Hoa Binh Province People's Committee

Summary Report

Vietnam

Pilot Survey for Disseminating SME's Technologies on Electrifying non/weakly electrified rural villages by micro hydropower

January, 2016

Japan International Cooperation Agency

JAG Seabell Co., Ltd.

1. BACKGROUND

Rapid economic growth in Vietnam has been posing significant challenges to offer stable power supply. It is expected that electricity demand will continue to grow by more than 10% year-on-year basis, which necessitates electricity-generation system be promptly in place.

Although electrification promoted by National Grid has achieved as high as 96% electrification rate, in the rate in rural areas remains 94%, with four million people left with no access to electricity, compared with 100% rate in urban regions. The reason is that minorities live in mountainous areas and islands, quite often with low income. Under the circumstances, provision of electricity to deserted areas inhabited by ethnic minorities should be prioritized.

Hoa Binh Province, for example, where we have launched this project, has 36 non-electrified areas or 4,000 households. The Province Government is well aware that supply of electricity to them is of utmost importance. The Province is considering to introduce renewable energy to regions where national grid system will be unattainable.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose

In the Hoa Binh Province of Vietnam, discussions with local authorities have revealed that Micro Hydro systems model of Seabell 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 Survey, human resource development concerning micro hydro Operation and Maintenance (O&M) for the micro hydrosystem, as well as electrifying the non-electrified village areas, would be verified.

This will enable the non-electrified areas to buffer power shortage, develop new industry through stable power, train local villagers through O&M, and generate employment and income.

(2) Activities

The hydro power generations installed by JAG Seabell will contribute to solving the power shortage in Thung Vong hamlet, Do Nhan village, Tan Lac district, Hoa Binh Province, and it will help the people in the area improve the living standard. Through the Survey, capacity building for Operation and Maintenance (O&M) for the micro hydro

generation system will be advised to the people in the area by JAG Seabell in cooperation with Hoa Binh Province People's Committee.

The Survey team will try to make the area a model case of improving the living standard by small hydro power generations so that it can be promoted to other areas in Hoa Binh province and Vietnam.

It is expected the Project will yield the following results:

- Effectiveness of micro hydropower system in non-electrified areas can be demonstrated;
- Technology of manufacturing and maintenance can be transferred to local company in Vietnam; and
- The project can serve as a model study on rural electrification through micro hydropower generation.

(3) Information of Product/ Technology to be Provided

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

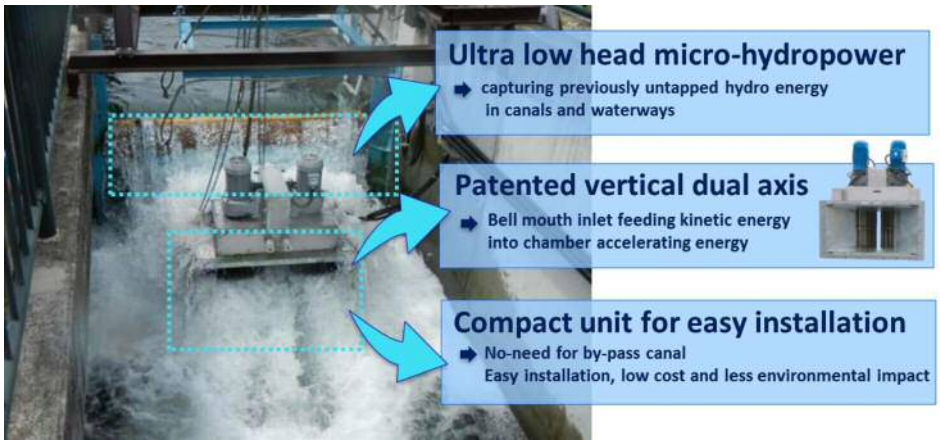


Figure 1 : product features

- Ultra low head micro-hydropower
- Patented vertical dual axis
- Compact unit for easy installation
- Easy localization of technology

STREAM can generate electricity especially in ultra-low head situations. Due to its compactness and ease in installation, the system is especially suited for de-centralized

power generation. Characteristic also concludes to ease in routine maintenance and relatively low off-time operation. Environments where STREAM can be deployed include: agricultural irrigation canals, as well as waterways with regulated water discharge such as those in water treatment plants or power plants. It has been identified as a viable solution for rural electrification where grid is not readily available. It will initially act as a quick fix to such regions. Due to its dual on/off grid features, once the grid is in place, it can act as permanent source of electricity generation, whilst retaining its independency and possibly local ownership.

