

“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.  
Nomura Research Institute, Ltd.)

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.

**Table 1 Development Issues and Needs in the Surveyed Countries**

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

## **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 units 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.

**Table 2 Possibility of Pilot Projects**

<b>Items</b>	<b>Vietnam</b>	<b>Cambodia</b>	<b>Laos(1)</b>	<b>Laos(2)</b>
Candidate Sites	So District, Hoa Binh Province Mountain area far off from the grid, non-electrified. Currently uses pico-hydro (500W, made in China or Vietnam). Sufficient water, but canals not secured by concrete. Requires civil work.	Toul Tbeing Village, Pursat Prvince. Irrigation canal has water year-round, but water management is unclear. There is a diesel mini-grid nearby, but expensive at 80cents /kWh.	Nang Houn District, Vientiane Province.. Discharge canal from local hydro dam provides sufficient water. Area already electrified, but there is potential to sell to the grid.	Nam Suong District, Vientiane Province Irrigation canal. Area already electrified, but there is potential to sell to the grid.
Possible Counter Part	MPI, Hoa Binh Province	EDC, MIME	Min. of Energy and Mining, EDL	Irrigation Dpt (Min. of Agriculture), Min. of Energy and Mining, EDL
Aim	Powering non-electrified areas. Spreading to other non-electrified areas in Vietnam can be expected, although their number is quite small.	Powering non-electrified areas. Spreading to other non-electrified areas in the country can be expected, although sites with enough water are limited.	Power sales An on-site showcase to assist the adoption in other non-electrified areas. Promote private firms to enter the market (possibility of using funds from Lao Government)	Power sales and income generation for irrigation Dpt. An on-site showcase of the business model
Possibility for ODA	No chance for grants and technical assistance. Small scale grant is a possibility, although too small with max 10 mill. JPY. Should consider schemes like SME demonstration Show case Project (tentative)	No chance for grants and technical assistance. EVC may purchase with own funds. This could be combined with small scale technical assistance. Should consider schemes like SME demonstration Show case Project (tentative)	No chance for grants and technical assistance, small scale grant. Should consider schemes like SME demonstration Show case Project (tentative)	No chance for grants and technical assistance, small scale grant. Should consider schemes like SME demonstration Show case Project (tentative)
Business prospects after the pilot project	High Small number of non-electrified areas. Business opportunities under FIT.	Small. Very few candidate sites. Hard to find business opportunities	High Many potential sites all around the country. High demand to deal with power shortage	Very High Many potential sites all around the country.. Can expect support from MoA and MoEM
Overall Evaluation	High	Low	High (but needs new ODA scheme)	High (but needs new ODA scheme)

### 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.

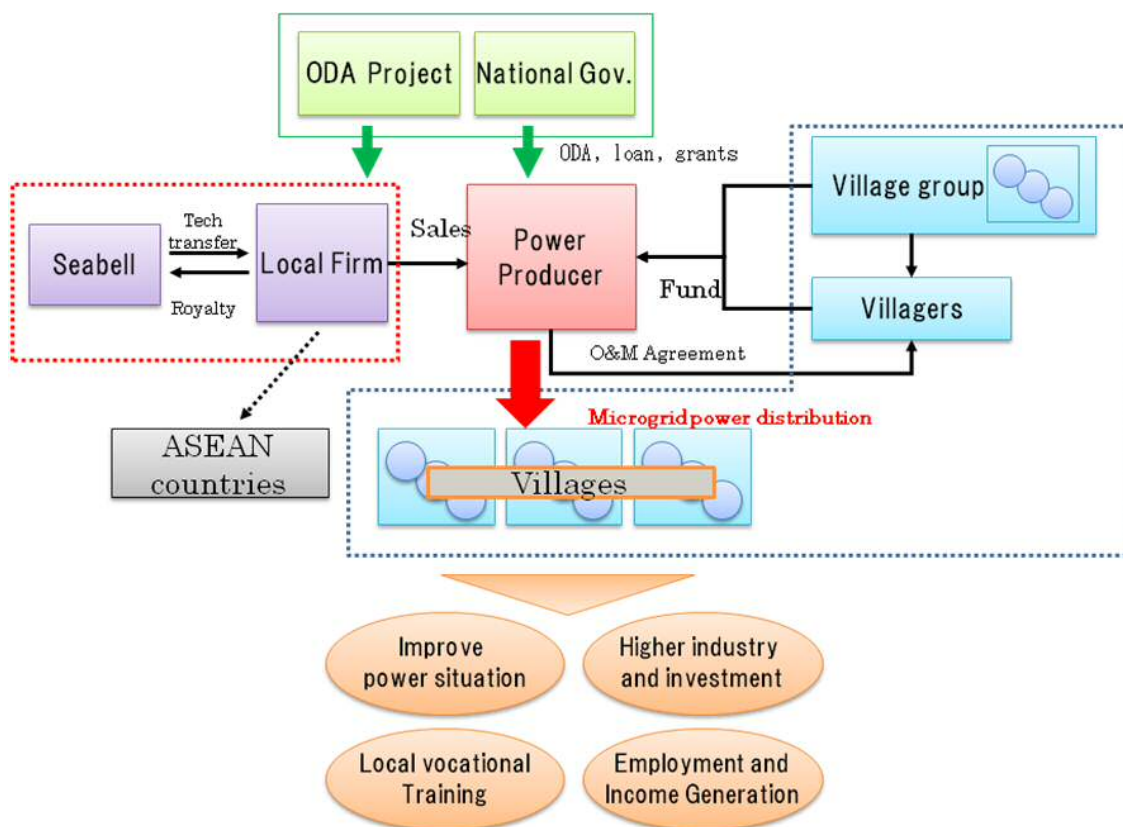


Figure 2 Possible Scheme

#### 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 supply
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: 1million 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

