= Narrative Report =

INTERNATIONAL TRAINING PROGRAMME ON MICRO HYDRO POWER FOR RURAL DEVELOPMENT

held in cooperation of:
the Government of the Republic of Indonesia,
the Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP), and
the Non-Aligned Movement
Centre for South-South Technical Cooperation (NAM CSSTC)

Padang, Indonesia, 24 - 31 March 2015

Narrative Report

International Training Programme on
Micro Hydro Power for Rural Development

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1. General Situation of the Programme

Background

Rural development in developing countries has been given high priority. Programmes to empower rural communities have been in place. Infrastructure such as road, bridge and electricity have been improved to support social and economic activities.

Demand for electricity is substantially increasing in line with the increasing population number, the growing industry and expansion of housing complex. However, people living in some remote areas still do not have access to electricity. Governments' capacity to supply electricity to their people is limited due to budget shortage, insufficient power plant capacity and other factors. One of the solutions to this problem is micro hydro energy that is relatively cheap, sustainable and appropriate for small communities.

Micro hydro is a type of hydroelectric power that typically produces up to 100 kW of electricity using the natural flow of water. These installations can provide power to an isolated home or small community, or are sometimes connected to electric power networks. There are many of these installations around the world, particularly in developing nations as they can provide an economical source of energy without the purchase of fuel.

Micro hydro power is generated through a process that utilizes the natural flow of water. This power is most commonly converted into electricity. With no direct emissions resulting from this conversion process, there are little to no harmful effects on the environment, if planned well, thus supplying power from a renewable source and in a sustainable manner. Micro hydro is considered a "run-of-river" system meaning that water diverted from the stream or river is redirected back into the same watercourse. Adding to the potential economic benefits of micro hydro is efficiency, reliability, and cost effectiveness.

In relation to rural development, the simplicity and low relative cost of micro hydro systems open up new opportunities for some isolated communities in need of electricity. With only a small stream needed, remote areas can access lighting and communications for homes, medical clinics, schools, and other facilities. Micro hydro can even run a certain level of machinery supporting small businesses. The future of micro hydro systems may become more appealing.

The Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC) with the support of the Ministry of Energy and Mineral Resources (MEMR) of Indonesia and the Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) shared its experience with developing countries through International Training Programme on Micro Hydro Power for Rural Development.

2. Participants and Beneficiaries

Total participant is 17 persons from 9 developing countries, namely: Bangladesh, Cambodia, Cuba, Indonesia, Lao PDR, Malaysia, Nepal, Philippines and Thailand.

The participants are from the government institutions, universities, non-government organization and state enterprises working on energy-related activities. Detail of participants and resource persons is described on pages 13-14.

3. Project Achievements

Objectives

(a) The objective of the training programme is to provide participants with basic knowledge of micro hydro power and its implementation to support rural development.

The training programme covered the following subjects:

a. Introduction to Renewable Energy;
b. Basic Knowledge of Micro Hydro Power (MHP);
c. Technical Engineering of MHP;
d. Financial Aspect of MHP;
e. Community Development (Social, Economic and Institutional);
f. Environmental and Sustainability Aspects of MHP;
g. Productive Use of Electricity; and
h. Successful Case of MHP Plants in West Pasaman District;
i. Field Study to the Supporting Workshop of Prowater for MHP Plant; and
j. Field Study to three MHP Plants (Lembah Derita, OMPP and Rimbo Batu) in West Pasaman District.

(b) the criteria of successful achievement are as follows:

a. participant's expectations were met;

b. training subjects delivered and discussed were relevant and clearly understood;
c. field studies enriched participants with technical aspects of the subjects concerned; and
d. participants could prepare action plans to be implemented post training.

Actual Outputs

The actual outputs are Action Plans prepared by participants on country basis. They also indicate what internal and external resources and assistance to be prepared and/or anticipated.

Evaluation Results

Following is the resuts of series of evaluations made:

1. Expectation and Evaluation

Before the training sessions started, all participants were requested to express their expectations in written form using the form prepared by the Committee. Their expectations were compiled by subject of concerns and openly discussed on the last session. They all together checked whether their expectations were met or not. There were also post-class and post-field evaluation by subjects. Overall evaluation was also made before the Closing Session.

The results are described as follows:

1. Check Participant's Expectations:

No.	EXPECTATIONS	MET			NOT MET		
		10	8	6	4	2	0
I	**ON THE GENERAL KNOWLEDGE RELATED WITH RENEWABLE ENERGY**						
1	Knowledge will be gathered by sharing experience of different country's point of view about Micro Hydro Power development (Rabeya Khandaker, Bangladesh)	√					
2	Renewable energy and natural resources, profitable and environmental friendly ((Khuth Samath, Cambodia)		√				
3	Knowledge related with renewable energy and get more information on this topic (Angel Nelvis Perez Marin, Cuba)	√					
4	Basic idea of why MHD should be developed (Krismadinata, Indonesia)		√				
5	From this training, I want to know more about renewable energy development from other countries such as Nepal, Phillipines, Thailand, Bangladesh and Malaysia, especially their success stories and how they solve the abstacles. Hopefully other countries could share the material on renewable energy (Azis Pusakantara, Indonesia)	√					
6	- With renewable energy we can get 100% ratio electification - Electricity is needed for all not just for city but also for rural - Renewable energy must be realiability, environmentally friendly and safe (Desrita Pardi, Indonesia)		√				
7	Renewable energy is the energy that produced by renewable resources, not from fossil fuel, for example solar, biomass, biogass, hydro power etc (Aria		√				