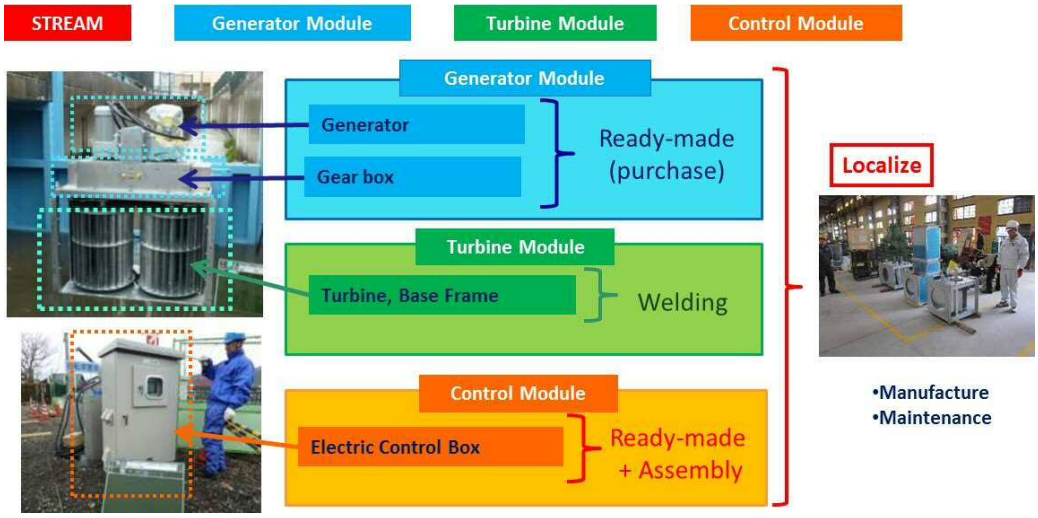


Figure 2 : easy localization of technology

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.

(4) Counterpart Organization

Hoa Binh Province People's Committee, Vietnam

(5) Target Area and Beneficiaries

Thung Vong hamlet, Do Nhan village, Tan Lac district, Hoa Binh Province

13 household, 61 people in non-electrified area, inhabited by the ethnic minority.

