



## **Narrative Report**

# **INTERNATIONAL TRAINING ON RENEWABLE ENERGY: BIOGAS ENERGY FOR COMMUNITY DEVELOPMENT**



held in cooperation of:  
Government of the Republic of Indonesia,  
Inter-church Organization for Development Cooperation (ICCO) and  
Non-Aligned Movement  
Centre for South-South Technical Cooperation (NAM CSSTC)

**Solo, Indonesia, 22 - 29 October 2013**



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## **I. Background**

Renewable energy is energy that comes from resources which are continually replenished such as sunlight, wind, rain, tides, waves and geothermal heat. About 16% of global final energy consumption comes from renewable resources, with 10% of all energy from traditional biomass, mainly used for heating, and 3.4% from hydroelectricity. New renewables (small hydro, modern biomass, wind, solar, geothermal, and biofuels) accounted for another 3% and are growing very rapidly. The share of renewables in electricity generation is around 19%, with 16% of electricity coming from hydroelectricity and 3% from new renewables, including biogas.

Rural development in developing countries has been given high priority. Programmes to empower rural communities have been in place. Infrastructure such as roads, bridges and electricity have been improved to support socio-economic activities. However, many people in many developing countries, have lack of access to economical and convenient energy sources. For various reasons, energy services provided by the government or the private sector are difficult to access by those living in remote areas. When accessible, the communities – mostly the poor – are burdened by the expensive price of the services, leading to an even more economically vulnerable state.

## **II. Context**

In many cultures - especially the poor - women and children are assigned to do the cooking and household chores. They become reliant on traditional forms of fossil fuels and natural resources such as coal and firewood and collecting them is a daily routine which isn't only time consuming but energy draining. The use of traditional fuel generating processes while being exposed to smoke on a daily basis, makes them susceptible to respiratory tract infection and eye disease.

Individual biogas systems are already benefitting many households in developing countries, such as in Nepal, India, China, Indonesia and elsewhere. Biogas technology brings a lot of benefits, including contributing toward eradication of poverty and providing greater food security. The utilization of biogas will greatly affect health conditions of local communities, open new employment opportunities, and also affect the

local economy. Although the Millennium Development Goals (MDGs) do not specifically target the energy sector, indirectly biogas technology undoubtedly has a positive impact on the fulfillment of MDGs in developing countries.

### **III. Training Programme on Biogas Energy**

The Government of Indonesia (Ministry of Foreign Affairs and Ministry of Energy & Mineral Resources) in cooperation with the Inter-Church Organization for Development Cooperation (ICCO) and the Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC) have successfully conducted an International Training Programme on Renewable Energy: Biogas Energy for Community Development.

The training programme was conducted from 22 to 29 October 2013 in Royal Surakarta Heritage Hotel, Solo. Field studies were conducted at the private-owned biogas unit plant of Supardi in Karangnongko Village and Livestock Farmers Group of Sambu Mulyo in Sambu Village of Boyolali District.

The participants were requested to present their respective country papers on the last session. The 8 (eight) Training Subjects were shared in the Class Session, namely: (1) Policy and Regulation of Renewable Energy; (2) Introduction to Biogas Energy Development; (3) Characteristics and Design of Biogas Energy; (4) Social, Economic and Financial Aspects; (5) Community Development; (6) Biogas Unit Plant Development; (7) Environmental Aspect; and (8) Case of Livestock Farmers Group of Sambu Mulyo in Boyolali; In addition, there were also field studies made in two villages of Boyolali District.

On the concluding session the participants also prepared and presented their Action Plans to be implemented in their respective countries when they are back home.

The series of evaluations were also made by using forms as described in the Chapter X, *pages 8-16*. Participants were also requested to express their expectations to be further discussed in the last session. In conclusion the training is satisfactorily achieved its objectives.

### **IV. Programme Achievements**

#### **IV.1. Goal**

Goal of the project is that the trainee is expected to:

- a. Acquire a complete comprehension on basic knowledge and technical aspects of biogas;
- b. Acquire necessary skills to develop biogas plant in his/her country;
- c. Produce an action plan to be followed-up upon his/her return to his/her country/organization;
- d. Learn from each other's experiences across the country.

#### IV.2. Objective

The main objective of the training is to provide an instant benefit to energy-related policy makers and renewable energy (especially biogas) practitioners. Upon completion of this training the trainee is expected to be aware of: (i) the importance of renewable energy; (ii) biogas energy development; (iii) environmental aspect; (iv) technical aspect and benefits of biogas; and (v) social and economic aspects.

