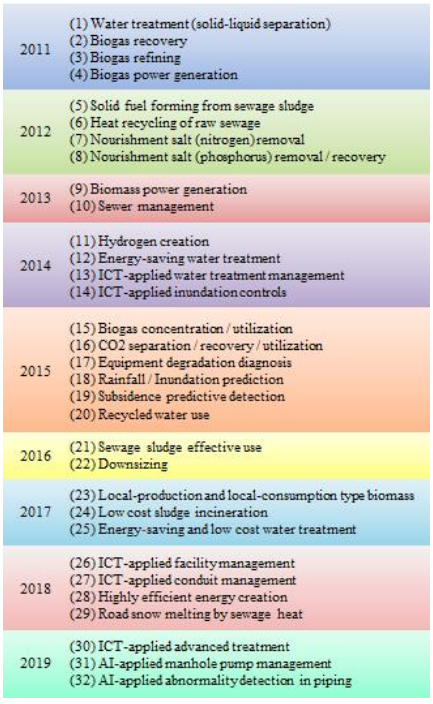

Fig. Trends of publicly-solicited themes for B-DASH

(15),(20), (21), (23), (28)

The utilization of ICT, etc. represents technical needs for supplementing human resource shortages and promoting labor-savings in all industries. In addition, technical solutions are being sought for the issues small to medium-sized cities face prior to the problems seen in large cities, including relatively weak project management systems and response to the issue of depopulation, which must be addressed in the future. The technical needs for labor-savings, downsizing, and actions by small to medium-sized cities are believed to remain at a high level, therefore the key issues at present are to develop and apply the technical seeds.

4. Top-runner approach

The technologies developed and disseminated through the B-DASH Project offer water and sludge treatment operators greater energy-efficiency than what is available with conventional technologies. For this reason, the Ministry of Land, Infrastructure and Transport (MLIT) decided to introduce a top-runner approach into sludge treatment facilities and require facilities that seek related grants for sewerage projects to achieve energy-efficiency performance above a certain level of (see the below table). This performance requirement was decided based on the results of the biogas collection technology ((2) in the above figure) and the biomass electric generation technology ((9) in the above figure) for incinerators in the B-DASH technologies. The effect of introducing this approach is expected to be great since sludge treatment facilities across the country are now entering a period of reconstruction.

Hence, the purpose of the B-DASH Project is to contribute not only to the development and dissemination of individual technologies but also the performance improvement of sewerage facilities across the country. Parallel to the B-DASH Project, NILIM continues to research these and other performance improving technologies, and consider what is coming out of the B-DASH Project as the top-runner in its field.

Table Example of the performance requirement indicators for grants

Facility name	Performance index value
Digester (Mesophilic digestion) *	Electricity consumption (per amount of decomposing organic matter) [kWh/t-VS decomposition ***] is not more than 280**.
Incinerator	Exhaust heat recovery rate is 40% or more and power consumption reduction rate is 20% or more.

* Treatment to stabilize sludge in an anoxic tank. Methane is obtained. Mesophilic digestion at a temperature of about 35 ℃is common, but thermophilic digestion is also being introduced.

** 270 or less for sewage treatment facilities with a daily sewage treatment volume of 100,000 m^3 or more.

*** Power consumption (kWh) per ton of organic matter (VS) decomposed in water, gas, etc. in the tank.

5. Future issues (Spread and promotion of developed technologies)

The future dissemination and promotion of developed technologies is important. Trends show that developed inspection and diagnosis technologies are introduced at an early stage, while advanced technologies for entire water treatment systems take time to disseminate because they can only be introduced when facilities are reconstructed. In the Water Quality Control Department at NILIM, we intend to continue cooperating with MLIT to disseminate and raise public awareness of guidelines and provide project entities with helpful information for choosing the technologies they need. In addition, this top-runner approach needs to be continued since it directly leads to the dissemination of technologies.

In the B-DASH Project, pilot tests are, in principle, conducted in an extremely short period of time (two years) though data acquisition over a longer period may in some cases lead to technical improvements and a more focused scope of application. As for the technologies demonstrated in the past, we have decided to follow up on the guidelines for technology introduction, as needed, based on the results acquired after the demonstration period through independent studies by the developer and reviews of the guidelines by a third-party committee. We expect that the transmission of more useful up-to-date information will also lead to the dissemination of the technologies.

By implementing and following up on the B-DASH Project and further disseminating and promoting the developed technologies as described above, we aim to upgrade and enhance the efficiency of domestic sewerage facilities.

☞See the following for details.

1) Outline of B-DASH Project, List of adopted technologies, guidelines for technology introduction (Website of Wastewater and Sludge Management Division, NILIM)
http://www.nilim.go.jp/lab/ecg/bdash/bdash.htm