
Research and Development of Sewerage Technologies

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1. Know the vision.

In order to advance research and development accurately while socioeconomic circumstances are changing, long-range outlook is indispensable. In the sewerage field, for achievement of the Sewerage Vision (formulated in July 2014), which is a policy vision, the Sewerage Engineering Vision ("Engineering Vision") was formulated in December 2015. In order to solve important issues in sewerage service, the Engineering Vision shows as a road map technical targets and technical development items required for achievement of targets on 11 technical development fields and specifies what should be addressed by stakeholders including the government, project owners, private sectors, and research institutions. Of the issues in the road map, those for which R&D is urgently required or those for which medium- to long-term solution is indispensable are studied every year in the Conference on Technical Development of Sewerage Systems (established in January 2016, for which NILIM serves as secretariat) ("Development Conference") considering the latest situation and are published as priority issues of the road map. Details of these issues are available in the Sewerage Technology Development Report.

2. Road map implementation

According to the literature search on sewerage-related papers (conducted by the Development Conference in 2018), in the technical development fields mentioned in the Engineering Vision, many researches and developments, etc. were implemented concerning "low carbon sewerage system" and "energy creation and renewable energy." Activities in these fields widely range from basic to demonstration stages and are implemented in a large number as well as in "Sustainable sewerage system (rehabilitation, response to deterioration, smart operation)", "Measures against earthquake / tsunami", and "Rainwater control (inundation measures)." Next come "Basin zone control" and "Risk management." For the former, many projects are implemented in the application / demonstration stage, while the latter, in the basic stage. The field of risk management has been becoming important in recent years, and development toward application etc. is expected in the future. Note that in each field, technical targets for the present (5 years) are generally addressed, compared with medium-term (10 years after) or future (about 20 years later) targets.

Particularly, there are many activities for priority issues of the road map on which support of the government is focused. On the other hand, there were not so many researches on ICT or robots found in the range of this literature search, but it is expected to work on these fields for response to changes in socioeconomic circumstances.

3. Where are needs of project owners

According to the country-wide questionnaire survey to sewerage service provider (in 2016 and 2017 by the Development Conference), the fields where the possibility of introducing / using new technologies is relatively high or at least fifty-fifty (medium degree) were "Earthquake / tsunami countermeasures", and "Sustainable sewerage system." Also in fiscal 2018, disasters by earthquake etc. occurred in many regions, and technical needs related to safety and security are always high regardless of the size of cities. For "Rainwater management", "Energy creation and renewable energy", and "Low carbon type sewerage system," needs are higher in large cities (administration population of 300,000 or more) than small and medium-sized cities (administration population of less than 300,000), and a certain trend is seen in the level of sewage maintenance. Particularly, in the cities with a size of core city that are eager about studying issues and could lead technical development / introduction, etc., according to the questionnaire and hearing survey (by the Development Conference in 2018) to such cities, many of them answered that they need technical development concerning "Pipeline rehabilitation", "Pipeline maintenance", and "Rainwater measures" such as measures for water from unknown source or infiltration water. Timewise, there are also immediate needs, such as "quickly" or "within one year." While there is a concern about rapid increase of old facilities, the issue of "pipeline management," for which data accumulation, etc. are highly required, is often discussed as a technical issue in major conferences on sewerage and attracting the interest of business operators.

4. What obstructs new technology introduction?

According to the above-mentioned country-wide questionnaire survey, as an issue on new technology introduction, many business operators are concerned about procurement of technologies, such as