#### IV.3. Substance

The training programme covered the following subjects:

- a. Policy and regulation of renewable energy;
- b. Introduction to biogas development;
- c. Characteristics and design of biogas;
- d. Social, economic and financial aspects;
- e. Community development;
- f. Biogas unit plant development;
- g. Environmental aspect;
- h. Case of livestock farmers group of Sambi Mulyo;
- i. Field study at the individual biogas unit plant in Karangnongko Village of Boyolali District;
- j. Field study at the community-owned biogas unit plant in Sambi Village of Boyolali District.

#### IV.4. Criteria of Successful Achievement

Criteria of successful achievement is as follows:

- a. Participant's expectations are met;
- b. Training subjects delivered and discussed are relevant and clearly understood;
- c. Methodology applied is appropriate;
- d. Field studies enriched participants with technical aspects of the subjects concerned;
- e. Participants prepared workable action plans.

#### IV.5. Participant's Actual Inputs and Outputs

The participant's actual inputs and outputs are: (1) provision of participant's countries situation; and (2) Action Plans prepared by participants on country basis.

### **V. Methodology**

The training programme was conducted through class session and field session.

### *V.1. Class Session*

The training session is highly participatory and the teaching methods are based on adult learning methodology that includes presentation on basic technical knowledge of biogas, case studies, group exercises and discussions. Very little lecturing is used as this training is meant to be practical and of immediate benefit to the participant.

### *V.2. Field Session*

Field study to the best practice of biogas energy plant is important part of the Training Programme. In this regard there are two different ownership schemes of biogas plant were studied at Supardi's and Sambu Mulyo's field sites.

### *V.3. Country Report*

Country reports relating to problems and potentials of renewable energy development, especially of biogas energy, in the participant's respective countries were shared by participants.

### *V.4. Language*

The official language of the Training Programme is English.

## **VI. Key Implementing Strategy**

Key strategies of the project implementation are as follows:

- a. Sharing of knowledge and experiences between participants and trainers/resource persons;
- b. Sharing of comparative experiences among participant of different countries;
- c. Promotion of green works;
- d. Transfer of knowhow and skills;
- e. Promotion of green development efforts;
- f. Application of appropriate and affordable technology.

## **VII. Programme Activities**

The Course Leader who successfully managed the programme activities is Endang Widayati (Ms) of the Ministry of Energy and Mineral Resources. The supporting officials for administration and logistics are Christina Sudiro (Ms) of NAM CSSTC and Vina Novianti (Ms) of the Ministry of Foreign Affairs.

The Training Agenda was organized as follows:

Date	Session	Programme of Activity
<b>Tue,</b> Oct 22	09.00 – 09.30	<b>Opening Ceremony</b>
	09.30 – 09.45	Coffee break
	09.45 – 10.30	Briefing on the Programme and Logistics <i>Christina Sudiro and Endang Widayati</i>
	10.30 – 12.00	Policy and Regulation on Renewable Energy <i>Dr. Dadan Kusdiana</i>
	12.00 – 13.00	Lunch break
	13.00 – 15.15	Introduction to Biogas Energy <i>I Teja Harjaya and Salafudin</i>
	15.15 – 15.30	Coffee break
	15.30 – 16.15	Introduction to Biogas Energy (cont'd) <i>I Teja Harjaya and Salafudin</i>
	16.15 – 17.45	Characteristics and Design of Biogas Energy <i>I Teja Harjaya and Salafudin</i>
<b>Wed,</b> Oct 23	08.00 – 09.30	Characteristics and Design of Biogas Energy (cont'd) <i>I Teja Harjaya and Salafudin</i>
	09.30 – 09.45	Coffee break
	09.45 – 12.00	Characteristics and Design of Biogas Energy (cont'd) <i>I Teja Harjaya and Salafudin</i>
	12.00 – 13.00	Lunch break
	13.00 – 15.15	Characteristics and Design of Biogas Energy (cont'd) <i>I Teja Harjaya and Salafudin</i>
	15.15 – 15.30	Coffee break
	15.30 – 17.45	Social, Economic and Financial Aspects <i>I Teja Harjaya and Salafudin</i>
<b>Thu,</b> Oct 24	08.00 – 08.45	Social, Economic and Financial Aspects (cont'd) <i>I Teja Harjaya and Salafudin</i>
	08.45 – 09.30	Community Development <i>Tri Mumpuni</i>
	09.30 – 09.45	Coffee break
	09.45 – 12.00	Community Development (cont'd) <i>Tri Mumpuni</i>
	12.00 – 13.00	Lunch break
	13.00 – 14.30	Community Development (cont'd) <i>Tri Mumpuni</i>
	14.30 –	Biogas Unit Plant Development

