MOEJ JCM Project Planning Study in Asian Region(JCM PS) 2014
Summary of the Final Report

"Saving Energy by introducing optimum pumps in water purification plant"

(Implementing Entity: Nippon Koei. Co., Ltd.)

1. Overview of the Proposed JCM Project

Study partners

Japan

Nippon Koei
- To summarize the survey results
- To prepare business plan
- To collect data for JCM methodology development

Ebara Corporation
- To prepare business plan and financial plan
- To study for the MRV method and implementation structure

Host country（Vietnam）

Ebara Vietnam Pump Company (EVPC)
- To study for the MRV implementation structure
- To collect data for JCM methodology development

Saigon Water Corporation (SAWACO)
- To plan a project for efficient operation by introducing high efficiency pumps in its purification plant

Tan Hiep 1
- To plan its operation policy and MRV implementation structure after introducing high efficiency pumps in its facility

Saigon Water Infrastructure Corporation/ Viet Technology Import Export Investment Corporation (Veeteq)
- To prepare business plan and financial plan

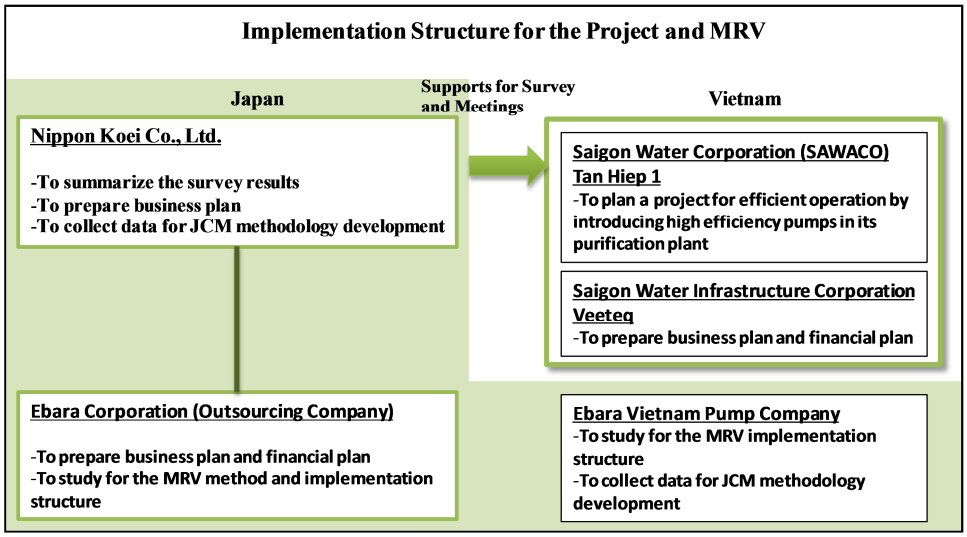

Figure 1 Implementation Structure for the Study

<table>
<tr><td>Project site</td><td colspan="4">Vietnam, Ho Chi Minh City</td></tr>
<tr><td>Category of project</td><td colspan="4">Energy saving</td></tr>
<tr><td>Description of project</td><td colspan="4">This study is for the project to replace existing distribution pumps with energy efficient pumps in a purification plant managed by Saigon Water Corporation (SAWACO). This study covers three existing pumps (out of five) introduced in 2002 which have specs 105 m^3/min, 65 m and 1,411 kW, and three new pumps produced by Ebara Corporation which have specs 105 m^3/min, approximately 40 m and 850 kW. Significant effects of GHG emissions reduction can be expected since operation times of purification plants is basically 24 hours a day,365 days a year.