Figure 3 : map of the project site

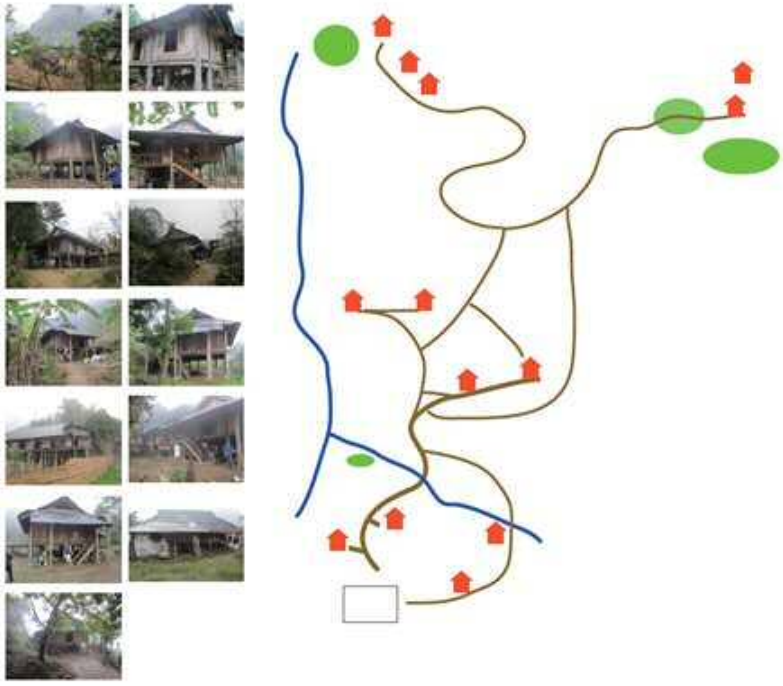
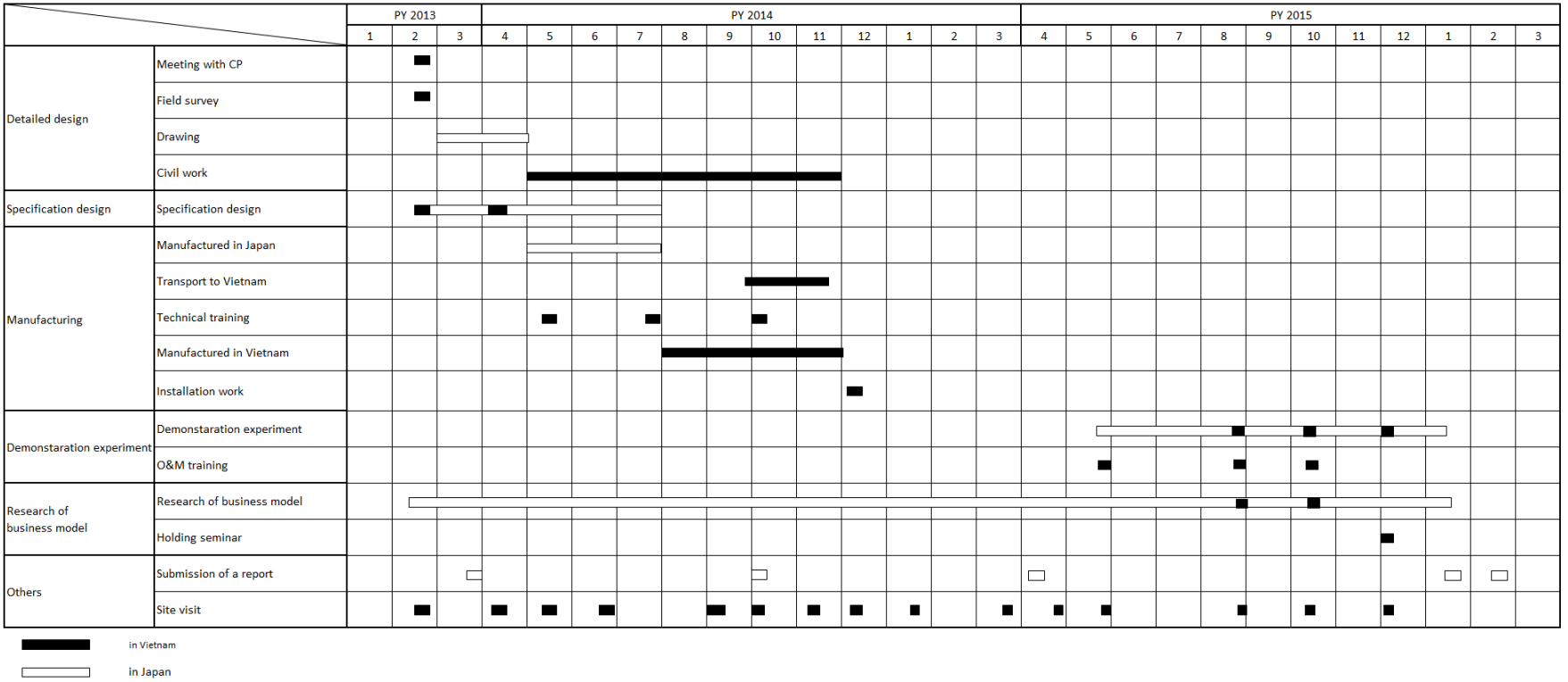