<b>Fri,</b> Oct 25	15.15	<i>Prof. Dr. Muchammad Junus</i>
	15.15 – 15.30	Coffee break
	15.30 – 17.45	Biogas Unit Plant Development (cont'd) <i>Prof. Dr. Muchammad Junus</i>
	08.00 – 09.30	Biogas Unit Plant Development (cont'd) <i>Prof. Dr. Muchammad Junus</i>
	09.30 – 09.45	Coffee break
	09.45 – 12.00	Biogas Unit Plant Development (cont'd) <i>Prof. Dr. Muchammad Junus</i>
	12.00 – 13.00	Lunch break
	13.00 – 15.15	Biogas Unit Plant Development (cont'd) <i>Prof. Dr. Muchammad Junus</i>
	15.15 – 15.30	Coffee break
	15.30 – 17.00	Environmental Aspect <i>Prof. Dr. Muchammad Junus</i>
	17.00 – 17.45	Presentation of Case of Livestock Farmers Group of Sambi Mulyo <i>Sulistyo</i>
<b>Sat,</b> Oct 26	08.00 – 12.00	Field Study at the Individual Biogas Unit Plant owned by Supardi Site: Karangnongko Village, Boyolali
	12.00 – 13.00	Lunch break
	13.00 – 17.00	Field Study at the Livestock Farmers Group of Sambi Mulyo Site: Sambi Village, Boyolali
<b>Sun,</b> Oct 27	08.00 – 12.00	Field Trip to Prambanan Temple
	12.00 – 13.00	Lunch break at the Kasultanan Palace
	13.00 – 14.00	Visit the Museum of Ngayogyakarta Palace
	14.00 – 17.00	Shopping along the Malioboro Street
<b>Mon,</b> Oct 28	08.00 – 09.30	Presentation of Country Papers
	09.30 – 09.45	Coffee break
	09.45 – 11.15	Presentation of Country Papers (cont'd)
	11.15 – 12.00	Preparation of Action Plan (Briefing by Achmad Rofi'ie)
	12.00 – 13.00	Lunch break

	13.00 – 15.15	Preparation of Action Plan (cont'd)
	15.15 – 15.30	Coffee break
	15.30 – 17.45	Finalization of Action Plan
<b>Tue, Oct 29</b>	08.00 – 09.30	Presentation of Action Plan
	09.30 – 09.45	Coffee break
	09.45 – 12.00	Check Expectations and Overall Evaluation <i>Christina Sudiro and Vina Novianti</i>
	12.00 – 13.00	Lunch break
	13.00 – 14.00	<b>Closing Ceremony and Certificate Awarding</b>

## VIII. Participants

Total participant is 19 persons from Bangladesh, Cambodia, Cuba, Indonesia, Lao PDR, Malaysia, the Philippines, Thailand and Vietnam.

They are from the government agencies, banks, state-owned energy institutions, university and non-governmental organizations. Details are as follows:

No	Country	Name	Office
1	Bangladesh	S.M. Ferdous Hossain	Bangladesh Bank
2	Bangladesh	Shad Md. Waheeduzzaman	Bangladesh Bank
3	Bangladesh	T.I.M. Rawshan Zadeed	Trust Bank Limited
4	Cambodia	Leang Khemarith	Ministry of Industry, Mines and Energy
5	Cambodia	Chum Sopha (Ms)	Department of Energy Technique
6	Cuba	Joel Gonzalez	Ministry of Energy and Minery
7	Indonesia	Setyo Prabowo	District Environmental Agency
8	Indonesia	Budi Listyono	District Environmental Agency
9	Indonesia	Yuli Yanti (Ms)	University of Sebelas Maret
10	Indonesia	Deden Hilga Safari	Association of Biogas
11	Lao PDR	Alounny Phommakone (Ms)	Institute of Renewable Energy Promotion
12	Lao PDR	Kongsin Xaiyalin	Ministry of Science and Technology
13	Malaysia	Fikri Mohd. Shamsuddin	Sustainable Energy Development Agency
14	Malaysia	Shanti Faridah Salleh (Ms)	University of Malaysia Sarawak
15	Philippines	Bienvenido H. Padilla, Jr.	Village Engineering Specialist Inc.
16	Thailand	Jariya Budnard	Department of Alternative Energy Dev't
17	Thailand	Pornpan Chanapiwat (Ms)	Department of Alternative Energy Dev't
18	Vietnam	Nguyen Duy Duong	Centre for Environmental Research
19	Vetnam	Tran Thi Hong Ha (Ms)	Institute of Geodesy and Cartography