Furthermore, applying for JCM projects is expected to be smooth since this project is for a private business, and SAWACO, the management company of the plant, has purchasing discretion. Therefore there is also no need for tender.</td></tr>
<tr><td rowspan="2">Expected project implementer</td><td>Japan</td><td colspan="3">Ebara Corporation</td></tr>
<tr><td>Host country</td><td colspan="3">SAWACO and Veeteq</td></tr>
<tr><td>Initial investment</td><td colspan="2">JPY 170,000,000</td><td>Date of groundbreaking</td><td>July 2015</td></tr>
<tr><td>Annual maintenance cost</td><td colspan="2">JPY 120,000,000
(only for electricity)</td><td>Construction period</td><td>12 months</td></tr>
<tr><td>Willingness to investment</td><td colspan="2">Yes</td><td>Date of project commencement</td><td>June 2016</td></tr>
<tr><td>Financial plan of project</td><td colspan="4">JPY 170,000,000 is expected for initial investment of this project. Financing will be handled by Viet Technology Import Export Investment Corporation (Veeteq), a private company, that will bear financing costs.
Business plan and financial plan are now being finalized under discussion with Ebara corporation, the outsourced vendor in this project.</td></tr>
<tr><td>GHG emission reductions</td><td colspan="4">Approx. 7,500 tCO2/year</td></tr>
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2. Study Contents

(1) Project development and implementation

1) Project planning

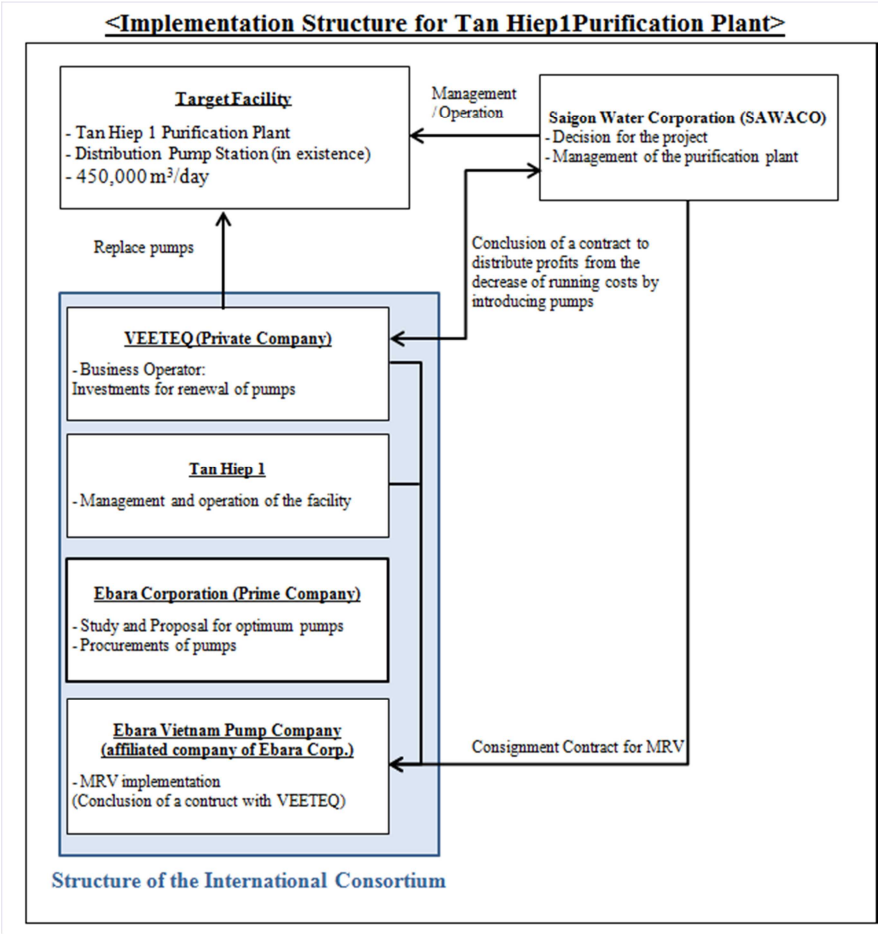
- Implementation Structure for the Project

The prime company of the international consortium is Ebara Corporation. The other three members of the consortium are Tan Hiep 1 which manages and operates the target facility, Veeteq and Ebara Vietnam Pump Company (EVPC) which is the affiliated company of Ebara Corporation.