Figure 4 : map of Thung Vong hamlet

(6) Duration

From February 2014 to March 2016

(7) Progress Schedule



(8) Manning Schedule

	duties	Name	Company name	PY 2013			PY 2014											PY 2015												MM	
				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	Vietnam	Japan
Vietnam	Project director	Yuji Unno	Seabell International Co.,Ltd.		8		8	8				7							7												38	
	Construction operation	Toshiro Takahashi	Seabell International Co.,Ltd.																												0	
	project leader	Akira Hidesawa	Seabell International Co.,Ltd.		8		8	8	7			7	7	7	7		7		7		7		7								87	
	Detailed design	Kensuke Hirano	Seabell International Co.,Ltd.				8	7																							15	
	Detailed design	IKUO NISHIOKA	Seabell International Co.,Ltd.											7	7																14	
	Chief advisor	Shoichiro Hara	Nomura Research Institute		8		8	8	7			7							7												45	
	Coordinator	Yasuhiro Hayakawa	Nomura Research Institute																7				7		7			7			28	
	Technical advisor	Tomomichi Sekiguc	Kuring System		8		8	8				7		7	7		7		7		7		7								73	
Japan	Project director	Yuji Unno	Seabell International Co.,Ltd.																													20
	Sub project director	Shunichi Maeda	Seabell International Co.,Ltd.																													10
	Construction operation	Toshiro Takahashi	Seabell International Co.,Ltd.																													20
	project leader	Akira Hidesawa	Seabell International Co.,Ltd.																													40
	Detailed design	Kensuke Hirano	Seabell International Co.,Ltd.																													20
	Chief advisor	Shoichiro Hara	Nomura Research Institute																													30
	Coordinator	Yasuhiro Hayakawa	Nomura Research Institute																													30
		report				△							△						△										△			

in Vietnam

in Japan

(9) Implementation System

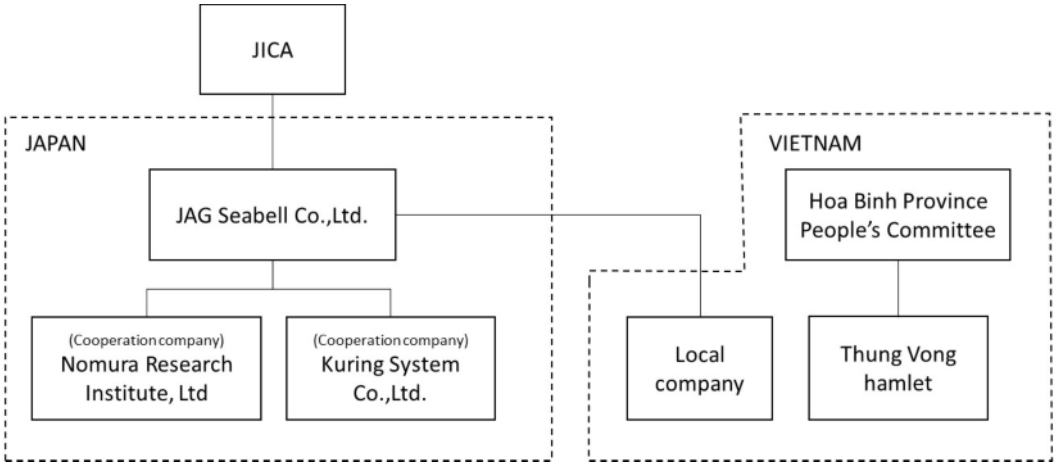


Figure 5 : project formation

[Japan]
JAG Seabell Co.,Ltd. (Undertaker of the project)
Nomura Research Institute Ltd. (Cooperation company)
Kuring System Co.,Ltd. (Cooperation company)

[Vietnam]
Hoa Binh Province People's Committee (Counter part)
Thung Vong hamlet (Installation site)

3. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

A) Status of system installation

We have installed three micro hydro turbine systems (one Japan made and two Vietnam made) in Thung Vong hamlet, Do Nhan village, Tan Lac District, thereby providing electricity to all 13 households in the hamlet.