## IX. Resource Persons

Resource persons are from the Indonesian Ministry of Energy and Mineral Resources, Universities, the Association of Biogas Indonesia and Institute for People's Economic Business Development. Details are as follows:

No	Name	Institution
1	Dr. Dadan Kusdiana	Ministry of Energy and Mineral Resources
2	Eng. Ignatius Teja Harjaya	Association of Biogas Indonesia
3	Eng. Salafudin	Association of Biogas Indonesia
4	Eng. Tri Mumpuni (Ms)	Institute for People's Economic Business Development
5	Prof. Dr. Muchammad Junus	University of Brawijaya
6	Eng. Sulistyono	University of Sebelas Maret

## X. Expectations and Evaluations

Prior to the starting session, 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 at the ending session. They all together checked whether their expectations were met or not. There were also series of post-class and post-field evaluations by subjects. Overall evaluation was also made before the Closing Session.

The results are as follows:

### X.1. Check Participant's Expectations:

No	EXPECTATIONS	MET			NOT MET		
		10	8	6	4	2	0
<b>I</b>	<b>ON THE GENERAL KNOWLEDGE RELATED WITH RENEWABLE ENERGY</b>						
1	Will the programme include other than Biogas of Renewable Energy, like: - Solar energy, its cost effectiveness in domestic and commercial size - Brick Kiln its potential in Indonesia. ( T.I.M. Rawshan Zadeed, Bangladesh)					√	
2	The Economy of Bangladesh depends largely on agricultural sectors. Biogas energy is one of the agricultural sectors. So, we like to share with the renewable energy production system for the rural area of Indonesia. (S.M. Ferdous Hossain, Bangladesh)		√				
3	I want to know technology & experience about biogas energy for community in Indonesia and other countries in this training. (Leang Khemarith, Cambodia).				√		
4	I want to know the renewable energy technology in Asian countries.(Chum Sopha, Cambodia).			√			
5	I want to know the experience of Asian countries. In the renewable energy area, the potential of uses, technologies, and the participation of	√					

	renewable energies in the energetical matrix of all the participants countries. (Joel González González, Cuba).						
6	Renewable Energy, wind, bio energy, ocean, geothermal. (Setyo Prabowo, Indonesia)				√		
7	I can learn how to build biogas design technically. (Budi Listyono, Indonesia).		√				
8	Renewable energy is energy that would not be run out. Kind of renewable energy are from animal waste, wind water, etc. (Yuli Yanti, Indonesia).		√				
9	I am new in Biogas business. So, I want to know many things of biogas as a knowledge, business, regulation, and experiences of other participants. I want to have many more friends in biogas field that I can work with them someday. (Deden Hilga Safari, Indonesia).	√					
10	Lao PDR has any potential renewable energy such as: Wind power, Small hydropower, Biofuel, Biogas, Solar Energy. Government target using Renewable energy in 2025 is 30%. (Alounny Phommakone, Lao PDR).			√			
11	In Lao PDR have potentials such as: Biofuel, Biomass, Hydro power, Solar, Wind & Biogas. (Kongsin Xaiyalin, Lao PDR).		√				
12	To gain knowledge and experiences on Biogas renewable energy in Indonesia which can be shared to Malaysia for implementation. (Fikri Mohd Shamsuddin, Malaysia).			√			
13	To be able to understand the potential & applications of biogas energy in Indonesia & the world. Also, to identify the problems & challenges associated with biogas energy/ renewable energy implementation. (Shanti Faridah Salleh, Malaysia).		√				
14	To learn basics of different renewable energy sources. Compare their potentials benefit, cost per Kwh energy produced, best practices in different countries biogas, biomass, solar, wind, Hydro. (Bienvenido H. Padilla, Jr., Philippines).				√		
15	- Introduction of each renewable energy, such as: Bioenergy, Solar biomass Geothermal, Biogas, Municipal waste - Policy and target about renewable energy of each country that participate in this training - Supporting mechanism. (Jariya Budnard, Thailand).			√			
16	- General information of renewable energy, such as: hydro power, solar, biomass, geothermal, etc. - Technologies for renewable energy. (Pornpan Chanapiwat, Jr., Thailand).			√			
17	- Biogas technology for future - Biogas is clean energy. (Nguyen Duy Duong, Vietnam).			√			
18	- What is biogas, basic information about biogas component, material producing, the process of making it, advantages and disadvantages when use it, is it a complete environmentally friendly product (because it contains CH <sub>4</sub> which can easily burn). - How to encourage more people to the biogas when there are still many of obstacles and challenges (technical, management & financial support). (Tran Thi Hong Ha, Vietnam).			√			