Initial investment for the project will be financed by Veeteq mostly with its own funds mostly. Ebara Corporation is in charge of design and construction. EVPC will implement maintenance for equipment and support for the monitoring, it will stay in close contract with Veeteq and Tan Hiep 1 which manage and operate the purification plant.

Initially, Saigon Water Infrastructure Corporation was considered as the investment company, but later, SAWACO proposed Veeteq as the result of preliminary meetings, since when Saigon Water Infrastructure Corporation implements a project, it requires agreements of company and shareholders, and therefore it is difficult to arrange schedules flexibly.

Later, Tan Hiep 1 was added as a consortium member to manage and operate the facility. Since Tan Hiep 1, a department of SAWACO, will be in charge of the management and operation of the purification plant and it can be called practical management and operation.



Source: Study Team

Figure 2 Implementation Structure for the Project

- Management Setup and Performance Records of Members in the Consortium

Tan Hiep 1 is in charge of the management and operation of Tan Hiep 1 purification plant managed by SAWACO. SAWACO has the ownership of the purification plant and collects & manages the water charge of the clean water from Tan Hiep 1 purification plant to Ho Chi Minh City.

Veeteq, in charge of investments for the project, was established for business related to water techniques and services in August 2014. Veeteq is still in a new firm, but Saigon Water Infrastructure Corporation, which proposed this project to SAWACO, is the founder and most members of Veeteq accumulated experience of business at Saigon Water Infrastructure Corporation. The company profile of Veeteq is listed below.

Table 1 Company Profile of Veeteq

Item	Description
Name	Viet Technology Import Export Investment Corporation (Veeteq Inc.)
Date of Foundation	August 2014
Capital Fund	VND 15,000,000,000
Business Configuration	- Equipment procurement - Installation of machinery and equipment - Manufacturer of machinery - Consultation of environmental technique - Civil engineering and construction - Management and operation
Record	-New construction of Tan Hiep 2 purification plant - Outline: equipment procurement and construction - Schedule: 2014-2017

Source: Study Team

- Profitability Evaluation

The purpose of this project is to replace pumps in Tan Hiep 1 purification plant in Ho Chi Minh City. This project aims at energy saving and plans to reduce GHG emissions reduction by replacing three pumps (out of five existing pumps).

Initial investment costs are estimated at JPY 170,000,000. Veeteq will bear the initial costs. It plans to recover the investment by sharing profits with SAWACO from the decrease of running costs by introducing high efficiency pumps.

- Financial Plan for Initial Investments, Maintenance and Operation, and MRV

Initial investment for the project will be financed by Veeteq with its own funds mostly. Costs for the management and operation, electricity and MRV will be born by Tan Hiep 1.

Veeteq and Tan Hiep 1 will have close contract with EVPC for MRV implementation. Costs for MRV are estimated at JPY 1,200,000. Financial plan including initial investments and costs for management, operation and MRV are shown below.

Table 2 Financial Plan

Item	Cost	Investor
Initial Investments	USD 1,458,100	Veeteq
Electricity Costs	USD 1,020,581	Tan Hiep 1 (SAWACO)
MRV Costs	USD 12,000 (per year)	Tan Hiep 1 (SAWACO)

Source: Study Team

- Risk Analysis

This project is positioned as a private project and there is no need for purchasing tender since a private company will make the investment. SAWACO, the management company of the plant, has purchase discretion; therefore there is no need to get permits of HCM City People's Committee. SAWACO is a public sector firm in Ho Chi Minh City and the Decree of Prime Minister 24/2005/QT-TTg states that SAWACO has purchasing discretion for projects related to facilities which it owns. Risks and policies for the project are shown below.