	Yoga Sentana, Indonesia)						
8	I want to know about renewable energy development in Indonesia and each country (from their sharing) (Aspita Dyah, Indonesia)		√				
9	More knowledge about the application of MHP (Muhammad Iqbal Nugraha, Indonesia)		√				
10	To know that Indonesia has Micro Energy potential to be developed (Zahrawani, Indonesia)	√					
11	Better technology that could simplify the Operation & Maintenance (Andri Suhindra, Indonesia)						√
12	Taking more understanding of renweable energy (Manopaphath Phithsamay, Lao PDR)		√				
13	- To know how micro hydro development in other country - Other type of potential renewable energy resources to be implemented in Sarawak, malaysia (Chan Wen Siong, Malaysia)		√				
14	- Renewable energy as an alternative to the grid connection - Solar, micro hydro and hybrid with generator in remote and isolated places (Razani bin Abdul Lazid, Malaysia)		√				
15	Some knowledge, how to develop micro hydro in rural and remote areas (Dilip Kumar Acharya, Nepal)	√					
16	To learn new and emerging technologies to maximize the use of renewable energy (Dani C. Molina, Philippines)			√			
17	- Everybody can understand renewable energy - Easy to understand and to make renewable energy (Worapot Rugfoong, Thailand)		√				
II	**ON THE BASIC TECHNICAL ASPECTS OF BUILDING AND DEVELOPING MICRO HYDRO POWER PLANT**						
1	From different technical expertise and their technology based project of MHP, on the basis of potential site, I will try to introduce in my country (Rabeya Khandaker, Bangladesh)			√			
2	- Civil facility combined with dam, sedimentation water way head tank, penstock, anchor block, spill ways and tail race - Electro mechanical - Power distribution (Khuth Samath, Cambodia)		√				
3	Although I already know the topic because i work in this branch (area), i would like to see new technologies or systems that today is not applied in Cuba (Angel Nelvis Perez Marin, Cuba)		√				
4	How to calculate accuracy hydro power energy potential (Krismadinata, Indonesia)	√					
5	- On basic technical aspect, I would like to know more about feasibility study and how to calculate regarding electrical and civil systems. - What kind of sub technical aspect that we should fulfil when we want to build the micro hydro (Azis Pusakantara, Indonesia)		√				
6	- MHP must be reliable with good technical - Micro Hydro Power Plant can give good capacity in best technical aspect, for example: we can get good voltage and best frecuence from this plant, so we can get best quality of electricity - We need turbin, generator and Pulley, Ballast load, elc (Desrita Pardi, Indonesia)	√					
7	Micro hydro power is a power plant that produce electricity from kinetic energy of water (Aria Yoga Sentana, Indonesia)			√			
8	- I want to know how to develop MHP from the potency until the operation - Any geological technic in material? (Aspita Dyah, Indonesia)		√				
9	To know the civil and mechanical aspect in developing the MHP plant project, because every site/location has a different consideration in		√				

	practice (Muhammad Iqbal Nugraha, Indonesia)						
10	To gain more knowledge of technical aspects of MHP and seeking some new technologies that might be applied in Indonesia (low head turbines, etc) (Zahrawani, Indonesia)			√			
11	Better construction and sustainability MHP (Andri Suhindra, Indonesia)		√				
12	Understand as the engineer of hydropower or to be able to make a plan for micro hydro power plants development (Manopaphath Phithsamay, Lao PDR)			√			
13	To know the criteria to be considered to design and build a micro hydro plant (Chan Wen Siong, Malaysia)		√				
14	That the technical aspects is simple, practical and easily understood by local community (Razani bin Abdul Lazid, Malaysia)	√					
15	Yes, technical developing micro hydro than sustainable if we make financially (cheap and affordable) viable (Dilip Kumar Acharya, Nepal)		√				
16	To learn techniques/methods used to (maximize) design micro hydro components for maximum efficiency/power output (Dani C. Molina, Philippines)			√			
17	Give knowledge on how to design and build micro hydro power plant (Worapot Rugfoong, Thailand)			√			
III	**ON SOCIAL AND ECONOMIC ASPECTS RELATED WITH THE DEVELOPMENT OF MICRO HYDRO POWER PLANT:**						
1	Micro hydro played important to develop at rural area to support social economic especially people at rural can get electricity to use (Khuth Samath, Cambodia)		√				
2	I like to know the developed in indonesia about the renewable energy from the social aspect, because in Cuba the social aspect is the most important aspect to implement the micro hydro power (Angel Nelvis Perez Marin, Cuba)		√				
3	How to make business plan for MHP - Financial aspect - To educate community (Krismadinata, Indonesia)		√				
4	- How to engage the local communities in involving the micro hydro development - What kind of capacity building that should be delivered to local communities in order to enhance their capabilities in managing micro hydro (Azis Pusakantara, Indonesia)		√				
5	- MHP is an environmental friendly power plant - MHP is a low cost power plant (Desrita Pardi, Indonesia)		√				
6	Micro hydro power plant can be implemented in rural community to supply the energy to community. Enough energy supply can increase the economic status of the community (Aria Yoga Sentana, Indonesia)		√				
7	How we can make MHP sustainable? Because in many places we find a stalled (mangkrak) MHP (Aspita Dyah, Indonesia)	√					
8	How to manage sustainability of micro hydro power plant, especially for the Operation & Maintenance aspects (Muhammad Iqbal Nugraha, Indonesia)		√				
9	To gain more information how MHP can affect the economy of its people and surrounding (Zahrawani, Indonesia)		√				
10	Awareness at the end users, that they are key of development of MHP (Andri Suhindra, Indonesia)			√			
11	To be able to analyze the impact and the feasibility on social and economic issues (Manopaphath Phithsamay, Lao PDR)		√				
12	To know how the impact to the social and economy after micro hydro is	√					

