

“Project Formulation Survey” under the
Governmental Commission on the Projects for ODA
Overseas Economic Cooperation
in FY2013
Summary Report

Socialist Republic of Viet Nam
Project Formulation Survey for Rehabilitation of
Municipal Solid Waste Landfills

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Consortium by
Actree Co., Ltd.
Sustainable System Design Institute
Satisfactory International Co., Ltd.

The content of this report is a summary of the needs survey, which is commissioned by the Ministry of Foreign Affairs of Japan in the FY 2013 and was carried out by the consortium (Actree Co., Ltd., Sustainable System Design Institute and Satisfactory International Co., Ltd.). It does not represent the official view of the Ministry of Foreign Affairs.

英文要約 English Summary

(1) Survey framework

This survey aims at studying the possibility of an ODA project in which an Actree made incinerator is applied to Socialist Republic of Viet Nam (hereinafter called as Vietnam). In developing the ODA project, the Actree's incinerators' characteristic that they can incinerate not only municipal waste but also hazardous industrial waste, hospital waste and excavated waste from existing landfills were considered. Although incineration projects can be supposed to be very effective for improving solid waste management situation in Asian countries, it cannot be introduced easily due to its high cost. In this survey, this aspect was focused the most and what models of incineration are profitable in Vietnam were explored.

For exploring the solutions, nineteen cities in Vietnam were visited. Profitable models were discussed with those cities through the discussions on their development issues. Also, proper counterpart agencies were selected for the target ODA project based on the data/information provided, the discussions and their development issues.

(2) Discription of the current situation and development needs of the concerned development issues in the surveyed country

The amount of waste is growing rapidly in Vietnam in accordance to the GDP growth and urbanization. The GDP capita in 2005 in Vietnam was only 700 USD and this was grown up to 1517 USD in 2011. The increase of waste amount was accelerated by urbanization. The increase of waste amount causes inadequate capacities of landfill sites, what is one of serious development issues in Vietnam. The questionnaire survey targeting 19 cities conducted in this survey discovered a serious situation that the average remaining life in these cites is 3.3 years and more than 60 percent of the landfills' remaining lifes are less than one year.

Further more, pollution from existing landfills is recognized as a serious environmental problem, where Prime Minister's decision No. 1788/2013/QD-TTg commanded cities to close their most polluted landfills. Thus, Vietnam is reaching a turning point where municipal solid waste management manners have to be reconsidered.

Waste stabilization and reduction by intemediate treatment technologies such as composting and incineration is expected as new solid waste management. In fact, 16 cities among visited 19 cites had plans to establish any intermediate treatment facilities. Among the technologies, incineration is paid attention the most by the cities and many cities are planning to establish incinerators. However, they are facing high investment and operation cost which results in a high tipping fee (solid waste management fee paid at the facility). This makes difficult to give a green light to the investors. The questionnaire survey could describe this situation by the fact that the average tipping fees paid for landfilling are 65 thousand VND (about 3 USD per ton) and 220 thousand VND per ton are paid as the tipping fees in the cities doing intermediate

treatment. The tipping fees presently planned for new incineration project are higher.

Another development issue is rehabilitation of present landfills. According to the questionnaire survey, 14 cities out of 19 cities are planning to rehabilitate their landfills. However, rehabilitation methods are not yet determined, as any technical standard is not common in Vietnam.

(3) Possible applicability of the SME's products and technologies, and prospects for future business development

A profitable model of "Multipurpose incineration project" in which municipal waste as well as industrial hazardous waste expected higher tipping fees are incinerated together was proposed as an applicable model.

It can be pointed out as the requirements of "Multipurpose incineration project" to secure the amount of industrial hazardous waste, as the amount of industrial hazardous waste generated is as small as 700 thousand tons and the amount of hospital waste is only 179 thousand tons, while the amount of municipal waste is 21,800 thousand tons and that of industrial waste is 700 thousand tons in 2010.

At present, solid waste management companies enabling manage waste regionally are located eccentrically only near Hanoi City and Ho Chi Minh City influencing the waste generator location distribution. The hazardous waste generated in other areas are transported to these areas. If hazardous industrial waste can be managed locally, the services would be competitive to the existing ones, because transportation costs borne by generators would be reduced. Here, it is expected that the local solid waste management services by using the incinerators for compensating the cost bearing for municipal waste burning by cities, even though such cities which can require the condition would be limited.

Another compensation way is to reduce the construction cost of an incinerator itself, as the analysis result that the construction cost affects the profitability very much was obtained from the calculation. The formation to construct incinerators in Vietnam by Actree will widen the feasible domain so that more cities can introduce incinerators. Such formation development can be motivated by another idea that Actree join in incineration projects as one of the investors. It can be proposed as one of the preferable future business strategies, as it could motivate the cost reduction in the incinerator construction as well as it can guarantee the secure operation.

In addition, electricity generation by the incinerators is not recommended because the profitability was resulted negative from the cost calculation, even though some cities showed their interest to generate electricity during the visiting. The additional investment cost cannot be covered by the sales revenue of the electricity generated by incinerators.

(4) Verification of adaptability of the SME's products and technologies to the surveyed country

In visiting 19 cities and three cities which were selected as the target cities in the ODA

project, the Actree's incinerators were explained and welcomed positively. However, financial sustainability was pointed out as one of the biggest anxieties regarding incineration projects.

