

Survey to Develop a Working Phosphorus Resource Recovery Sewage Treatment System

Year of Research

2008

(Goals)

This was a survey study undertaken to develop practical phosphorus recovery technologies for sewage treatment plants in response to the recent soaring international price of phosphorus, which is an imported resource, by clarifying the application range and technical precautions according to wastewater and wastewater sludge treatment processes and other properties of sewage treatment plants, information needed to introduce the various types of phosphorus recovery technologies which have been developed into actual sewage treatment plants. The main items are ① to collect and inventory information concerning technologies already developed to recover phosphorus from sewage and sewage sludge, ② to classify patterns of characteristics of sewage treatment plants according to water treatment methods and sludge treatment processes etc. and ③ to study the application range of each phosphorus recovery technology according to the properties of sewage treatment plants and precautions etc. to be followed when introducing such technologies.

(Results)

(1) Phosphorus recovery technologies

At the time, technologies for recovering phosphorus in sewage systems included four types of crystallization methods and five types of carbonization methods which had reached the practical stage. The crystallization method is a method used primarily to recover phosphorus from water, and includes the MAP method, HAP method, crystallization for phosphorus removal, and the PhoStrip process. Material recovered by these technologies has actually been registered as ordinary fertilizer. And technology which recovers phosphorus by eluting it from incinerator ash has also been developed. The concentration of heavy metals in sludge is a challenge to its use, but because incinerator ash, which is the form during final processing of most sewage sludge, is its source material, the source material is easily ensured.

(2) Properties of sewage treatment plants

Figure 1 shows the reserves of phosphorus in sewage sludge by prefecture based on sewage system statistics. Nationwide, sewage sludge contained approximately 44,000 tons/year (2006) of phosphorus, and about 70% of this was produced by large treatment plants serving more than 100,000 people. The form of sludge during final treatment includes incinerator ash, which at about 70%, is an overwhelmingly high share, followed by 11% compost, 10% melted slag, and 7% dewatered sludge. By prefecture, phosphorus reserves exceed approximately 900t/year in 14 prefectures, accounting for about 75% (about 35,000t/year) of the total in Japan.

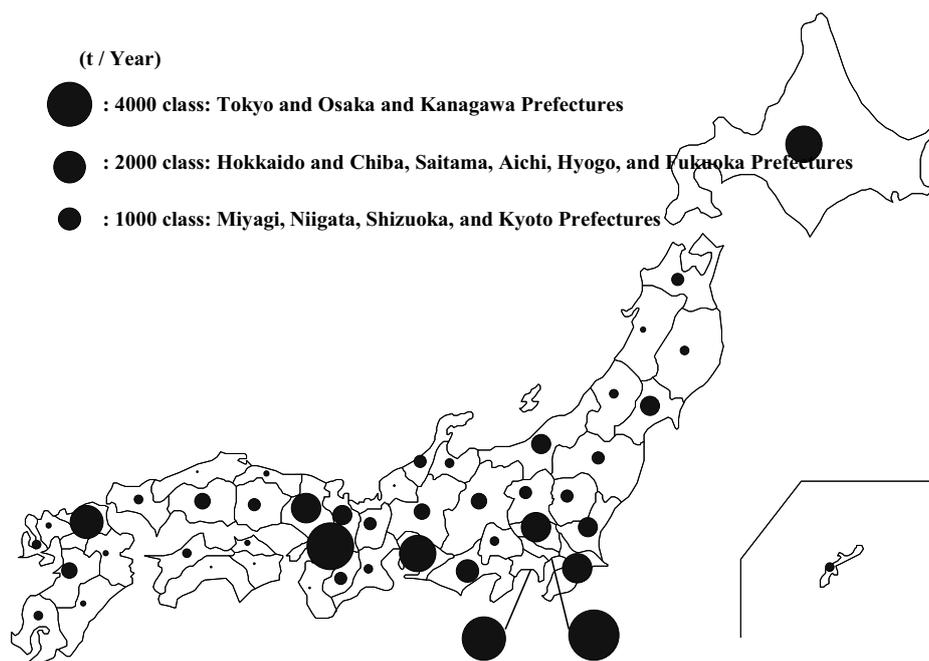


Figure 1. Phosphorus Reserves in Sewage Sludge by Prefecture

(3) Precautions etc.

Based on discussions by the study committee, the following are controversial points which should be the object of specific studies in the future.

- Improvement of the cost of recovering phosphorus from sewage systems
- Clarification of technical challenges facing the use of recovered phosphorus
- Constructing a quality control system for the phosphorus recovery side.
- Improving the image of phosphorus recovered from sewage systems
- Clarification of the position of and handling of recovered phosphorus in the Fertilizer Control Law
- Financial support for the use of recovered phosphorus
- Constructing distribution channels
- Others (providing phosphorus recovery and utilization promotion measures such as a phosphorus version of the RPS (Renewable Portfolio Standard) method, clarification of targets for the recovery and use of phosphorus, creating a road map and other specific menus, and study of feasibility)

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Key words

Phosphorus recovery and use, properties of sewage treatment plants, inventory of precautions