	developed (Chan Wen Siong, Malaysia)						
13	- Development of MHP will involve participation of rural communities - Transform rural communities enhancing sosial and economic benefits (Razani bin Abdul Lazid, Malaysia)	√					
14	Education and communication will be easier after the energy, so more aspects in micro hydro (Dilip Kumar Acharya, Nepal)		√				
15	How micro hydro are used in remote areas to improve their quality of life and may be a source of livelihood (Dani C. Molina, Philippines)	√					
16	To support the domestic renewable energy (micro hydro power) technology production industry (Worapot Rugfoong, Thailand)		√				
IV	**HOW YOU MAY RELATE THE SUBSTANCES (EITHER POLICY OR TECHNICAL ASPECTS) THAT WILL BE DELIVERED IN THE SESSION TO YOUR COUNTRY'S INTEREST**						
1	I will relate substance according to human resources and also technological point of view from different countries perspective (Rabeya Khandaker, Bangladesh)		√				
2	I hope this session can give me more information on micro hydro power and I'm confident that I can share that information to my staff who are related (Khuth Samath, Cambodia)	√					
3	From the theoritical point of view, whenever one receives information it is very important because new concepts appear in the matter that he/she has received. Regarding to that, I also believe that this course can show my country a good option of technologies that today is not used in the development of the rural areas (Angel Nelvis Perez Marin, Cuba)		√				
4	We need a case that we involve all stages to design MHP (Krismadinata, Indonesia)	√					
5	Indonesia has a huge micro hydro potential and also has a program of 35.000 MW in the next 5 years. That's the opportunity to enhance our capacity to support government's program (Azis Pusakantara, Indonesia)		√				
6	Direct to be applied with NGO Prowater For the plan: in this year, NGO prowater work with USAID and EIC for building of 3 MHP in West Sumatera province (Desrita Pardi, Indonesia)		√				
7	Based on the social and economical aspects, it is a major concern to apply/implement a micro hydro power in rural community, because technical and technology aspect of micro hydro power plant has been proven (Aria Yoga Sentana, Indonesia)	√					
8	Field study (Aspita Dyah, Indonesia)	√					
9	To develop the technical aspect and specification for the sake of MHP programme in Indonesia (Muhammad Iqbal Nugraha, Indonesia)		√				
10	We will be able to compare the regulation and procedure among the countries and will be able to formulate and simplify the regulation (Zahrawani, Indonesia)			√			
11	We have big problem with Feasibility Study & Detailed Engineering Design (FS&DED) that will affect the MHP construction (Andri Suhindra, Indonesia)			√			
12	Bringing the knowledge and idea to be able to be implemented (Manopaphath Phithsamay, Lao PDR)			√			
13	The theory is practical and operational and applicable to Malaysia's interest (Razani bin Abdul Lazid, Malaysia)		√				
14	Basically theory and little of technically (Dilip Kumar Acharya, Nepal)	√					
15	Whatever I will learn from this training program will be shared to our new renewable energy center staff who are directly implementing our micro hydro projects (Dani C. Molina, Philippines)	√					
16	Develop design and technical micro hydro power and transforming knowledge to rural (Worapot Rugfoong, Thailand)		√				

V	POSSIBLE APPLICATION OF KNOWLEDGE AND EXPERIENCES SHARED IN THE SESSION TO YOUR COUNTRY'S RENEWABLE ENERGY PROGRAMME						
1	In my country there are expected potential site but there are some limitation here – poor transportation, lack of financial, people relocation, lack of long transmission line (Rabeya Khandaker, Bangladesh)	√					
2	The new technology and experience fron that session is very informative and useful to be applied in my country (Khuth Samath, Cambodia)		√				
3	I learn about the development of MHP, in the fundamental thing is in the turbins. In Cuba, the turbines are made/designed by Russian and they are in old condition. Regarding to that, I believe this turbines can be replaced by new turbines which are more efficient and less noise (Angel Nelvis Perez Marin, Cuba)	√					
4	Especially to sustain the MHP (Krismadinata, Indonesia)	√					
5	Especially for West Sumatera province (Desrita Pardi, Indonesia)		√				
6	Community development knowledge (Aria Yoga Sentana, Indonesia)			√			
7	Project development and procurement, also more consideration and knowledge in planning the project (Muhammad Iqbal Nugraha, Indonesia)		√				
8	How to build MHP in isolated area with some technical aspects (FS+DED) (Zahrawani, Indonesia)			√			
9	We have every sites that needs more effort to bring the MHP equipments (Andri Suhindra, Indonesia)	√					
10	Hopefully this programme can increase my knowledge and experiences to be implemented in my country (Manopaphath Phithsamay, Lao PDR)	√					
11	The knowledge will be shared with my colleague and enable us to relate and to be applied in Sarawak, Malaysia (Chan Wen Siong, Malaysia)	√					
12	My ministry MRRD plan to develop MHP in rural and isolated areas which are not covered by the national grid/network (Razani bin Abdul Lazid, Malaysia)	√					
13	Of course we are coming here to share experience of each other, especially on micro hydro in rural and remote areas (Dilip Kumar Acharya, Nepal)	√					
14	I believe I will learn a lot from this training session and these are all valuable inputs as we also develop our own capacity/competency in building micro hydro power plants. I foresee a lot of first practices shared on this seminar which i can bring home and share with other stakeholders interested in micro hydro (Dani C. Molina, Philippines)	√					
15	Transferring knowledge of micro hydro power technology to the organization in country (Worapot Rugfoong, Thailand)	√					
VI	**OTHER EXPECTATIONS**						
1	- Besides achieving new knowledge in the development of MHP in rural areas, ideas also showed with other countries that use this technologies to be able to elevate the level of life of the rural towns and make the life easier for the residents. - In the personal thing, it will allow me to know another culture of which I know very little or almost nothing. My country and Indonesia are separeated by 12 hours difference and it is in the opposite hemisphere, i believe that would be very interesting (Angel Nelvis Perez Marin, Cuba)	√					
2	I think we need to do internship in MHP training (Krismadinata, Indonesia)					√	
3	Field study makes me clear/understand the information in theory (Aspita Dyah, Indonesia)	√					
4	Knowledge sharing among countries/participants (Muhammad Iqbal Nugraha, Indonesia)	√					