Figure 6 : civil work / installation

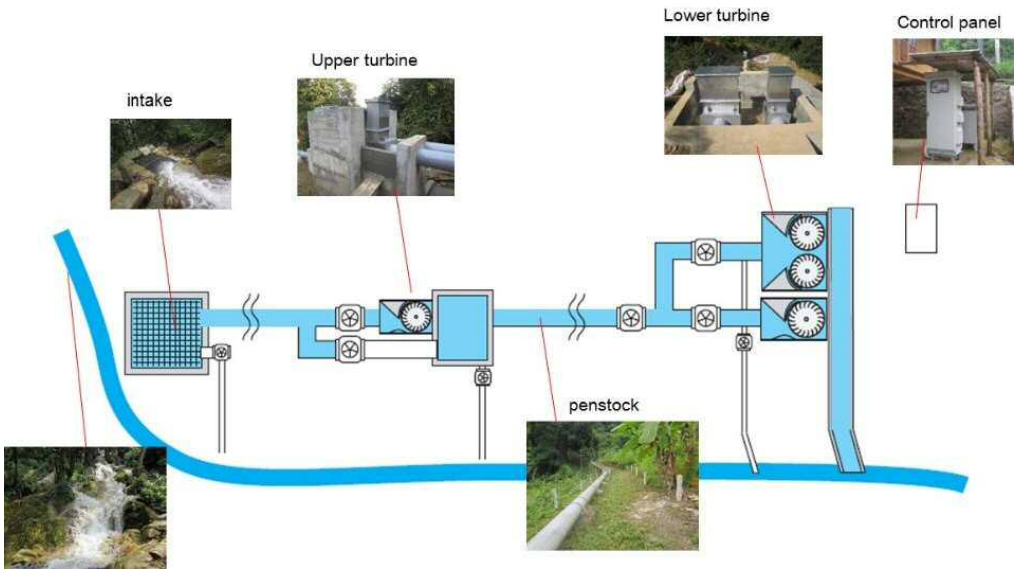


Figure 7 : overview of micro hydro system

B) Pilot study activities in non-electrified area

We solicited views of local people in Thung Vong hamlet on changes in their living after electrification. For most households, no significant change was confirmed in the number of electric appliances possessed because from the beginning they had no income in cash, while some bought television sets.

