

"Project Formulation Survey" under the  
Governmental Commission on the Projects for  
ODA Overseas Economic Cooperation  
in FY2013

Summary Report

Socialist Republic of Viet Nam  
Water Quality Improvement Project  
using Jet Streamer

March, 2014

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Consultants Co.,Ltd.  
Joint Venture

The content of this report is a summary of the project formulation survey, which was commissioned by the Ministry of Foreign Affairs of Japan in the FY 2013 and is carried out by the consortium Ebismarine Co.,Ltd. / Pacific Consultants Co.,Ltd. / Oriental Consultants Co.,Ltd. It does not represent the official view of the Ministry of Foreign Affairs.

## **Executive summary**

### **1. Description of the current situation and development needs of the concerned development issues in Vietnam**

Vietnam has accomplished remarkable economic development after the Doi Moi Policy started in 1986. However, following the rapid industrialization and concentration of population from rural areas to urban areas, the water pollution of river caused by untreated waste water has also been a serious problem.

In major cities, such as Hanoi, Hai Phong, Hue, Ho Chi Minh, sewerage system development based on ODA projects has been carried out. However, the percentage of population with proper sewerage system is still low; it is a fact that the capacity of sewerage treatment can't keep pace with the speed of economy development resulting in serious water pollution in urban rivers and water channels due to domestic wastewater and industrial wastewater.

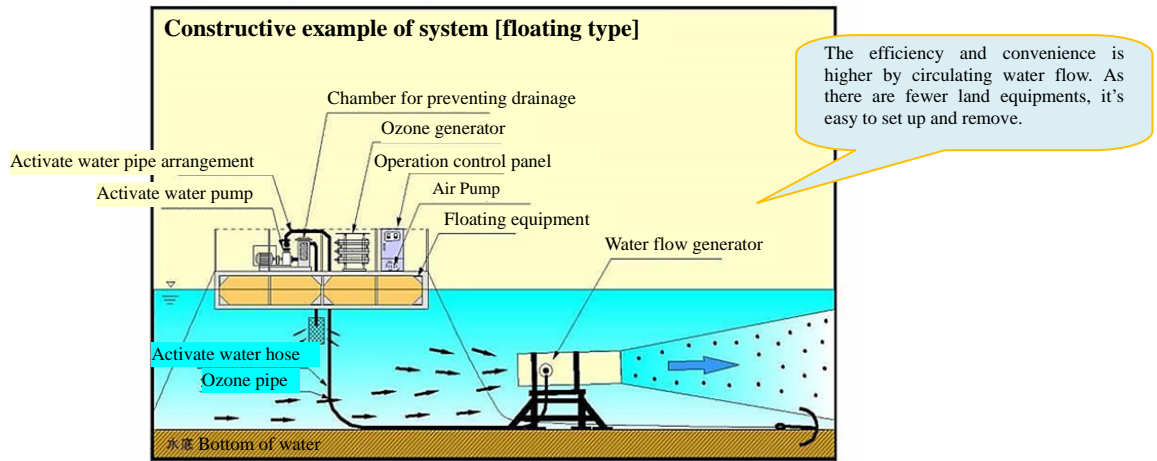
In the canals in Hanoi and Ho Chi Minh City, BOD<sub>5</sub> reaches several tens to more than one hundred mg/L at some locations. In these water areas, it is easy to imagine that the water quality problems such as blue-green algae, oxygen deficiency, odor, deterioration of sanitation status would occur.

So far, the national and local government of Vietnam has been promoting measurements such as sewerage system development by the cooperation of ODA, it may take a considerable period of time until they can be operated effectively. It's necessary to find a temporary solution for this situation. However, up to present the solution that meets the demands for technology and cost hasn't been found yet.