5	To gain other knowledge + information of other countries's MHP development. And how they develop MHP to be successful as a potential plant (green energy) (Zahrawani, Indonesia)	√					
6	I hope through this training, I am sure that MHP is the solution for rural electricity (Andri Suhindra, Indonesia)	√					
7	Hopefully the programme could going well (Manopaphath Phithsamay, Lao PDR)	√					
8	- The cost to construct a micro hydro is very high, we look for possible methods to build a simple and workable micro hydro plant - To get knowledge to build and design micro hydro (Chan Wen Siong, Malaysia)			√			
9	Other experience on mindset change as some of the MHP will be handovered to the local communities for operation and maintenance (Razani bin Abdul Lazid, Malaysia)			√			
10	I want to get knowledge on how to develop micro hydro in other country technically and significally (Dilip Kumar Acharya, Nepal)		√				
11	Learn new tools in designing micro hydro power plants (Dani C. Molina, Philippines)			√			
12	Made documents of textbook for designing micro hydro power (Worapot Rugfoong, Thailand)			√			
Total		**33**	**42**	**17**	**0**	**0**	**1**
		92			**1**		
Percentage		**98,4%**			**1,6%**		

Based on the percentage of met expectations (98.4%), we may conclude that the participants are satisfied with the training programmes they participated.

[*As reference, the scoring range is classified as follows: 81-100% met is Satisfied; 51-80% met is Good; 26-50% met is Sufficient; and 0-25% met is Failed*]

2. Summary of Evaluation by Training Subjects:

Participants were requested to fill up the Evaluation by Subject/Field Form right after the related subject/field was finished. The Evaluation by Subject/Field Form is shown on pages 22-28. The tabulation result of the filled up questionnaires shows the summary as follows:

No	A1	A2	B1	B2	B3	Score	Relevance	Efficiency
1	3,6	3,6	3,7	3,8	3,8	3,7	3,6	3,7
2	4,5	4,5	4,1	4,5	4,5	4,4	4,5	4,4
3	4,2	4,5	4,2	4,4	4,3	4,3	4,3	4,3
4	4,1	4,2	4,2	4,4	4,5	4,3	4,1	4,4
5	4,1	4,1	4,4	4,5	4,4	4,3	4,1	4,4
6	4,5	4,4	4,6	4,8	4,5	4,6	4,4	4,6
7	4,3	4,1	4,5	4,5	4,5	4,4	4,2	4,5
8	4,3	4,4	4,1	4,4	4,1	4,2	4,3	4,2
9	4,4	4,5	4,1	4,4	4,5	4,4	4,4	4,3
10	4,6	4,6	4,4	4,5	4,5	4,5	4,6	4,5
11	4,8	4,5	4,3	4,5	4,5	4,5	4,6	4,5
12	4,6	4,5	4,4	4,5	4,5	4,5	4,5	4,5
	4,3	4,3	4,2	4,4	4,4	4,3	4,3	4,3

Block A for Relevance; Block B for Efficiency
A1 is level of understanding; A2 is level of application
B1 is training material; B2 is method and communication skill; B3 is time given

The score range is from 1 to 5. [1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree]. If the average score of all training subjects is closer to 5, it means that the 12 subjects delivered in the Class and Field Sessions are well understood by the participants and most appropriate for them. Based on the average of scores described above, the evaluation result is good.

Description of Resource Person and Subject delivered:

1. Todo Simarmata and Budiman Saragih on *Introduction to Renewable Energy*
2. Madhusudhan Adhikari on *Basic Knowledge of MHP*
3. Priyono Sutikno on *Technical Engineering of MHP*
4. Chayun Budiono on *Financial Aspect of MHP*
5. Madhusudhan Adhikari on *Community Development (Social, Economic and Institutional)*
6. Saifudin Suaib on Environmental and Sustainability Aspects of MHP
7. Amalia Suryani on *Productive Use of Electricity*
8. Johnny Ivan and Faisal Rahadian on *Successful Case of MHP Plants in West Pasaman*
9. Johnny Ivan on *Field Study to the Supporting Workshop of Prowater for MHP Plant*
10. *Field Study to MHP Plant of Lembah Derita*
11. *Field Study to MHP Plant of OMPP*
12. *Field Study to MHP Plant of Rimbo Batu*

3. Summary of Overall Evaluation:

Participants were requested to fill up the Overall Evaluation Form on the last session. The tabulation result of the filled up Overall Evaluation is as follows:

No	A1	A2	B1a	B1b	B2	C1	C2	C3	C4
1	5	5	5	5	5	5	5	5	5
2	5	5	4	4	5	5	4	4	5
3	5	5	5	5	5	5	5	5	5
4	4	5	5	3	4	5	5	4	5
5	5	4	5	5	5	5	5	5	5
6	4	4	4	4	4	5	4	5	4
7	5	5	5	5	5	5	5	5	5
8	4	5	4	4	5	5	4	5	4
9	4	4	4	4	3	3	4	3	3
10	5	5	4	5	5	5	5	4	4
11	4	3	4	4	4	4	4	4	5
12	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	4	4	5
14	5	5	4	4	5	4	5	5	4
15	5	5	4	4	5	5	5	4	4
16	4	4	4	4	3	4	3	3	3
17	5	4	4	4	4	4	4	4	4
Total	79	78	75	74	77	79	76	74	75

Score	4,6	4,6	4,4	4,4	4,5	4,6	4,5	4,4	4,4
	4,62		**4,43**			**4,47**			
					Total Score				40,4
					Final Score				**4,49**

Block A for Relevance; Blok B for Effectiveness; Block C for Efficiency
A1 is workability; A2 is content of the course
B1a is knowledge and practices; B1b is MHP development; B2 is content clarity
C1 is as expected; C2 is improved knowledge; C3 is timely; C4 is course duration

The score range is from 1 to 5. [1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree]. If the average score of all training subjects is closer to 5, it means that overall subjects delivered in the Class and Field Sessions are well understood by the participants and most appropriate for them. Based on the average of scores described above, the overall evaluation result is good. This evaluation also to cross-check the result of evaluation by training subjects. There's consistency between evaluation by subjects and overall performance of the training sessions.

