"Project Formulation Survey" under the Governmental Commission on the Projects for ODA Overseas Economic Cooperation in FY2012

Summary Report

(Vietnam, Cambodia, Laos) (Electrifying non/weakly electrified rural villages by micro hydropower)

March, 2013

(Seabell International Co., Ltd.

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This report is a summary of a project formulation survey conducted by the contractor, under the Governmental Commission on the Project for ODA Overseas Economic Cooperation, commissioned by the Ministry of Foreign Affairs of Japan in Fiscal Year 2012. It does not necessarily represent the official views of the Ministry of Foreign Affairs of Japan

1. Discription of the current situation and development needs of the concerned development issues in the surveyed countries

Based on the field surveys, the issues and needs summarized in Table 1 were identified.

Country	Development Issues	Development Needs	
Laos	Water seems plentiful enough to allow	In non-electrified areas, there are	
	year-around power generation.	demands for small hydro combined	
	Difference in water levels between	with overall village development. Even	
	the dry season and the rainy season	electrified area, there are demands for	
	needs to be confirmed.	power sales to the grid, due to power	
		shortage in the dry season caused by	
		excessive power sales	
Vietnam	Areas where "STREAM" (Micro	In Hoa Binh Province (2 hours from	
	hydro generator from Seabell	Hanoi) there are 36 non-electrified	
	International) can be installed are	villages, with 4000 households. Local	
	already covered by the grid.	Government emphasizes the need to	
	Non-electrified areas are mountainous	electrify these villages, and micro hydro	
	areas and islands, mostly inhabited by	is an important option.	
	ethnic minorities. These residents often	Energy department (Ministry of	
	rely on pico-hydro units (500W, about	Industry and Trade) has proposed to use	
	50USD).	Vietnam as not only a potential site for	
		STREAM, but also into a center of	
		manufacturing and O&M, using ODA	
		as its funding source.	
Cambodia	Farms in the lowlands depend on	Water level changes significantly	
	rainfalls. Irrigation canals dries up half	between rainy and dry seasons. Micro	
	of the year. Mountain areas have	hydro not feasible in the dry season.	
	year-round water, but the difference		
	between rainy season and the dry		
	season can be significant.		

Table 1 Development Issues and Needs in the Surveyed Countries

2. Possible applicability of the SME's products and technologies, and prospects for future business development

STREAM, the micro-hydro generator from Seabell International, has the following technical advantages;

- Short deployment time as a distributed power source.
- Easy O&M after installation
- Easy to adapt to irrigation channels
- Low investment compared to other hydro units with similar output.
- With 5-15kW output, ideal for the needs of non-electrified villages.

The micro hydro unit of Seabell International utilizes a patented technology in the main generation unit. For foreign deployment, the company will transfer the technology locally under a license agreement, and have local firms undertake the production as well as the O&M. (In the initial phase, Japanese unites need to be exported. However, since the technology contributes to the improved living standards of the local poor in non-electrified areas, it needs to adapt to the specifications and price levels that meet local demand. This requires local production.

Although the structure of the unit is patented, the components and parts are all readily available in the market. If these components can be procured in the local market, no special technology for manufacturing would be necessary, making technology transfer easier.

Since the product is suited to irrigation channels, greater Mekong region with their strong rice production is one of the targets for the global deployment of the units. Especially with the ASEAN integration in 2015, Seabell sees opportunities for technology transfer in Vietnam which is relatively industrialized in the area, with markets in Vietnam and surrounding countries in the Mekong region.

Through this study, it was revealed that in the initial phase of the product deployment in the target countries, a pilot project is necessary to assess the applicability of the project to the local conditions and to clarify the specifications that ensure their sustainable use. Therefore, in this study, the feasibility of pilot projects in each country was assessed through interviews with local government organizations and on-site surveys.

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Table 2 Possibility of Pilot Projects

3. Expected development impact and effect on business development of the proposing SMEs in the surveyed countries through proposed ODA projects

Micro Hydro systems can be deployed quickly and in a distributed manner. It is highly suited to the electrification of village areas, in developing countries with inadequate power infrastructure. Therefore, large market remains in developing countries. Seabell regards developing countries as their strategic markets within their business strategy. Seabell's technology stresses the importance of ODA since it benefits the infrastructure development of developing countries.

With stable power supply in the non-electrified areas through this project, it will assist the creation of micro enterprises, improvement of productivity, and increased income. The additional income will contribute to leisure, leading to higher literacy and schooling time that contributes to poverty reduction and sustainable socioeconomic development.