II	ON THE BASIC TECHNICAL ASPECTS OF BUILDING AND DEVELOPING BIOGAS ENERGY						
1	<ul style="list-style-type: none"> <li>- Various size &amp; diameter of domestic biogas/ family / hours cooking. (T.I.M. Rawshan Zadeed, Bangladesh)</li> <li>- Commercial size of biogas/hour cost and investment size. (T.I.M. Rawshan Zadeed, Bangladesh)</li> </ul>			√			
2	<ul style="list-style-type: none"> <li>- Find the difference between the technology of biogas plant in your country with ours</li> <li>- Remove of moisture, SO<sub>2</sub> from biogas. (Shad Md. Waheeduzzaman, Bangladesh)</li> </ul>	√					
3	<ul style="list-style-type: none"> <li>- How many biogas plant in the rural area of Indonesia.</li> <li>- What is the general technique to produce bio energy in Indonesia. (S.M. Ferdous Hossain, Bangladesh)</li> </ul>		√				
4	I want to know how technology to build bio digester and how to use fertilizer. (Leang Khemarith, Cambodia).			√			
5	I want to know how bio digester building and developing biogas plant in Indonesia. (Chum Sopha, Cambodia).			√			
6	I want to know the technologies of building, their efficiency, time of construction, materials, etc. How to improve the biogas production, and the uses of biogas, and the different technologies to do it. (Joel González González, Cuba).	√					
7	We need animal waste and location if to build and develop biogas plant. Because this is principle. (Setyo Prabowo, Indonesia).		√				
8	To build and develop biogas plant need high cost. Indonesian farmers would have financial problem to build it. Because they have only 1-3 cattles in their farm. I hope I can find solution. (Yuli Yanti, Indonesia).		√				
9	I want to know many more techniques of building & developing biogas from other participants, which can be adopted in my organization business. (Deden Hilga Safari, Indonesia).		√				
10	I have general basic of knowledge regards to biogas based on referring books and site visit for the biogas plant in Malaysia. Perhaps in this training could give me the details & more information about biogas in term of technical aspects. (Fikri Mohd Shamsuddin, Malaysia).			√			
11	<ul style="list-style-type: none"> <li>- The design of biogas plant</li> <li>- To optimize the design of biogas plant</li> <li>- To analyze the design of biogas plant upon commissioning &amp; operation</li> <li>- To trouble shoot any problems associated with biogas plant. (Shanti Faridah Salleh, Malaysia).</li> </ul>			√			
12	To learn basic-advance technical knowledge on biogas plant; compare best design, management practices, cost per kwh produced of different models. (Bienvenido H. Padilla, Jr., Philippines).		√				
13	<ul style="list-style-type: none"> <li>- Technology of biogas production</li> <li>- Utilization of biogas</li> <li>- Standardization and regulations of biogas plant. (Jariya Budnard, Thailand).</li> </ul>		√				

14	- Technologies which apply and develop for biogas plant - Financial & economic aspects of biogas development - Utilization of biogas production. (Pornpan Chanapiwat, Jr., Thailand).	√					
15	The Biogas technical. (Nguyen Duy Duong, Vietnam).		√				
16	Scale (appropriate scale for household & industrial field). (Tran Thi Hong Ha, Vietnam).		√				
<b>III</b>	<b>HOW YOU MAY RELATE THE SUBSTANCES (EITHER POLICY OR TECHNICAL ASPECTS) THAT WILL BE DELIVERED IN THE SESSION TO YOUR COUNTRY'S INTEREST</b>						
1	- Biogas interested commercial concern in rural areas. - Solar related irrigation pumping/interested farmers depend on cost. (T.I.M. Rawshan Zadeed, Bangladesh)			√			
2	Mid-range biogas plant (volume of bio digester is greater than 50 cubic meter up to 110 cubic meter. (Shad Md. Waheeduzzaman, Bangladesh)				√		
3	I relate the system of production of renewable energy in Indonesia with our country. (S.M. Ferdous Hossain, Bangladesh).			√			
4	I will deliver technical from this session to develop bio digester for community in my country. (Leang Khemarith, Cambodia).		√				
5	At the end of training, I will deliver the knowledge here to colleagues in my country. (Chum Sopha, Cambodia).			√			
6	Maybe are include in the class session, but I want specific technical aspects of electricity production with biogas, uses biogas in a boiler to produce steam or heating water, and any aspects related to this two applications of biogas. (Joel González González, Cuba).			√			
7	- We hope building and developing biogas can reduce water pollution of stream. (Setyo Prabowo, Indonesia).		√				
8	We know that energy from fossil will decrease in amount by years. And renewable energy can developed in my country. There are many sources to build biogas plant. Because Indonesia has many livestock, especially cattle. The theory and technical aspects will very helpful to enrich my knowledge and I can spread it out to my students and colleagues to develop our biogas for Indonesia better future. (Yuli Yanti, Indonesia).		√				
9	I work in a good biogas association and some are very professional people. And I have a good relation with local government. Things could make me related the substance is the training with my country's interest, especially in local government where I live. (Deden Hilga Safari, Indonesia).		√				
10	Lao PDR has Pilot project. (Alounny Phommakone, Lao PDR).			√			
11	In my country make Biogas for use cooking. (Kongsin Xaiyalin, Lao PDR).		√				
12	Malaysia have some resources like Indonesia. Perhaps this training could give me more knowledge of technical aspects. I think the technologies, regulation, benefit for community & implementation of biogas is important knowledge to deliver to my country. (Fikri Mohd Shamsuddin, Malaysia).		√				
13	We are in the beginning stage of exploring the potential of biogas energy as well as setting up biogas plant. (Shanti Faridah Salleh, Malaysia).		√				