4. Work Activities / Progress

The training programme was conducted through:

Class Session:

The session conducted using adult-learning methodology. There is no instruction but knowledge-sharing approach is applied.

Field Session:

Field study to the best practice of micro hydro power plants is intended to see how micro hydro power plant works to generate electric power and give benefits to local communities as the beneficiaries. In the case of MHP Plants of Lembah Derita, OMPP and Rimbo Batu, the beneficiaries are also the owners. Factually there are seven MHP Plants developed in the same river bank operated by the respective local communities' groups. They have all together established an Association of Tuah Sakato Cooperative which the members are the local communities represented by the community groups to sit in the Board of Association. The Association officially and technically controls the MHP Plants managed by the seven respective community groups, namely Lembah Derita, OMPP, IMPP, Koto Patagak, Rombo Batu, Kampong Sejati and Banjar Durian Gadang. During the field study the participants also exercised some practical works.

Presentation of Country Reports:

Participants were requested to prepare and present their Country Reports covering problems and potentials of renewable energy development, especially of micro hydro power. Their knowledge and experiences were shared during the class and field sessions.

Preparation of Action Plan:

At the end of the Class Session, participants were asked to prepare Action Plan to be implemented in their respective countries when they are back home. They also indicated possible future collaboration post training.

Language:

The language used in the Training Programme is English.

5. Problems and Difficulties

Basically problems and difficulties were not significantly found, either during the training preparation and implementation. However there was only one thing that should be carefully managed and anticipated which is related to the nomination and selection processes.

The nomination forms received were not in schedule as expected. Most of the nominees were late in the selection process, although they were still in time to proceed with administrative works.

In general, the qualification of participants was met.

6. Recommendations

Following is the conclusion and recommendation for further anticipation:

The overall implementation of the training programme on renewable energy: micro hydro power for rural development has been well implemented, both substantially and logistically.

However, there are some feedbacks from the participants expressed during the overall evaluation that could be accommodated in future similar training, as follows:

1. Despite the training subjects have been considered appropriate, it could be enriched with supporting references from other countries that have similar cases.
2. Tehnical exercises at fieldsite should be supported with appropriate instruments which are not complicated.

3. Since the field study is not merely on technical matters, it is suggested to extend more days at feldsite to observe and practise relevant field works related to social, institutional and economic development.

There is also strong recommendation to conduct another similar training with considering the feedbacks from participants. In this regard, NAM CSSTC and the Ministry of Energy and Mineral Resources instantly identify another best practice of community-based microhydro power development that generates value added to local communty. Another recommendation is to introduce smaller capacity of micro hydro power plant that supports local community, especially for productive uses. Bali could be the best alternative as there are some models that are technically and culturally supported by customary villages.

7. Name and title of persons who prepared the report

1. **Achmad Rofi'ie**
   Assistant Director for Programme, NAM CSSTC
   for <u>Narrative Report</u>

2. **Subandiyo**
   Assistant Director for Administration and Finance, NAM CSSTC
   for <u>Financial Report</u>

Attachments

List of Participants

No	Country	Name	Office
1	Bangladesh	Rabeya Khandaker	Bangladesh Bank
2	Cambodia	Khuth Samath	Generation Department
3	Cuba	Angel Nelvis Perez Marin	National Hydro Company
4	Indonesia	Krismadinata	State University of Padang
5		Azis Pusakantara	Indonesian Institute for Energy Economics
6		Desrita Pardi	Office of Energy and Mineral Resources of West Sumatera
7		Aria Yoga Sontana	PT Gerbang Multindo Nusantara
8		Aspita Dyah Fajarsari	Ministry of Energy and Mineral Resources
9		Muhammad Iqbal Nugraha	Ministry of Energy and Mineral Resources
10		Zahrawani	Ministry of Energy and Mineral Resources
11		Andri Suhendra	Ministry of Energy and Mineral Resources
12	Lao PDR	Manopaphath Pithsamay	Ministry of Energy and Mine
13	Malaysia	Chan Wen Siong	Menara Sarawak Energy
14		Razani bin Abd Lazid	Ministry of Rural and Regional Development
15	Nepal	Dilip Kumar Acharya	Manasalu Energy Pvt. Ltd
16	Philippines	Dany Cuevas Molina	Central Philippine University
17	Thailand	Worapot Rugfoong	Department of Alternative Energy Development and Efficiency

List of Resource Persons

No	Name	Institution
1	Todo Simarmata	Ministry of Energy and Mineral Resources
2	Budiman R. Saragih	Ministry of Energy and Mineral Resources
3	Priyono Sutikno	Bandung Institute of Technology
4	Chayun Budiono	Sepuluh Nopember Institute of Technology
5	Amalia Suryani	Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ)
6	Madhusudhan Adhikari	Alternative Energy Promotion Centre (Nepal)
7	Faisal Rahadian	Bandung Small Hydro Power Association
8	Saifuddin S. Wittoeng	USAID-Indonesia Clean Energy Development Project
9	Johnny Ivan	Workshop of Prowater
10	Abu Bakar	Tuah Sakato Cooperative

Project/Training Programme

Date	Session	Agenda
D-1: Tue, 24 March	08:00-09:00	**Opening Ceremony** ***(Remarks and Group Photo)*** *(MC: Elly Tioria of MOFA Indonesia)*
	09:00-09:15	**Coffee break**
	09:00-09:30	- Briefing on the Programme, Logistics and Action Plan *Achmad Rofi'ie, Faisal Rahadian*
	09:30-12:30	- Presentation of Country Papers *(Facilitated by Faisal Rahadian)*
	12:30-14:00	**Lunch break**
	14:00-15:30	- Introduction to Renewable Energy *Todo Simarmata, Budiman Saragih*
	15:30-15:45	**Coffee break**