"insufficient development of estimation standards, technical guidelines, etc." Particularly for bidding and contract procedures, many of them are concerned about limitation to a specific company although competitive bidding is basically required, such as "Competitiveness does not work for new technologies and bidding is limited to a specific company" or "Fairness / transparency is not assured." Many of them also answered that little progress in considering introduction is attributable to insufficient information, insufficient understanding of the technology, etc., including "Uncertain reliability of the performance of new technology" (business operators in large cities), and "Unknown whether there is any applicable new technology," "Difficult to choose optimum one among similar technologies / approaches" and "Unable to consider new technology introduction because of shortage of technical staff" (all in small and medium cities). In addition to the effort to introduce details, effects, etc. of new technologies in an easy-to-understand manner, promotion of development of new technologies applicable to small and medium-sized cities, where many businesses are operating, supporting system for introduction consideration, etc. are also important issues. Particularly in the cities with a size of core city, the following opinions were raised by business operators in the above-mentioned hearing survey: (i) For a certain period after new technology introduction, follow-up service by manufacturer is required for the purpose of know-how transfer, etc. for maintenance since even partial renewal may require adjustment of the operation control method of the whole system; (ii) Place a focus on life cycle cost but may hesitate to introduce new technology for financial reasons if initial cost is high; and (iii) Since it is difficult to implement an ordering system that determines the validity of technical proposal evaluation and price, such as comprehensive evaluation bidding system, due to shortage of technical staff, securing competitiveness or performance / stability of the technology to adopt is necessary.

5. For promotion of introduction

It is desirable to implement at an early stage new technologies that can respond to technical issues of business operators. As a measure of the government to support the promotion of new technology introduction, etc. in the sewerage field, Breakthrough by Dynamic Approach in Sewage High Technology ("B-DASH" Project) has been implemented since 2011, in which the government takes the initiative in verification of innovative technologies that can serve the solution of business issues and formulate guidelines for dissemination and development of new technologies across the country. A total of 41 technologies were so far demonstrated in real scale, covering all the fields of sewerage. We are going to continue research activities with focus on follow-up after preparation of guidelines. Further, for the issues of matching of seeds and needs, shortage of information, etc., we are considering systematic mapping of the content of the study implemented by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) in cooperation with the Environmental Engineering Committee of the Japan Society of Civil Engineers, as well as the use of GAM (Gesuido Academic Mapping), a project aiming to strengthen cooperation of industry, academia and government. Further, the Energy Subcommittee was installed in the Development Conference and is implementing institutional study considering various issues so far found in new technology introduction. Through the activities etc. introduced above, we intend to advance actively social implementation of R&D findings.

☞ See the following for details.

1) Technical Note of NILIM, No.1033, "2017 Sewerage Technology Development Report"
http://www.nilim.go.jp/lab/eag/gesuidougijyutsukaihat_sureport.html

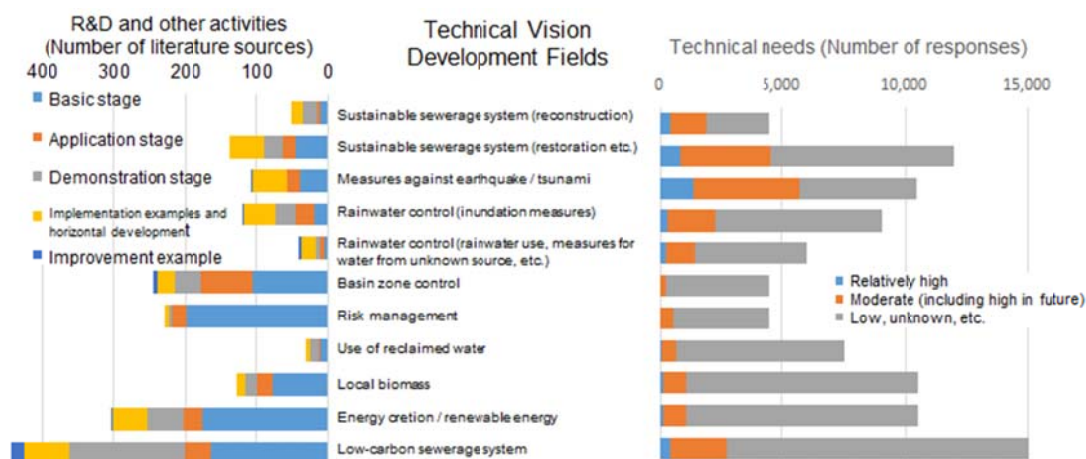


Fig. R&D activities, etc. and technical needs