Seabell International is planning to first develop the production capability in Vietnam through the use of ODA projects, utilizing its human networks in the field of micro hydro, then developing the ASEAN market that will be integrated in 2015, finally considering the possibility of export to Europe, Africa, and Japan.



Figure 1 Global Business Strategy Map of Seabell International

4. Proposals for formulating ODA Projects

Initially, potential pilot project sites were considered in various countries, and Laos was considered to be a prime candidate. However, since many areas were already electrified, and project formation under grant technical assistance or grass-roots grants would be difficult.

On the other hand, in the Hoa Binh Province of Vietnam, discussions with local authorities have revealed that Seabell International's following prospective business model may be promising. Since the Province is only 70 km west from Hanoi, it would be usable as a showcase project for Japanese SMEs.

Through the scheme, human resource development concerning micro hydro O&M, as well as the main issue of electrifying the non-electrified village areas, would be achieved.

This will enable in the non-electrified areas, the alleviation of power shortage, new industry development through stable power, technical training of local villagers through O&M, and employment and income generation can be expected.



Figure 2 Possible Scheme

4.1. Project Outline

4.1.1. Goal of the ODA Project

As an ODA project in Fiscal 2013, Demonstration Showcase Project for Japanese SMEs (tentative) will be undertaken.

4.1.2. Contents of the Project

- Two to five units of STREAM (Micro Hydro Generator from Seabell International) will be installed in Hoa Binh Province for a demonstration project.
- During the demonstration period, AGRIMECO (local firm) and Seabell will sign and Non Disclosure agreement and Memorandum of Understanding, after which Seabell will provide the design schematics. Components that will be produced by AGRIMECO will be used in STREAM, and technical evaluation as well as cost evaluation for local deployment will be made.
- The location for the STREAM unit installation will be selected based on discussion with People's Committee of Hoa Binh, and the local power authorities.
- In the non-electrified area in Hoa Binh Province, there are no irrigation canals. Therefore, installation of STREAM will require civil works. The cost for the civil works shall be borne by the Province.
- The O&M of STREAM will be undertaken by the power authorities in Hoa Binh Province. The O&M training will be held during the demonstration project.
- The generated power will be distributed to the non-electrified households through mini-grids installed by the local power authorities.

4.1.3. Counter Parts

Hoa Binh Province People's Committee Vietnam Ministry of Planning and Investment

4.1.4. Location

So District, Thung Thanh Village, Hoa Binh Province (70 km east of Hanoi)

So District is a 54 household non-electrified area, inhabited by the minority Muong. It is located at an altitude of 500m, living on subsistence.

4.1.5. Project Formation (Japan)

Seabell International Ltd. (Undertaker of the Pilot Project)
Nakayama Iron Works, Ltd. (STREAM manufacturer in Japan, training for Vietnam firm)
Nomura Research Institute Ltd. (Consultant)
(Vietnam)
Hoa Binh Province People's Committee (Counter Part)
Vietnam Ministry of Planning and Investment (Counter Part)
AGRIMECO (local partner, component manufacturing. Will manufacture the whole unit in the future)

Hoa Binh Province Power Authority (site selection, civil works, unit installation, O&M, mini-grid installation, distribution)

4.1.6. Schedule

1Q, FY2013	Discuss pilot project with CP, site selection				
	NDA and MOU with AGRIMECO				
	Manufacture STREAM in Japan				
2Q, FY2013	Local civil works				
	Provide drawing and schematics to AGRIMECO, technical training,				
	sample component manufacturing				
	Training to Hoa Binh Province power authority				
	Ship STREAM to Vietnam				
3Q, FY2013	Install STREAM and mini-grid				
	Start generation and power suply				
4Q, FY2013	O&M training to villagers from Hoa Binh power authority				
	Evaluate components from AGRIMECO				
	Evaluate pilot project (effectiveness, O&M sustainability)				
	Reporting				

4.1.7. Cost Estimate

Total 100 million JPY (including VAT)

Manufacturing (5 units of 5-15KW): 50million JPY Labor (planning, sustainability planning, scheme planning): 3 million JPY Survey and installation: 5 million JPY Transportation: 1milion JPY Training (O&M, manufacturing): 5 million JPY Travel expense (JP - VN, 10 trips): 3 million JPY Other (interpretation, seminar costs): 2 million JPY

4.1.8. Use of the Generated Power

Power supply to the 54 households in the un-electrified So District inhabited by the Muong minority

<u>Type (Formulation Survey)</u> <u>Vietnam,Lao,Cambodia</u> <u>Electrifying non/weakly electrified rural villages by micro hydropower</u>