### **2. Possible applicability of Ebismarine's products and technologies, and prospects for future business development**

Water flow generator (Jet Streamer; JS) is a device to generate large-scale water flow in stagnant water area and suppress the occurrence of water quality problems caused by stagnant water, resulting in the water quality problems such as sufficient dissolved oxygen (DO) in the bottom layer and abnormal phytoplankton growth which occurred due to stagnation of water in the enclosed water area such as dams and lakes, urban rivers, canals, etc.,

A major method to improve water quality in enclosed water area is called "aeration circulation method". It is different from the technology of competitor company which uses "air", Jet Streamer generates water flow by directly moving "water". It has a higher flow efficiency and is more convenient to use, it's possible to generate the effect in water area like relatively shallow reservoir and water channel where aeration device is not able to work. In addition, Jet Streamer has the following advantages; (a) large-scale facilities are not required on land, it's easy to remove, and it's possible for local staffs to operate; (b) it doesn't use chemicals, the load to environment is less.



**Fig. 1 Constructive example of water flow generator “Jet Streamer” system**

In accordance with the confirmation of strong needs for Jet Streamer from the organizations where interview was conducted in this survey, and from the participants at the opening ceremony and closing ceremony of this experiment, the business development plan are drawn up as follows:

- Firstly to promote the business development in Vietnam, and finally in other neighboring Asian countries. Regarding the sales system, to appoint local partner enterprise as an agent, Ebismarine will expand sales through the sales network of this company; then set up a representative office of locally proposed company, establish the distribution and sales network in Vietnam.
- Consider how to introduce financial resource of Jet Streamer, (a) ODA projects of Japan, etc; (b) Loan Aid; (c) Local government budget (B to G); (d) Classification of B to B transactions with private enterprise, as well as to draw up the plan of manufacturing and sales according to the ODA assistance and policies of Japan to Vietnam and neighboring countries and economic strength of each country.

	2013	2014-2015 (Phase 1)	2016~2017 (Phase 2)	2018~2023(Phase 3)
Items of research and project	Survey (this survey)	Create proposal for ODA, spread and development	Development in neighboring countries	Full-scale project development
Subject area	Ho Chi Minh	Vietnam	Vietnam/Southeast Asian countries	Vietnam/Southeast Asian countries
Project implementation system	This JV, Ho Chi Minh City government, Ho Chi Minh City University of Technology	This JV, Vietnam national government, the municipalities with high request for improvement, research institutes, etc.	This JV National and local authorities of subject country	This JV National and local authorities of subject country
Fund scheme	Overseas development assistance project for SME (survey for proposal creating) 1. Survey for water environment needs 2. Demonstration experiment 3. Sum up the possibility for the application of JS 4. Create the ODA proposal	JICA's pilot survey for disseminating SME's technologies 1. Demonstration experiment at different candidate sites 2. Human resource treatment for maintenance and management 3. Customer development  JICA Partnership Program 1. Create the environment education program 2. Conduct the environment education to enterprises and residents  Non-Project Grant Aid for Provision of Japanese SME's Products (Nonreco. pro. aid)	Project loan Loan aid with collateral technology professional 1. Introduction of package such like water quality improvement PJ, etc. 2. Planning for education and system, system review, etc.	ODA projects in other countries • Survey for needs and proposal creating • Pilot survey for disseminating SME's technologies • Project loan/Loan aid with collateral technology professional, etc.
Content of project	ODA Projects (in Vietnam)		Local governmental funds Local private funds	Business development on the basis of actual achievement • Water purification for public water area • Water purification for fisheries, fish farms, etc.

**Fig2 Business development plan (overview)**

### 3. Verification of adaptability of Ebismarine's products and technologies to Vietnam (Demonstration and pilot survey)

In this survey, demonstration experiment using Jet Streamer was carried out to confirm the water quality improvement effect of the Jet Streamer in Vietnam. Ho Chi Minh City, the biggest city as well as the center of business of Vietnam, was selected as the subject area. Capacity of waste water treatment in Ho Chi Minh City hasn't kept pace with the development speed of population and integration of industry, which recently results in serious pollution of urban rivers and canals. The so-called "black water problem" as well as other water quality issues are becoming more and more obvious.

During the experiment, after the operation of Jet Streamer, visible effects of water quality improvement were obtained such as water quality improvement, water color improvement (resolution of black water), suppression of scum, suppression of odor, etc.