A mathematical model which can calculate 15 year-turnover was developed by setting 15 years as the project lifetime. The parameters consisting the model were given three values which express the worst and the best scenario besides the standard scenario. Those scenario were supposed to happen probably and given the values with probabilities. By using the probabilities, the 15 year-turnover can be calculated with a probability distribution, which can be used for evaluating the project by considering the project profitable structure.

The basic case in which only municipal waste is incinerated with low tipping fee was evaluated unprofitable, as the 15 year-turnover was calculated as -560 to 500 billion VND.

This can be improved by incinerating not only municipal waste but also any other kinds of waste from which higher tipping fee is expected, reminding that the Actree's incinerators can incinerate various types of wastes. It was heard that hazardous industrial wastes including hospital wastes need more than ten times of tipping fees of that of municipal waste. According to the interviews to 19 cities, they are ranging from 200 USD per ton at the lowest and reaching to 700 USD per ton at the highest. The improved scenario in which municipal waste as well as 20 to 30 percent hazardous industrial wastes are incinerated was evaluated positive as the 15 year-turnover was calculated as -200 to 400 billion VND and the probability of deficit project was only nearly 10%.

In the next step, by changing the tipping fees and the mixture rate of hazardous industrial wastes, the profitable domain where the 15 year-turnover is zero was explored by using the mathematical model. Higher tipping fees for hazardous industrial waste can give more capacity for municipal waste. In the case that the tipping fee for hazardous industrial waste is 100 USD per ton, 50 percent of hazardous industrial waste in the total capacity is necessary, while the tipping fee is expected to be 400 USD per ton, the mixture rate goes down to only 10 percent.

(5) Expected development impact and effect on business development of the proposing SME in the surveyed country through proposed ODA projects

Multipurpose incineration project enables to expand the lifetimes of the existing landfills and stabilize them. The challenge to excavate existing landfills and incinerate them can generate new landfill capacities in the existing landfills.

From the viewpoints of Actree, it can open a new market for selling incinerators to Asian countries getting out from the domestic market so far. Such business development by Actree could stimulate and lead other machinery companies located in Ishikawa Prefecture, what would be expected to result in local economic development.

(6) Proposals for formulating ODA projects

i) Selection of counterparts

This survey proposed an ODA project to disseminate the Actree's incinerators to the cities in

Vietnam by utilizing the assistance scheme of JICA's "Pilot Survey for Disseminating SME's Technologies".

The candidates for the counterparts were selected from 19 cities visited in the survey. Following four criteria were used for screening the candidates and Quảng Ninh (capital: Hạ Long), Thanh Hóa (capital: Thanh Hóa) and Thừa Thiên–Huế (capital: Huế) were selected. Workshops were held after selected and the possibilities of the JICA's Pilot Survey, the contents, the required inputs from the counterparts were discussed. Based on the discussion, the survey team was received official letter of intent from those counterparts. One city where an experimental incinerator will be brought and operated will be selected in the JICA's Pilot Survey from these three cities.

- Emergency in the existing landfills
- Availability of "Multipurpose Incinerator"
- Timing of formulating the JICA's Pilot Survey
- Willingness of participation in the experimental incineration

In the national level, Ministry of Construction and Ministry of Natural Resources and Environment were involved and asked to play the roles of supervisors for the JICA's Pilot Survey for effective dissemination.

ii) Framework of the project

The framework of the project can be summarized below.

- Project purpose
 - A model of an integrated solid waste management including landfill rehabilitation by using an incineration technology is developed through a pilot project in a target city.
- Outputs
 - Study on the current policies regarding an integrated solid waste management
 - Study on the current situation of the solid waste management in the target city
 - Implementation of a pilot project by using a multipurpose incinerator in the target city
 - Dissemination of the integrated solid waste management
- Activities
 - Study on the current policies regarding an integrated solid waste management
 - Study on the current situation of the solid waste management in the target city
 - Implementation of a pilot project by using a multipurpose incinerator in the target city
 - Dissemination of the integrated solid waste management
- Inputs
 - Provision of an experimental incinerator with the capacity of 50 kg/hour
- Project duration
 - About 15 months
- Project budget
 - About 100 million JPY

Project Formulation Survey for Rehabilitation of Municipal Solid Waste Landfills in Vietnam

SMEs and Counterpart Organization

- Name of SME : Actree, Sustainable System Design institute, Satisfactory International
- Location of SME : Misumi-cho, Hakusan city, Kanazawa Pref., Tsukishima, Chuo-ku, Tokyo, Hachobori, Chuo-ku, Tokyo
- Survey Site: Municipality Counterpart Organization : Ministry of Construction, Municipality, etc.

Concerned Development Issues

Improvement of municipal solid waste management

- Rehabilitation of municipal waste landfills
- Waste reduction and stabilization of municipal waste by intermediate treatment
- Proper management of hazardous wastes

Products and Technologies of SMEs

Waste Incinerator

- Rotary kiln type incinerator
- Daily capacity: 500kg – more than 300 ton/day
- Available for mixed waste of excavated waste from landfills, municipal waste, hazardous waste (solid, liquid) and hospital waste
- Easy operation and maintenance

Proposed ODA Projects and Expected Impact

- Project for verification of availability of waste incinerators for rehabilitating an existing municipal landfill by using an experimental incinerator in a municipality in Vietnam (Problems identification and measures consideration in an experiment to incinerate mixed waste of excavated waste from landfills, municipal waste and hazardous wastes)

Future Business Development of SMEs

- Market expansion based on experiences of incinerator construction and operation in Japan
- Identification of a potential market and manufacturing, marketing and human resource management etc. in Vietnam

