

Support Survey on the Documentation of the Technical Evaluation of the Research on Breakthrough by Dynamic Approach in Sewage High Technology (Biomass Power Generation System Technology)

Year of Research

2013

Establishment of energy and resource recycling

(Purpose)

The Ministry of Land, Infrastructure, Transport and Tourism is conducting the Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH Project) in order to accelerate research and development and implementation of new technologies, thereby realizing sharp reductions of the LCC, greenhouse gas emissions and energy consumption in sewage works. The purpose of this project is to collect, organize and document the information required for properly evaluating two corroborative research projects regarding the biomass power generation system that is adopted for the Research on Breakthrough by Dynamic Approach in Sewage High Technology for 2013.

(Results)

(1) Collection and organization of information necessary for evaluating corroborative research

In order to properly evaluate the benefits achieved through the implementation of innovative technology for sewage works, we used existing literature and documents to summarize the information on the construction and operation and maintenance costs, greenhouse gas emissions, and energy consumption of conventional technologies for comparison purposes. The conventional dewatering technologies studied are: (i) centrifugal dewatering machine (1-agent conditioning type), (ii) belt press dewatering machine, (iii) filter press, (iv) screw press dewatering machine, (v) rotary filter press, and (vi) double-layer cylindrical filter press. The incineration technologies studied are: (i) bubbling fluidized bed furnace (conventional type), (ii) stoker furnace (conventional type), and (iii) pressurized fluidized bed combustor. Furthermore, the power generation technologies studied are: (i) gas engine (reciprocating and turbine engines) and (ii) fuel cell.

(2) Creation of documents necessary for evaluating corroborative research

In order to collectively evaluate each study of the conventional technologies that are subjective to the calculation and evaluation of the benefits achieved through the corroborative research, we collected and organized the latest information on the sludge properties, basic energy units, utility unit prices, and greenhouse gas emission factors, etc. In order to apply the sludge properties as general values for evaluating the corroborative research, we suggested using the average values from the treatment plants where the average daily flow was 30,000m³/day or more and only high polymer coagulant was used, as reported in the 2011 sewage statistics. **Table 2** shows the calculated electricity unit prices reflecting the day and night and seasonal variations with reference to each electric power company's homepage (December, 2013). From this calculation, the average unit price of the electric companies was found to be 11.81 yen. Therefore, we suggested using the electricity unit price of 12 yen/kWh for this study. In addition, it is important to evaluate each technology in order to keep the whole system running without any problems in further implementation. Hence, in creating the report, we also organized the information that needs to be focused on with regards to considerations for implementing the innovative technologies.

Table 1 :Sludge properties for the evaluation targets

Target sludge	Moisture content	Organic component	Remarks
Mixed raw sludge	76%	84%	Simple average for the treatment plant with an average daily flow of 30,000 m ³ /day and using high polymer coagulants

Table 2 :Sludge properties for the evaluation targets

	Electricity unit price (yen/kWh)					Remarks
	Hokkaido Elec.	Tohoku Elec.	Tokyo Elec.	Chubu Elec.	Hokuriku Elec.	
Electricity price	—	17.29	18.24	12.85	12.72	At peak
	13.98	16.04	17.61	10.50	12.13	Summer (daytime)
		14.82	16.20		10.76	Others (daytime)
	10.58	10.81	12.10	9.29	7.44	Night-time
	12.13	13.37	14.72	10.07	9.59	Unit price
	Kansai Elec.	Chugoku Elec.	Shikoku Elec.	.	Okinawa Elec.	
	13.49	15.79	16.65			At peak
		13.26	14.43	11.91	13.55	Summer (daytime)
		12.21	13.17	11.06	12.37	Others (daytime)
		12.59	9.29	10.52	—	—
12.69	10.30	11.26	11.27	12.67	Unit price	
Average electricity unit price (yen/kWh):						11.81 ≒ 12

(Summary)

Promoting the implementation and spread of innovative technologies can encourage the effective use of sewage resources and energy, which may further contribute to establishing a low-carbon and recycling-oriented society.

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Key words

Research on Breakthrough by Dynamic Approach in Sewage High Technology, biomass power generation system technology, cost reduction greenhouse gas emission reduction