**Table1 Outline of experiment**

Purpose	- To confirm the effect of water quality improvement by Jet Streamer. - To know the interest in the experimental result (effect of water quality improvement) and the needs for business development in the future
Location	Ben Me Coc1 regulating pond (Ho Chi Minh City)
Period	2013.11.19 ~ 2014.1.20 2013.11.19: Opening Ceremony 2014. 1.20: Closing Ceremony

**Table 2 Water quality improvement effect by Jet Streamer**

Items		Experiment area (JS stably operating time)	Condition when JS stopped operation and comparison area
Water quality	DO	Dissolved oxygen recovers compared to the other area.	Approximately zero at all times (no oxygen).
	Organic matter	Operation of JS has promoted decomposition process of organic matter, which reduced the value of B-COD .	Pollution is progressing seriously in both experiment area and comparison area.
Occurrence of scum		Scum didn't occur during operating time of JS. Effect on suppression of scum has been confirmed.	Scum occurred during the experiment period.
Color of water		Water color has turned into brown due to decomposition of colored matter (organic matter).	The color has remained black because of domestic wastewater
Smell		Smell was reduced compared to the other area.	Odor usually occurred, and was serious especially when there is scum.
Complaints of neighborhood residents		During the experiment period, there was no complaint from residents living nearby the experiment area.	During the experiment period, there were several complaints from residents living nearby the compared area because of bad smell and mosquitos .



**Fig3 Effect by installation of water flow generator “Jet Streamer”**

#### **4. Expected development impact and effect on business development of Ebismarin in Vietnam through proposed ODA projects**

Jet Streamer is a device to improve water quality in deteriorated water. It generates effects to the water bodies which need urgent solution for water quality improvement as JS can works rapidly to improve the water quality. The following tables show development issues, current measures in water environment in Vietnam and introduction effects of JS. As shown in the table, JS is a technology and device that provides effective solution for the development issues.

**Table 3 Current situation of development issues and measurements for water environment in Vietnam, and the corresponding effects after the introduction of JS**

Current situations of development issues and measurements	<ul style="list-style-type: none"> <li>-Amid rapid urbanization and economic growth, air pollution, water pollution and waste increase has also become serious. Especially due to the insufficiency of sewerage treatment facilities, water pollution is serious in urban rivers, canals and lakes. Moreover, the insufficiency of drainage system also causes the sanitation problems, such as spread of infectious diseases due to inundation of sewage water caused by flood.</li> <li>In response to such situation, countermeasures focused on construction of sewerage treatment system have been promoted through international assistance (aid) and cooperation such as Japanese ODA, in major cities such as Hanoi, Ho Chi Minh. Water quality improvement above a certain degree requires a considerable amount of time till the effect can be generated.</li> <li>Water quality deterioration arises in closed water bodies such as lake, dam reservoir, canal, etc., and aquaculture pond in other than major cities also. And the impacts to water utilization, landscape, tourism etc. are becoming more and more serious.</li> </ul>
↓	
The effect of the jet streamer introduction	<ul style="list-style-type: none"> <li>Jet Streamer is a device that can directly and immediately improve the water quality in stagnant water bodies.</li> <li>Water quality improvement by Jet Streamer is possible to resolve various impacts and problems of water pollution, landscape, tourism, etc. immediately</li> </ul>

The effects of development by application and popularization of Jet Streamer in Vietnam are listed as followings:

«The effects of development by application and popularization of Jet Streamer in Vietnam»

- |   |
|---|
| A) Improvement of water environment, sanitation environmental and quality of life   |
| B) Awareness education (benefit of environmental improvement -> raise the awareness of further environmental improvement)                         |
| C) Human resource development (operation and application of equipment, technical assistance and technology transfer of water quality improvement) |
| D) Job creation (Creation of new jobs through equipment operation and manufacturing, development of water environment improvement business)       |

## 5. Proposals for formulating ODA projects

In order to promote Jet Streamer, the following items can be considered as possible application of ODA scheme in the future.

