

Project of Lead to Outstanding Technology for Utilization of Sludge (LOTUS Project)

Year of Research

2004~2007

(Purpose)

In order to positively promote the conversion of sewage sludge into resources and the use of energy based on the Biomass Japan Overall Strategy and the Kyoto Protocol Target Accomplishment Plan, the Ministry of Land, Infrastructure and Transport selected a project of Lead to Outstanding Technology for Utilization of Sludge (LOTUS Project) as a second research subject of the sewerage technology development project (SPIRIT 21 : Sewage Project, Integrated and Revolutionary Technology for 21st Century), and has been proceeding with the development of new technology under the cooperation of industry, university and administration.

The LOTUS Project is largely classified into two technologies i.e. a sludge zero discharge technology (hereinafter referred to as ZD technology) with the aim of “enabling to recycle all sewage sludge at a lower cost than its disposal” and a green sludge energy technology (hereinafter referred to as “GE technology”) with the aim of “enabling to generate power at a lower cost than purchase power with the use of biomass such as sewage sludge.” Concerning both technologies, they have set development target cost, that make the disposal cost of sewage sludge or the the purchase power price standard, to proceed with the project.

Development target cost: ZD technology 16,000 yen/t (dehydrated sludge), 8,000 yen/t (incinerated ash)
GE technology 9.32 yen/kWh

Table1 Outline of Proposed Technologies and Demonstrative Experiments

Classification	No	Proposer of technology	Name of development technology	Outline of development technology	Place of Demonstrative experiment	Technical evaluation
ZD	1	Hitachi Zosen Corporation	Production of biosolids fuel from sewage sludge	The technology which produces fuel from the dehydration Sludge which occurs at a sewage-treatment plant and uses it as alternate fuel of coal. Produced fuel is the granular one of several millimeters of diameter by less than 10 % of water content.	Western Sewage Treatment Center in Maizuru city	Completed
	2	METAWATER Co.,Ltd. Gifu City	The technology for recovery of phosphorus from sewage sludge incineration ash.	The technology which collects the phosphoric acid by adding alkaline solution to incineration ash and makes it a value-added fertilizer raw material as a liquefied fertilizer or calcium salt phosphate.	Plant in the north of Gifu city	Completed
	3	Kawasaki Plant Systems,Ltd. Kimura Manufacturing Co., Ltd.	Composition of activated carbon from sewage sludge and reduction of the cost for sludge treatment by effective utilization.	The technology which produces an activated carbon from the dehydration Sludge and uses it as a sludge dehydration auxiliary agent, a sludge reforming agent, an adsorbent for dioxin of a garbage incinerator.	Manufacturing demonstration: Western Water Quality Management Center in Nanao City Hyogo Factory of Kimura Manufacturing Co., Ltd. Application demonstration : Hojyo Sewage Treatment Center in Matsuyama city	Completed
GE	4	Tsukishima Kikai Co., Ltd.	Energy recovery from sewage sludge and biomass with synchronous digestion	The technology which accepts the biomass of the garbage from sewage-treatment plant outside, digests by a digestive tank as well as the sewage Sludge which became more soluble by ultrasonic treatment, makes the digester gas emission rate increased and uses it for generation of electricity.	Southern Sludge Resources Center in Yokohama city Inagawa Regional Sewerage System Harada Sewage Treatment Plant	Completed
	5	JEE Engineering Corporation. Daiki Ataka Engineering Co., Ltd. Kajima Corporation Dainen Co., Ltd.	The Development of the Anaerobic Co-digestion System for Power Generation with Low Running-cost.	The technology which accepts the biomass of the garbage from sewage-treatment plant outside, digests by a digestive tank as well as sewage Sludge, makes the digester gas emission rate increased and uses it for generation of electricity after the biological desulphurization.	Southern Sludge Resources Center in Yokohama city	Completed
	6	Hitachi Plant Technologies, Ltd. Kurita Water Industries,Ltd.	Sludge reduction through accelerating digestion and electrical generating system using digestion gas.	The technology which makes sludge volume reduction and the digestion gas amount increased by reforming refractory organics by ozone and uses digestion gas for generation of electricity.	Tokamachi Sewage Treatment Center in Tokamachi city	Completed
Both technologies	7	Kawasaki Plant Systems,Ltd.	Methane fermentation system of sewage sludge and raw garbage and carbonization-activation for utilization.	The technology which mixes organism waste of garbage and sewage sludge, makes methane fermented and uses collected methane gas for generation of electricity also produces activated carbon from the dehydration sludge which is a fermented residual and promotes recycling.	ZD demonstration: Southern Sewage Treatment Center in Kumamoto city Hyogo Factory of Kimura Manufacturing Co., Ltd. GE demonstration: Southern Sewage Treatment Center in Kumamoto city	Completed

(Results)

Development of three ZD technologies, three GE technologies, one technology in which ZD and GE technologies are integrated, that is, seven technologies in total ended as of January, 2008 (Table 1). They extracted matters important to achieve the development target cost with respect to each technology, set an estimated target value, verify it through a demonstration experiment and existing data, and calculate cost.

Concerning seven technologies of technical evaluation was approved by the SPIRIT 21 Committee meeting held on 13 March, 2007, and January 2008, and it has become possible to introduce these technologies in actual businesses in after fiscal 2008.

Concerning seven technologies which was completed at the end of January 2008, “technical manual” which becomes support of planning and a design when introducing the technology of the LOTUS Project will be issued in the first half of fiscal 2008, after the Technical Material Study Committee approves it.

Contact: Toshiaki Shimizu, Yoshihiro Morishima, Toshihiko Tsuchida, Oofukuzhi Tomohiro

Key words

Biomass, effective use, gas power generation, cost target