	15:45-17:15	- Introduction to Renewable Energy (*continued*) *Todo Simarmata, Budiman Saragih*
D-2: Wed, 25 March	08:00-09:30	- Basic Knowledge of Micro Hydro Power (MHP) *Madhusudhan Adhikari*
	09:30-09:45	**Coffee break**
	09:45-11:15	- Basic Knowledge of Micro Hydro Power (MHP) (*continued*) *Madhusudhan Adhikari*
	11:15-12:45	- Technical Engineering of MHP *Priyono Sutikno*
	12:45-13:45	**Lunch break**
	13:45-15:15	- Technical Engineering of MHP (*continued*) *Priyono Sutikno*
	15:15-15:30	**Coffee break**
	15:30-17:00	- Technical Engineering of MHP (*continued*)
D-3: Thu, 26 March	08:00-09:30	- Financial Aspect of MHP *Chayun Budiono, Faisal Rahadian*
	09:30-09:45	**Coffee break**
	09:45-11:15	- Financial Aspect of MHP (*continued*) *Chayun Budiono, Faisal Rahadian*
	11:15-12:45	- Community Development (Social, Economic and Institutional) *Madhusudhan Adhikari, Faisal Rahadian*
	12:45-13:45	**Lunch break**
	13:45-15:15	- Community Development (Social, Economic and Institutional) (*continued*) *Madhusudhan Adhikari, Faisal Rahadian*
	15:15-15:30	**Coffee break**
	15:30-17:00	- Environmental and Sustainability Aspects of MHP *Saifudin Suaib, Faisal Rahadian*
D-4: Fri, 27 March	08:00-09:30	- Environmental and Sustainability Aspects of MHP (*continued*) *Saifudin Suaib, Faisal Rahadian*

	09:30-09:45	**Coffee break**
	09:45-12:00	- Productive Use of Energy *Amalia Suryani, Faisal Rahadian*
	12:00-14:00	**Lunch break/Friday Prayer**
	14:00-14:45	- Productive Use of Energy (*continued*) *Amalia Suryani, Faisal Rahadian*
	14:45-16:15	- Presentation of MHP Cases *Johnny Ivan, Faisal Rahadian*
	16:15-17:45	- Field study to the Micro Hydro-supported Workshop of 'Prowater' *Johnny Ivan, Faisal Rahadian*
D-5: Sat, 28 March	***Daylong***	- Field Study to Micro Hydro Power Plants *Johnny Ivan, Faisal Rahadian, Upik Jamil, Abu Bakar*
D-6: Sun, 29 March	***Daylong***	Sightseeing/shopping *Recreation to Bukittinggi and surroundings*
D-7: Mon, 30 March	***Daylong***	- Preparation of Action Plan by Country *(Facilitated by Faisal Rahadian)*
D-8: Tue, 31 March	08:00-09:30	- Presentation of Action Plan *(Facilitated by Faisal Rahadian)*
	09:30-09:45	**Coffee break**
	09:45-11:15	- Presentation of Action Plan (*continued*) *(Facilitated by Faisal Rahadian)*
	11:15-12:00	- Check Expectations and Overall Evaluation *Achmad Rofi'ie, Elly Tioria*
	12:00-13:00	**Lunch break**
	13:00-13:30	**Closing Ceremony** ***(Remarks, Certificate Awarding and Group Photo)*** *(MC: Elly Tioria)*
	Coffee break	Free

Evaluation Forms

SUBJECT/FIELD EVALUATION

International Training Programme on
Micro Hydro Power for Rural Development
Padang, Indonesia, 24 - 31 March 2015

Name of Subject/Field :

Name of Trainer/ Resource Person :

Date : **Time :**

Instruction:

Use the following score to indicate the extent to which you agree or disagree with each of the statements below.

Score Code:

Strongly disagree	= 1
Disagree	= 2
Neutral	= 3
Agree	= 4
Strongly agree	= 5

If you have any comment, please write down on the space at the end of each item.

BLOCK A: RELEVANCE

A1. I was able to understand the operating system of Micro Hydro Power. (Level of Understanding)

1	2	3	4	5

Comment:

……

A2. Knowledge/skills gained from this field visit could be applied in my country. (Level of Application)

1	2	3	4	5

Comment:

……

BLOCK B: EFFICIENCY

B1. Documents provided (Training Materials) are appropriate and useful.

1	2	3	4	5

Comment:

……

B2. The Trainer/ The resource person is professional (Method of instruction, Communication skills: clear explanation, clear answers to questions)

1	2	3	4	5

Comment:

……

B3. The time given was appropriate.

1	2	3	4	5

Comment:

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OVERALL EVALUATION

International Training Programme on
Micro Hydro Power for Rural Development
Padang, Indonesia, 24 - 31 March 2015

Instruction:

Use the following score to indicate the extent to which you agree or disagree with each of the statements below.

Score Code:

Strongly disagree	= 1
Disagree	= 2
Neutral	= 3
Agree	= 4
Strongly agree	= 5

If you have any comment, please write down on the space at the end of each item.

BLOCK A: RELEVANCE

A1. The knowledge and practices of Micro Hydro Power for Rural Development scheme seem workable in my country.

1	2	3	4	5

Comment :

.....

.....

A2. The content of the course (how to understand, develop and manage micro hydro power, and its benefit for rural development seem workable in my country.

1	2	3	4	5

Comment:

……..

……..

BLOCK B: EFFECTIVENESS

B1. I was able to achieve the following objectives of this course:

a. Knowledge and practices of Micro Hydro Power.

1	2	3	4	5

Comment:

……

……

b. Explain and analyse Micro Hydro Power Development, its context, actors and venues, its relevance to your host country and the skills it requires.

1	2	3	4	5

Comment:

……

……

B2. The course contents are clearly related to your present or future works.

1	2	3	4	5

Comment:

……

……

BLOCK C: EFFICIENCY

C1. This course has covered the subjects that I expected.