14	To learn how to apply these technology in rural areas in Phillipines for various scope of farm, e.g/ton. Example: 6-10 pigs = Model 1, 11-25 pigs = Model 2, 26-50 pigs = Model 3, 51-100 pigs = Model 4. (Bienvenido H. Padilla, Jr., Philippines).		✓				
15	Review of renewable energy or biogas energy situation of each country. (Jariya Budnard, Thailand).	✓					
16	Review the situation of renewable energy, especially biogas energy in each country. (Pornpan Chanapiwat, Jr., Thailand).	✓					
17	International standard for constructing biogas plants. (Tran Thi Hong Ha, Vietnam).			✓			
<b>IV</b>	<b>POSSIBLE APPLICATION OF KNOWLEDGE AND EXPERIENCES SHARED IN THE SESSION TO YOUR COUNTRY'S RENEWABLE ENERGY PROGRAMME</b>						
1	By arranging skill development program in rural areas with the help of CIRDAP & Bangladesh Bank. (T.I.M. Rawshan Zadeed, Bangladesh)			✓			
2	Biogas and Solar Energy. (Shad Md. Waheeduzzaman, Bangladesh)		✓				
3	Theoretical & technical knowledge of experience can be shared. (S.M. Ferdous Hossain, Bangladesh).		✓				
4	I hope that when finish this session, I will get more knowledge and experiences to develop bio digester in my country. (Leang Khemarith, Cambodia).		✓				
5	After finish the session proramme, I will develop in my country. (Chum Sopha, Cambodia).			✓			
6	We are working in the production of electricity with biogas. We have 3 plants as experimental facility. (Joel González González, Cuba).		✓				
7	Renewable energy programme to substitute current use of petroleum and contribute in mitigating greenhouse gas emission. (Setyo Prabowo, Indonesia).		✓				
8	It is very possible to implement the knowledge gained from this training, because there are still many farmers in Indonesia who cannot build biogas plant yet. (Yuli Yanti, Indonesia).	✓					
9	I work in biogas business, so I can apply all knowledges and experiences share in the session easily. My biogas association has a good relationship with Energy & Resources Ministry. These all, I think I can influence my country renewable programme. (Deden Hilga Safari, Indonesia).	✓					
10	Lao PDR has any pilot project support by SNV and now preparing studies. (Alounny Phommakone, Lao PDR).			✓			
11	- Technical aspects - Implementation aspects - Regulation aspects - Benefit to country other than generating electricity - Incentive to the producers. (Fikri Mohd Shamsuddin, Malaysia).			✓			
12	- To be able to tap and identify the potential of biogas energy. - To set up a biogas plant for rural area/ community. (Shanti Faridah Salleh, Malaysia).		✓				
13	To be able to make recommendations to government authority and people/community groups/ cooperatives, how to improve renewable energy and appreciate their benefits in the long term; Produce a promotional manual perhaps. (Bienvenido H. Padilla, Jr., Philippines).		✓				