Table 3 Risk and Policy

Risk Item	SAWACO	Consortium	Policy
1) Financial Arrangements	-	Yes	Veeteq will be in charge of financial arrangements. It is necessary to check its own funds and credit line from banks. Furthermore, SAWACO and Saigon Water Infrastructure Corporation will make a Memorandum Of Understanding (MOU) that Saigon Water Infrastructure Corporation will take over the projects if there is any problem in making financial arrangements.
2) Non-completion of EPC*	-	Yes	Veeteq will pay the construction cost to Ebara Corporation by Letter of Credit (L/C). Therefore, Ebara can keep the cost and the project of manufacturing if Veeteq cannot pay. Agreements of international consortium notes that members of the consortium will take over other tasks (e.g. custom cleaning and installation) in such a case.
3) Cost Increase of EPC*	-	Yes	It is necessary to pay attention when deciding the rates in the agreements since the main reason of cost increase will be caused from the change of currency exchange rates of JPY-VND.
4) Settlements of the Ownership	Yes	Yes	The ownership of pumps will belong to Veeteq until Veeteq collects initial investment costs. After collecting costs, the ownership will belong to SAWACO. Relating to the above, SAWACO and Veeteq will sign a MOU. Also, the settlements of the ownership will be described in the MOU in the case Veeteq cannot continue business.
5) Share of Profits	Yes	Yes	SAWACO and Veeteq will share profits from the decrease of running costs by introducing high efficiency pumps. Profits will have been shared for seven years after the start of operation in the provisional plan.

Source: Study Team
*EPC: Engineering procurement and construction

2) Permits and License for the project development and implementation

This study is a replacement project for the existing purification plant. Therefore, there is no need to gain new permits for this project. Furthermore, the project does not include the installation of facilities or equipment which requires permits or license.

3) Advantage of Japanese technology

The study targets the technology for high efficiency pumps for purification plants produced by Ebara Corporation and the size of pumps is large-scale over 6,000 m^3/h. There are five purification plants which have been installed pumps of this size in Ho Chi Minh City and its suburbs. There are additional five other plants which will install pumps of this size in future.

In the market of pumps for purification plants, Company A, has the largest share with more than 45%, Ebara Corp. has 25%, Company B has 15% and others have 4% to 5% each. Products by Japanese enterprise have the advantage in technologies, but also have a disadvantage in cost, and therefore they do not have the top share of the market.

In performance tests, the efficiency of pumps produced by three top manufacturers in the market of Ho Chi Minh City was rated. In the size of pumps which can allow water flow 6,300 m^3/h, pumps produced by Ebara show the top efficiency with 91.2%, ones by Company B show 87.0% and ones by Company A show 86.0%.The following table and graph show the results.

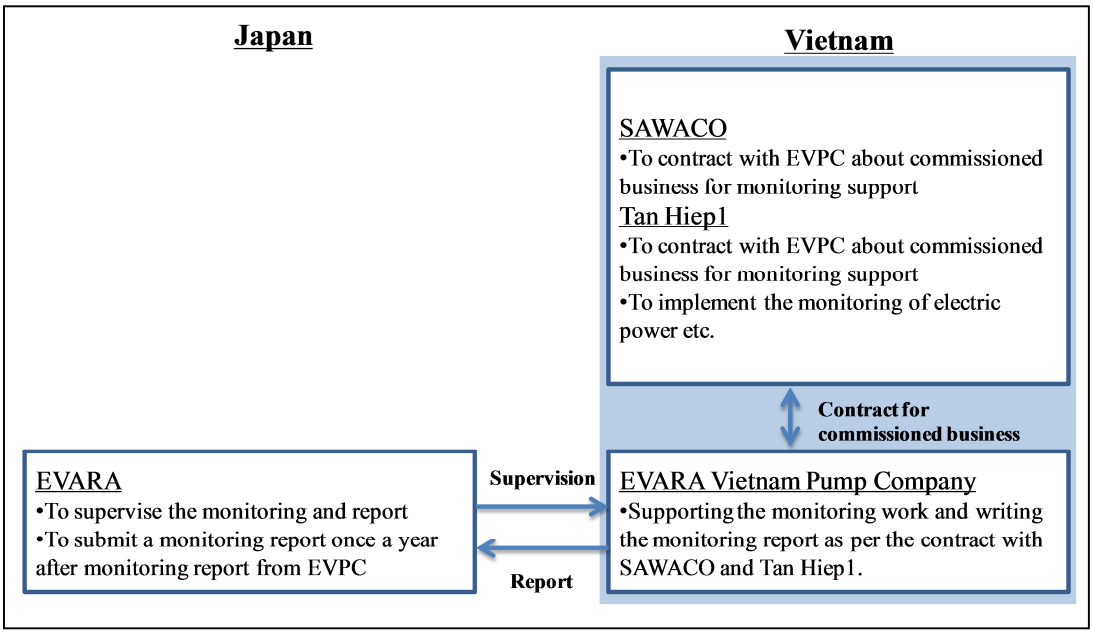
Table 4 Comparison Table for Manufacturers