1	2	3	4	5

Comment:

……

……

C2. In general, the study visits arranged were suitable to help me deepen my understanding or further improve my skills on each subject.

1	2	3	4	5

Comment:

……

……

C3. I consider the course is "timely" implemented according to the country's needs in developing micro hydro power (objective of the course).

1	2	3	4	5

Comment:

……

……

C4. One-week course is appropriate.

1	2	3	4	5

Comment:

……...

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Tabulation of Evaluation by Training Subjects

(*Number of participants/correspondents is 17 persons*)

1. Todo Simarmata and Budiman Saragih on *Introduction to Renewable Energy*

No	a1	a2	b1	b2	b3
1	4	5	5	5	5
2	4	4	5	5	5
3	3	3	3	4	3
4	2	3	2	3	3
5	2	2	3	3	3
6	4	4	4	4	4
7	3	2	2	3	3
8	5	5	5	5	4
9	2	2	2	2	2
10	5	4	4	3	4
11	4	3	3	3	3
12	4	4	4	3	4
13	4	4	4	4	4
14	5	5	5	5	5
15	3	3	3	3	4
16	3	4	4	4	3
17	4	5	5	5	5
Total	61	62	63	64	64
Score	3,6	3,6	3,7	3,8	3,8
	3,62		**3,75**		
			Total Score		18,5
			Final Score		**3,69**

2. Madhusudhan Adhikari on *Basic Knowledge of MHP*

No	a1	a2	b1	b2	b3
1	4	4	4	4	4
2	5	5	5	5	5
3	4	4	3	4	4
4	5	5	5	5	5
5	3	3	3	4	4
6	4	4	3	4	4
7	5	5	5	5	4
8	4	4	4	4	4
9	5	5	4	5	5
10	4	4	5	5	4
11	5	5	4	5	5
12	5	4	3	4	4
13	4	5	3	4	5
14	5	5	5	5	5

15	5	5	5	5	5
16	5	5	5	5	5
17	4	4	4	4	4
Total	76	76	70	77	76
Score	4,5	4,5	4,1	4,5	4,5
	4,47		**4,37**		
			Total Score		22,1
			Final Score		**4,41**

3. Priyono Sutikno on *Technical Engineering of MHP*

No	a1	a2	b1	b2	b3
1	3	4	4	4	3
2	4	4	3	3	4
3	4	5	4	5	4
4	5	5	5	5	5
5	5	5	5	5	5
6	5	5	5	5	5
7	4	4	4	4	4
8	4	4	4	3	4
9	3	3	4	3	4
10	4	5	4	5	5
11	4	5	4	5	4
12	4	5	5	4	4
13	3	3	1	4	4
14	5	5	5	5	5
15	5	5	5	5	5
16	5	5	5	5	5
17	4	4	4	4	3
Total	71	76	71	74	73
Score	4,2	4,5	4,2	4,4	4,3
	4,32		**4,27**		
			Total Score		21,5
			Final Score		**4,29**

4. Chayun Budiono on *Financial Aspect of MHP*

No	a1	a2	b1	b2	b3
1	5	5	5	5	5
2	4	5	5	5	5
3	4	4	4	5	5
4	4	4	4	5	5
5	4	4	4	4	4
6	3	3	3	3	4
7	3	3	4	4	4
8	4	4	4	4	4

9	4	5	5	5	5
10	5	5	5	5	5
11	4	5	4	4	4
12	4	4	3	3	4
13	3	3	5	5	5
14	4	4	5	4	4
15	5	5	5	5	5
16	4	4	1	4	3
17	5	5	5	5	5
Total	69	72	71	75	76
Score	4,1	4,2	4,2	4,4	4,5
	4,15		**4,35**		
			Total Score		21,4
			Final Score		**4,27**

5. Madhusudhan Adhikari on *Community Development (Social, Economic and Institutional)*

No	a1	a2	b1	b2	b3
1	4	4	4	4	4
2	4	4	4	4	4
3	4	4	4	5	5
4	4	5	4	5	4
5	3	4	4	3	3
6	3	3	3	4	3
7	5	5	5	5	5
8	4	5	5	5	5
9	5	5	5	5	5
10	3	3	5	5	5
11	5	5	5	5	4
12	4	2	4	4	3
13	3	3	4	4	4
14	4	4	4	5	5
15	5	4	4	4	5
16	5	5	5	5	5
17	5	5	5	5	5
Total	70	70	74	77	74
Score	4,1	4,1	4,4	4,5	4,4
	4,12		**4,41**		
			Total Score		21,5
			Final Score		**4,29**

6. Saifudin Suaib on Environmental and Sustainability Aspects of MHP

No	a1	a2	b1	b2	b3
1	4	3	5	5	4
2	5	5	5	5	5

3	5	5	5	5	5
4	5	5	5	5	5
5	5	4	4	5	4
6	4	5	4	4	4
7	4	4	5	5	5
8	4	4	4	5	4
9	4	4	3	5	4
10	5	5	5	5	5
11	3	3	5	5	5
12	5	5	5	5	5
13	5	5	5	5	5
14	5	5	5	5	5
15	4	4	4	4	4
16	4	4	4	4	4
17	5	5	5	5	4
Total	76	75	78	82	77
Score	4,5	4,4	4,6	4,8	4,5
	4,44		**4,65**		
			Total Score		22,8
			Final Score		**4,56**

7. Amalia Suryani on *Productive Use of Electricity*

No	a1	a2	b1	b2	b3
1	5	5	4	4	4
2	4	4	4	4	4
3	4	3	4	4	4
4	5	5	5	5	5
5	5	5	5	5	5
6	5	5	5	5	5
7	4	4	5	5	5
8	5	5	5	5	5
9	4	4	5	5	5
10	4	2	5	5	4
11	4	5	5	5	5
12	4	3	4	4	5
13	4	4	5	4	5
14	4	4	4	4	4
15	4	4	4	4	4
16	4	3	3	4	4
17	4	5	4	4	4
Total	73	70	76	76	77
Score	4,3	4,1	4,5	4,5	4,5
	4,21		**4,49**		
			Total Score		21,9