14	<ul style="list-style-type: none"> <li>- Policy &amp; target of renewable energy</li> <li>- Current situation of renewable energy development</li> <li>- Current situation of biogas development. (Jariya Budnard, Thailand).</li> </ul>	<u>√</u>					
15	<ul style="list-style-type: none"> <li>- Policy &amp; target of renewable energy development</li> <li>- Current situation of renewable energy development</li> <li>- Current situation of biogas development. (Pornpan Chanapiwat, Jr., Thailand).</li> </ul>	<u>√</u>					
16	<ul style="list-style-type: none"> <li>- Help &amp; encourage more people (especially in rural &amp; remote areas) to build biogas plants.</li> <li>- Biogas technology has been developed fastly in Vietnam recently. Warning farmers and people who intend to build biogas plants should follow the standard. (Tran Thi Hong Ha, Vietnam).</li> </ul>		<u>√</u>				
<b>V</b>	<b>OTHER EXPECTATIONS</b>						
1	Any funding channel with lower cost to reach the community (T.I.M. Rawshan Zadeed, Bangladesh)			<u>√</u>			
2	<p>Multiple use of gas, such:</p> <ul style="list-style-type: none"> <li>a. Cooking</li> <li>b. Lighting</li> <li>c. Generating electricity</li> <li>d. Running irrigation pump</li> <li>e. Bio-fertilizer from slurry</li> <li>f. Removal of moisture from bio fertilizer to get good quality organic manure.</li> <li>g. Marketing procedure of organic manure in your country.</li> <li>h. Types of biogas generator</li> <li>i. Thermal control system of bio digester</li> <li>j. How to involve community to construct mid-range biogas plant &amp; to get maximum benefit from plant.</li> <li>k. Financing facility at lower interest rate. (Shad Md. Waheeduzzaman, Bangladesh)</li> </ul>			<u>√</u>			
3	Bangladesh has several tremendous growth in recent years. A rapid economic growth, rapid urbanization increased industrialization and development. So we can like to share our experience with other participants of different countries. We also like to share our experience in renewable energy and biogas plant with rest of participants. We also like to know the economic progress in rural area of other countries. If there is anything which is very much in special nature for this sector that can be shared with each others. We can share policy guidelines of the government and central bank. Finance and reference scheme of central bank, energy ministry and commercial bank. (S.M. Ferdous Hossain, Bangladesh)		<u>√</u>				
4	I can have many knowledge from other country cases about biogas as renewable energy and how to solve it. I expect I can have more knowledge from this training. I can share my knowledge to other participants. (Yuli Yanti, Indonesia).	<u>√</u>					
5	<ul style="list-style-type: none"> <li>- I can meet &amp; have friend who can work with</li> <li>- A better relationship with the government. (Deden Hilga Safari, Indonesia).</li> </ul>	<u>√</u>					
6	Transfer this training technology development for my country. (Kongsin Xaiyalin, Lao PDR).	<u>√</u>					

7	<ul style="list-style-type: none"> <li>- To create network between organizations in other countries</li> <li>- To create corporation between organization which can benefit on how to make renewable energy is one of important energy.</li> <li>- To promote the Renewable energy in world &amp; give motivation to people of how important renewable energy is.</li> <li>- In regulation part: To find out the benefit to producer other than given the FIT rates (which implemented) in Malaysia.</li> <li>- To get suitable FIT rates based o the cost, risk, etc. which need to revise the rate. (Fikri Mohd Shamsuddin, Malaysia).</li> </ul>	√					
8	Sharing of knowledge from other participated countries. (Shanti Faridah Salleh, Malaysia).	√					
9	Find partners from the group of participants, expert in renewable energy and agencies committed to international and community development to help in establishing a national biogas development programme from small scale livestock farms in rural Philippines. Lastly, I also expect to learn best models and practices from the panel speakers and participants from other countries, beside Indonesia experts. (Bienvenido H. Padilla, Jr., Philippines).	√					
10	<ul style="list-style-type: none"> <li>- I would to know about renewable energy situation of each country, such as: Policy &amp; target of renewable energy, supporting mechanism, current situation of renewable energy. Or especially for biogas energy development.</li> <li>- Website or email og our group for sharing/update information after we finish the training. (Jariya Budnard, Thailand).</li> </ul>	√					
11	<ul style="list-style-type: none"> <li>- Policy regulation &amp; target on renewable energy for each country, especially biogas energy</li> <li>- Biogas energy for community development: Technologies, Capacity, Utilization &amp; Application. (Pornpan Chanapiwat, Jr., Thailand).</li> </ul>	√					
12	Sharing knowledge & experiences of Indonesia. (Tran Thi Hong Ha, Vietnam).	√					
<b>Total</b>		<b>19</b>	<b>31</b>	<b>24</b>	<b>4</b>	<b>1</b>	<b>0</b>
		<b>74</b>			<b>5</b>		
<b>Percentage</b>		<b>93.7</b>			<b>6.3</b>		

Based on the percentage of met expectations (93.7%), we may conclude that the participants are satisfied with the training programmes that have met their expectations.

