

## Research on assessment technique of life cycle in sewer

Whole term

2001.4 ~ 2003.3

### (Purpose)

Life Cycle Assessment (referred as LCA hereinafter) is to assess environmental load generated throughout the life of a product from production, distribution and consumption to disposal. PLCA, Product Life Cycle Assessment, developed by the industries of home electric appliances, automobiles, and materials, has been promoted to assess the environmental burden caused by the production of individual product.

As the concept of PLCA has been extended to a variety of social infrastructure projects in recent years, researches on LCA targeted on different structures are actively conducted. Japan Society of Civil Engineers studies LCA for social infrastructures and the units and common procedures for major structures are proposed.

This research is to categorize the fundamental matters and theories to conduct LCA for sewage facilities by carrying out a case study focusing on the inventory analysis (referred as LCI analysis hereinafter).

### (Research content)

In FY2001 analysis on the existing researches and, present situation of composting facilities and sludge melting plants was conducted. Based on the result, two composting facilities and one sludge melting plant were selected for LCI analysis and case studies were carried out in the following year. The LCI analysis for each facility is conducted in the following procedures: (1) collecting data; (2) setting the unit to be used; (3) producing an inventory (referred as LCI hereinafter) and (4) quantizing the environmental burdens.

### (Result)

#### (1) Collecting data

Relevant design documents and maintenance records are collected. Information to know major quantities of the facility including weight of each facility for machineries and volume table for civil structures is gathered. Additionally, hearing about the progress and operational situations are carried out as necessary.

#### (2) Setting the unit to be used

The value of "Architectural Institute of Japan "LCA guide" (draft)", providing environmental burden per unit-physical quantity (weight), is employed.

#### (3) Producing an LCI

The structure of each facility is broken into the level to which the unit of the environmental burden emission is applicable by disassembling them down to instrument level and material composition ratio.

#### (4) Quantizing the environmental burdens

Environmental burden is calculated for five categories-the burden caused by the construction of civil structures, architectural structures, machineries and operation and disposal of the facilities.

Based on the results above, environmental burden and unit of each instrument of the two composting facilities and one sludge melting plant is calculated and the units are defined.

### (Summary)

In this research, an LCI analysis is conducted for three selected facilities. Utilizing the unit of the instruments obtained from this research enables estimation of the environmental burden without breaking into the material level so that the whole LCI analysis process is simplified.

In order to estimate the number of each facility and environmental burden according to each machinery, future tasks include obtaining design documents, operation and management record and more detailed data about utility usage amount of each facility and, providing public data back to the manufacturing stage of the targeted product, all of which are essential to the premise of LCI analysis.

### Independent research

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Keywords

LCA, LCI, Composting facilities, Sludge melt facilities