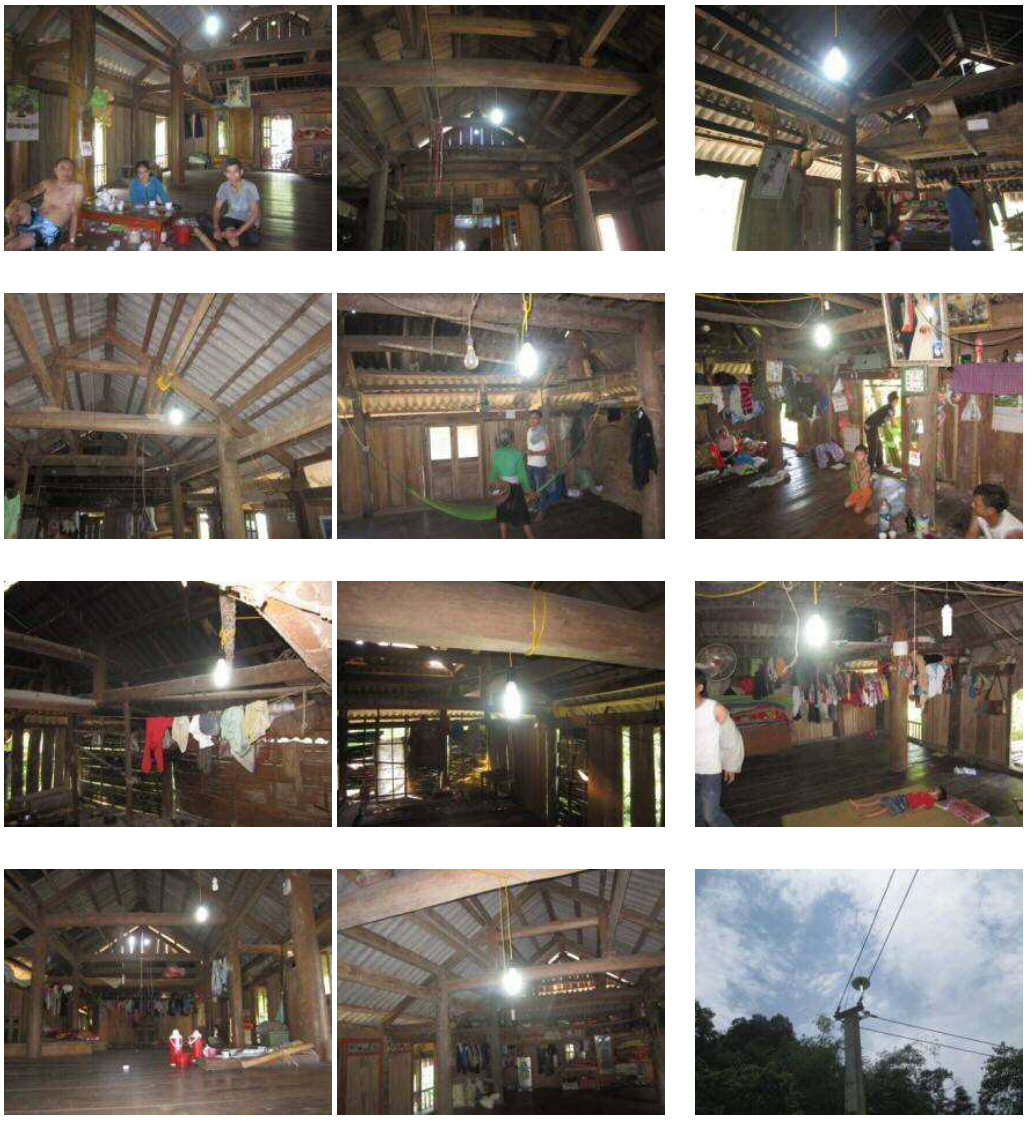


Figure 8 : power usage at each household

Mothers and grandmothers found it easier to take care of their children/grandchildren under lights; residents up on the mountain told us now that they no longer didn't have to come to town only to charge mobile phones, they were satisfied.

It is confirmed that electricity generated through hydro system has given specific positive impact on lifestyle of local residents.

	• Child care Child care has become easier. Women can effectively use the time.
	• Mobile charger It is no longer needed to go down the mountain to charge mobile phone.
	• Literacy, Education The chance to study have increased by light
	• Cooking Labor and time of daily cooking become convenient

On December 9, 2015, an on-site seminar and site tour to show the machine were held to report results and celebrate the launch of the system. 44 people were attended including Head of Hoa Binh Provincial Department of Commerce and Industry, vice-head of Department of Planning and Investment, academic people from Hanoi University of Water Resources and Hanoi University of Science and Technology, Thai Nguyen Provincial Department of Commerce and Industry near Hoa Binh Province and the representative of non-electrified villages in Thai Nguyen Provincial Department. We took the opportunity to report installation results thereat.

Figure 9 : on-site seminar and site tour

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

Based on the job responsibilities agreed upon between us and Hoa Binh Province, it was determined that the Department be responsible for getting a budget to deliver electricity from the control panel of the hydro generator to consumers, and for its implementation. It is up to Hoa Binh Province Industry and Trade department to determine how to collect electricity charges. They said that no electricity charge would be imposed for the first one year, and thereafter they would determine the policy by reviewing usage.

Figure 10 : power transmission by Hoa Binh province

We have also given training on maintenance and management of the system to three local people appointed by Hoa Binh Provincial Department, in cooperation with Vietnamese including technical staff of MECC, our local manufacturing partner, and an electricity expert, Hanoi University of Science and Technology. The training was a

good opportunity not only for us to deepen understanding of local residents but for MECC staff as trainer to have experience in giving instructions.

Figure 11 : operation and maintenance training for local residents

4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business Development of the Product/ Technology in the Surveyed Country

A) Business developments in Vietnam as a manufacturing hub

- Manufacturing for domestic sale: The market scale of Vietnam is limited.
- Manufacturing for ASEAN countries: production entrustment for Myanmar has already commenced
- Manufacturing for Japan: While turbine production is possible, electricity segment such as control panel need to be checked in terms of compliance with Standard of Japanese Electrotechnical Committee.

B) Business developments as a prospective market

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. JAG Seabell regards developing countries as their strategic markets within their business strategy. JAG Seabell believes its technology is best suited to ODA to improve the infrastructure in developing countries.

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

(2) Lessons Learned and Recommendation through the Survey

Unfortunately it took longer than expected to obtain approval for civil engineering, etc. This is partly attributable to the fact JAG Seabell was unfamiliar with local regulations and procedures, but it should also be noted we were required to prepare documents in Vietnamese, not English, which makes all the process even more time-consuming.

We take this opportunity to express our gratitude for support offered by the excellent Japanese-Vietnamese interpreters and professors of academic institutions in Hanoi, with whom we have established cooperative relationship during the course of the project. We are convinced that with such effective network in place, we will be able to carry out similar projects with far less time.

ATTACHMENT: OUTLINE OF THE SURVEY