

## Research on the effects of introduction of renewable energy use technology

Year of Research

2013 • 2014

Establishment of energy and resources recycling

### (Purpose)

Sewerage facilities consume large amounts of electric power and fuel. Energy consumption increases with the progress of advanced sewerage treatment technology. With social needs on the increase to rationalize energy consumption, further reduction of energy consumption is being sought in sewerage facilities. Against such background, the move to study the introduction of technology to use renewable energy is growing, coupled with earthquake recovery measures.

This study is in the first year of a two-year research, focused on power generation technology using digestion gas, small hydropower, sunlight and wind as well as wastewater heat utilization technology. The purpose of this study is to appropriately perceive the current state of the effects of introduction of renewable energy use technology and to formulate and organize the procedural flow chart for the examination of the introduction, design approach, business schemes and review process for the effects of the introduction as a guideline. This is the interim report.

### (Results)

(1) In basic research, studies were conducted by questionnaires concerning the issues and purpose related to the use of renewable energy, and on a summary of the technology, regulations and legal framework and other latest information. The results of the questionnaire on the issues concerning the introduction of technology highlighted the lack of incentives in its introduction, while from the technical side, efforts in maintenance and management and safety measures were raised.

(2) Regarding procedures for the examination of the introduction, a technology selection flow chart that allows easy confirmation of the possibilities of applying various power generation and heat utilization technologies to sewerage facilities was prepared as a prior step before conducting the examination of the introduction. This was followed by preparing a flow chart for the examination of the introduction, where evaluation of feasibility and judgment of introduction appropriateness can be made for the technologies selected by the technology selection flow chart.

(3) In the review for the effects of the introduction, it was decided that a computation tool to calculate the cost-effectiveness of the introduction of renewable energy use technology be prepared in the following year, to calculate the cost-benefit ratio (B/C) of direct effects, such as income from generated power sales, initial and running costs. This year, as a prior step, preliminary cost calculations were conducted for equipment costs and periodical maintenance and repair costs, for each technology and for large, medium, and small scale facilities, to obtain cost functions to be used in the computation tool, considering the size and economies of scale due to the capacity of the facilities.

(4) Studies were also conducted in ways to respond to reduction in costs (C) and increase in benefits (B).

As methods to reduce costs (C), various cases were summarized including reduction in initial and running costs achieved by the progress of technology development and mass production, reduction in quantity of purchased power by cutting peak power consumption, and leasing of usable land inside the sewerage facility premises to private companies to install renewable energy facilities to receive rent.

As methods to increase benefits (B), such cases were summarized as receiving income by CO<sub>2</sub> emission trade through the reduction in green-house effect gas emission and employing the contingent valuation method (CVM).

In addition, cases for improvement in security by the increase in energy self-sufficiency, education and enlightenment effects, and regional vitalization were summarized as items that cannot be simply converted to costs.

**(Future subjects)**

(1) The outcome of this research is scheduled for completion at the end of March, 2015, and expected to be summarized into a *Renewable energy use technology introduction guideline* that can respond to sewerage facilities of various sizes and conditions around the country.

(2) As only the presentation of some cases has been made this time in the studies for methods to reduce costs (C) and increase benefits (B), we are scheduling the preparation of questionnaires (draft) for CVM to propose currency conversion figures. Studies will be conducted to reflect the outcome in the computation tool to calculate the effects of the introduction of renewable energy use technology.

(3) In the studies for the effects of the introduction, case studies are scheduled soliciting requests from local governments.

※ Liaison Conference for Sewerage Technical Development (Tokyo Metropolitan Government, Cities of Sapporo, Sendai, Saitama, Chiba, Sagami-hara, Kawasaki, Yokohama, Niigata, Shizuoka, Hamamatsu, Nagoya, Kyoto, Osaka, Sakai, Kobe, Okayama, Hiroshima, Kitakyushu and Fukuoka) ,Japan Institute of Wastewater Engineering and Technology

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Key words

Renewable energy, energy reduction, introduction effects