Final Score	**4,38**

8. Johnny Ivan and Faisal Rahadian on *Successful Case of MHP Plants in West Pasaman*

No	a1	a2	b1	b2	b3
1	4	4	4	4	4
2	4	4	4	4	4
3	4	4	5	5	5
4	4	4	3	3	3
5	4	4	4	4	5
6	5	5	5	5	5
7	4	4	4	4	4
8	4	5	3	3	4
9	4	4	5	5	5
10	4	3	4	5	4
11	5	5	3	5	3
12	5	5	4	5	4
13	5	5	5	5	5
14	4	4	3	3	2
15	4	4	3	4	3
16	5	5	5	5	5
17	4	5	5	5	5
Total	73	74	69	74	70
Score	4,3	4,4	4,1	4,4	4,1
	4,32		**4,18**		
			Total Score		21,2
			Final Score		**4,24**

9. Johnny Ivan on *Field Study to the Supporting Workshop of Prowater for MHP Plant*

No	a1	a2	b1	b2	b3
1	5	5	5	5	5
2	5	5	5	5	5
3	5	5	4	4	5
4	5	5	3	5	5
5	4	4	4	4	4
6	5	4	4	4	4
7	5	5	5	5	5
8	5	5	5	5	5
9	4	5	4	4	4
10	4	4	3	4	4
11	4	3	3	3	3
12	3	4	3	4	4
13	4	4	4	4	5
14	4	4	4	5	5
15	5	5	5	5	5

16	4	5	5	4	5
17	4	4	4	4	4
Total	75	76	70	74	77
Score	4,4	4,5	4,1	4,4	4,5
	4,44		**4,33**		
			Total Score		21,9
			Final Score		**4,38**

10. *Field Study to MHP Plant of Lembah Derita*

No	a1	a2	b1	b2	b3
1	5	5	5	5	5
2	4	5	4	4	4
3	5	4	4	5	4
4	5	5	5	5	5
5	5	5	3	4	4
6	5	5	5	5	5
7	4	4	4	4	4
8	4	4	3	4	3
9	5	5	5	5	5
10	5	5	5	5	5
11	4	3	3	3	3
12	5	5	5	5	5
13	5	5	5	5	5
14	5	5	5	5	5
15	4	4	4	4	4
16	5	4	4	4	5
17	4	5	5	5	5
Total	79	78	74	77	76
Score	4,6	4,6	4,4	4,5	4,5
	4,62		**4,45**		
			Total Score		22,6
			Final Score		**4,52**

11. *Field Study to MHP Plant of OMPP*

No	a1	a2	b1	b2	b3
1	5	4	3	4	5
2	5	5	5	5	5
3	4	5	4	4	4
4	5	4	4	5	4
5	5	5	5	5	5
6	5	4	3	4	4
7	5	5	5	5	5
8	4	4	3	4	3
9	5	5	5	5	5

10	4	3	3	3	3
11	5	5	5	5	5
12	5	4	4	4	5
13	5	5	5	5	5
14	4	4	4	4	4
15	5	5	5	5	5
16	5	5	5	5	5
17	5	5	5	5	5
Total	81	77	73	77	77
Score	4,8	4,5	4,3	4,5	4,5
	4,65		**4,45**		
			Total Score		22,6
			Final Score		**4,53**

12. *Field Study to MHP Plant of Rimbo Batu*

No	a1	a2	b1	b2	b3
1	4	4	3	4	3
2	4	4	5	5	5
3	4	4	5	5	5
4	5	5	5	5	5
5	4	5	4	4	4
6	5	4	4	5	4
7	5	5	5	5	5
8	5	4	3	4	4
9	5	5	5	5	5
10	4	4	4	4	4
11	5	5	5	5	5
12	5	5	5	5	5
13	4	4	3	3	3
14	5	4	4	4	5
15	5	5	5	5	5
16	4	4	4	4	4
17	5	5	5	5	5
Total	78	76	74	77	76
Score	4,6	4,5	4,4	4,5	4,5
	4,53		**4,45**		
			Total Score		22,4
			Final Score		**4,48**

Documentation

Group photo of participants

Welcoming Remarks by Upik Jamil,
Ministry of Energy and Mineral Resources

Opening Remarks by H.E. Ambassador Esti Andayani,
Director General of Information and Public Diplomacy, Ministry of Foreign Affairs,
and Director of NAM CSSTC

Briefing on the Programme and Logistics

Presentation of Country Paper by Participants

Class Session at the Grand Zuri Hotel, Padang

Welcoming Dinner hosted by NAM CSSTC

Dancing together on the Welcoming Dinner

Discussion between resource person and participants

Group discussion

Field Session at the Micro Hydro Workshop of Prowater

Discussion on the production of turbine at the Prowater Workshop

Padang traditional dances welcoming participants at the MHP Plants in West Pasaman

Group photo with the Board of MHP Plants

Observation of the Power House

Turbine made in Padang used in the Power House

Observing flow of water

Observing the operation of micro hydro power works

Recreation to Bukittinggi and surroundings

At the entrance of the historical Japanese tunnel

In the historical Japanese tunnel

Back to class: Preparation of Action Plan by Participants

Discussions during preparation of action plan

Presentation of Action Plan by Participants

Participants' representative from the Philippines giving remarks on the Closing Session

Upik Jamil of the Ministry of Energy and Mineral Resources giving remarks on the Closing Session

Sukiman, Ministry of Energy and Mineral Resources of Indonesia,
awarding Certificate to the Participant on the Closing Session

Subandiyo Subardjo of NAM CSSTC
awarding Certificate to the Participant on the Closing Session

Upik Jamil awarding Letter of Appreciation to Faisal Rahadian, the Training Coordinator, on the Closing Session

Achmad Rofi'ie of NAM CSSTC delivering Closing Remarks on the Closing Session