**Table 4 Overview of ODA scheme and business**

Term	Fund · Scheme	Subject water area
<b>1. Short-term</b>	Pilot survey for disseminating SME's technologies	Ponds for tourism and water-amenity
	JICA Partnership Program (Local Gov. Type)	-
	Non-Project Grant Aid for Provision of Japanese SME's Products	Jet Streamer applicable water area
<b>2. Medium and long-term</b>	Loan Aid	Urban water area, dam
	Technical Assistance Project related to ODA Loan	
	Technology cooperation project	Water in tourism destinations

Firstly, a 2-year demonstration experiment will be conducted through pilot survey for disseminating SME's technologies, as a short-term ODA. During this demonstration experiment, the local staff who will operate and maintain the Jet Streamer will be trained. And also the maintenance system will be established in Vietnam. The project team already had discussed with Da Lat City PC and Da Nang City PC regarding this pilot project, and they agreed to cooperate in the project. The supporting letter from Da Nang for this pilot project was issued already. Demonstration experiment plans are being prepared for each target water area. In Da Lat City, the target is Lake XUAN HUONG which is a tourist destination and it is important tourism resource of Da Lat City. In Da Nang, Tho Quang Dock is target. This dock is an inner bay district affected by water pollution problems due to marine products industry.

At the same time, water environmental education will be conducted in order to raise the water environment awareness of the local government, residents and business operators through JICA Partnership Program (Local Gov. Type), in cooperation with Nagasaki Prefecture where the proposed company is located, with collaboration of C/P organization staffs. At the 5th on-site survey in this project, the vice governor of Nagasaki Prefecture visited Vietnam; during the courtesy visit to Ho Chi Minh City PC, both parties agreed to promote the cooperation of HCMC and Nagasaki Prefecture. Mr. Phuc, the director of UCCI, a C/P of this project, also proposed to promote the project with Nagasaki Prefecture.

Moreover, the project team compiles the results of demonstration experiment of this project, and

proposes to MOFA Japan to nominate the JS for list of the Non-Project Grant Aid for Provision of Japanese SME's Products. As the technology of Jet Streamer is made available to the entire country and water areas if certain conditions of electricity power and water depth are met, the effects can be generated in a relatively short period of time, not limited to the improvement of water quality in retention water area of Vietnam, but also available as a scheme to promote the sales to governments and authorities which requires solutions with immediate effect.

As a medium-and long-term ODA, the implementation as pilot projects has taken into account the initial and partial countermeasures of Loan aid, Technical Assistance Project related to ODA Loan and technology cooperation, etc.. When the result of the demonstration experiment and the confirmed water environment of the related cities by the above ODA short term project had been reported to MONRE, the project team will propose water quality improvement measures in related cities.



Project Formulation Survey  
Socialist Republic of Viet Nam, Water Quality Improvement Project using Jet Streamer

**SMEs and Counterpart Organization**

- Name of SME: Ebismarine Co.,Ltd.
- Location of SME: Nagasaki Pref., JAPAN
- Survey Site : Ho Chi Minh City, Viet Nam
- Counterpart Organization: Urban-Civil Works Construction Investment Management Authority

**Concerned Development Issues**

- Water quality pollution has become serious matter in Vietnam.
- Domestic and industrial wastewater have not been treated properly.
- There isn't any appropriate solution yet, which means technical/cost demands.

**Products and Technologies of SMEs**

- Jet Streamer (JS) generates water stream and improve the water quality of stagnant water bodies such as canal, lake, pond or reservoir.
- Advantages of JS are as follows;
  - High efficiency and saving cost
  - Wide applicability: lakes, dams, ponds, channels and canals
  - Easy installation, operation & maintenance
  - Eco friendly: no chemicals used

**Proposed ODA Projects and Expected Impact**

- Demonstration experiment: Operating JS in HCMC to confirm the water quality improvement
- Expansion to other deteriorated water bodies in Viet Nam using ODA schemes etc.
- Expected development impacts are improvement of water and sanitary condition, awareness improvement for environmental issues, human resource development and employment generation.

**Future Business Development of SMEs**

- JS will be applied to improve water quality in Asian countries, establishing a local production system in Viet Nam.
- As water environment issues are common in developing country, Japanese excellent solutions, such as JS, for water quality improvement will be expected to be widely applied based on JS application.