	Ebara Corp.	Company A	Company B
Type	Radial Flow Pump (both sides)	Radial Flow Pump (both sides)	Radial Flow Pump (both sides)
Market Share	Approx. 25%	Approx. 45%-50%	Approx. 15%
Cost	100	90-100	90-100
Efficiency[1)]	90.6%	86%	87%

Source: Results of hearings and performance tests by manufacturers (modified by study team)
1) Efficiency for the range of pump discharge from 6,000-7,000 m^3/h

4) MRV Implementation structure

EVPC will make a service contract with SAWACO and Tan Hiep1 for support of monitoring works. Tan Hiep1 will make a service contract with EVPC for support of monitoring works and will monitor the electricity consumption as a routine work. EVPC will issue monitoring reports as per the service contract with Tan Hiep1 and SAWACO. EBARA will manage the implementation and report for monitoring as the prime company of the project and will submit annual monitoring reports based on the results of monitoring by EVPC.



Source: Results of performance tests by manufacturers (modified by study team)

Figure 3 MRV Implementation Structure

5) Environmental integrity and Sustainable development in host country

This project aims to replace existing pumps with high efficiency pumps in the irrigation and drainage pump facility. The project does not construct new facilities, so it is not necessary to get new approval and authorization about environmental impact assessment referring government ordinance (Decree No. 80/2006/ND-CP).

Moreover, the project contribute s to reducing environmental load as follows.

i. Using paints with low heavy metal content
ii. Reusing of casting sand made from pump production.

As a result of the interview surveys, the major pump manufacturers in Vietnam do not take measurements for reduction of environmental load in the manufacturing process. However, the diffusion of EBARA's pumps will contribute to reduce the environmental load in Vietnam.

6) Toward project realization (planned schedule and possible obstacles to be overcome)

The Project needs to prepare some documents for subscription of subsidiary business system and build consensuses within international consortium by mid March. If the subsidiary business system is adopted, the international consortium will contract in July or August with Ministry of the environment about the subsidiary business system. Lead time will take nine or ten months. The transportation of pumps from Japan to Vietnam will take one month. The installation and testing operation will take about one month. The operation will start in July 2016.

Table 5 Tan Hiep1 / Project Execution Schedule

		2015												2016						
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
1	PS study	◄——►																		
2	Technical inspection of exisiting facilities		◄——►																	
3	Subscription of subsidiary business system				◄——►															
4	Decision to adopt subsidiary business system						◄►													
5	Contract for subsidiary business system (if adopted)							◄- - -►			<9-10 months>									
6	Manufacture								◄——	——	——	——	——	——	——	——	——	——►		
7	Transportation																◄——►			
8	Installation and testing operation																		◄►	

Source: Study Team