*As a 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.*

#### *X.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 tabulation result of the filled up questionnaires shows the summary as follows:

No	a1	a2	b1	b2	b3	Score	Relevance	Efficiency	Name
1	2,9	2,8	3,1	3,1	2,9	<b>2,93</b>	<b>2,83</b>	<b>3,00</b>	Dadan Kusdiana
2	1,8	1,9	1,7	1,8	2,1	<b>1,86</b>	<b>1,86</b>	<b>1,85</b>	Teja & Salafudin
3	1,8	2,0	1,9	1,9	1,8	<b>1,89</b>	<b>1,92</b>	<b>1,88</b>	Teja & Salafudin
4	1,8	1,9	2,1	1,9	1,8	<b>1,89</b>	<b>1,84</b>	<b>1,93</b>	Teja & Salafudin
5	4,3	4,3	3,8	4,6	4,5	<b>4,31</b>	<b>4,32</b>	<b>4,30</b>	Tri Mumpuni
6	2,6	2,9	2,2	2,5	2,8	<b>2,60</b>	<b>2,74</b>	<b>2,51</b>	Muchammad Junus
7	2,5	2,9	2,4	2,6	2,8	<b>2,64</b>	<b>2,71</b>	<b>2,60</b>	Muchammad Junus
8	1,7	1,5	1,7	1,2	1,6	<b>1,57</b>	<b>1,63</b>	<b>1,53</b>	Sulistyo
9	4,3	4,5	4,2	4,3	4,5	<b>4,34</b>	<b>4,37</b>	<b>4,32</b>	Field Study 1
10	4,3	4,5	4,3	4,2	4,5	<b>4,36</b>	<b>4,39</b>	<b>4,33</b>	Field Study 2
	<b>2,80</b>	<b>2,92</b>	<b>2,74</b>	<b>2,82</b>	<b>2,92</b>	<b>2,84</b>	<b>2,86</b>	<b>2,82</b>	Average

*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 subjects delivered in the Class Session and/or Field Session are well understood by the participants and most appropriate for them.*

*[a1=level of understanding; a2=level of application; b1=training material; b2=professionalism of resource person; b3=time given; a1+a2=relevance; b1+b2+b3=efficiency].*

As reference, following is the number of subjects evaluated (left column of the above table):

1. Policy and Regulation of Renewable Energy
2. Introduction to Biogas Development
3. Characteristics and Design of Biogas
4. Social, Economic and Financial Aspects
5. Community Development
6. Biogas Unit Plant Development
7. Environmental Aspect
8. Case of Farmers Group of Sambi Mulyo
9. Field Study 1 at Supardi
10. Field Study 2 at Sambi Mulyo

### *X.3. Result of Overall Evaluation:*

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

#### **1. On Relevance of the Training:**

- Training subjects and contents (70%)

## 2. On Effectiveness of the Training:

- Training objective (80%)
- Learning achievement (90%)
- Development of action plan (90%)

## 3. On Efficiency of the Training:

- Training inputs (85%)
- Training management (90%)
- Training environment (70%)
- Development of follow-up mechanism (65%)

*The score range is from 1 to 5. [1=strongly disagree/not satisfied/not beneficial/not capable/not appropriate to 5=strongly agree/highly satisfied/very beneficial/very capable/very appropriate], and choice of No and Yes. If the average score of all training subjects is closer to 5, it means that overall subjects delivered in the Class Session and/or Field Session are well understood by the participants and most appropriate for them. Result of the tabulation is stated in percentage. Higher percentage shows better result.*

## **XI. Conclusion and Recommendation**

Following is the conclusion and recommendation for further anticipation:

The overall implementation of the training programme on renewable energy: biogas energy for community development has been well implemented, both substantially and logistically.

However, there are some feedbacks from the participants expressed during the series of evaluations that should be taken into account 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 for comparative purposes. Cases of China, India, Nepal or Bangladesh could be referred to.
2. Technical exercises at fieldsite(s) could be added with other instruments which are not complicated as well.
3. Since the field study is not merely on technical matters, it is suggested to extend more days at fieldsite(s) to observe and exercise relevant field works related to social and economic benefits.
4. Since the training programme is limited to use the biogas energy for cooking and lighting, it is suggested to study another use of biogas such as to generate electricity. There might be a good case available in Indonesia to be shared.

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 will identify other best practices of biogas energy development that generate more value added to local community. Potential plants that will be observed sooner could be located in Java or outer islands.

## XII. Selected Photos



Group photo of participants and the VIP guests



Welcoming Remarks by Ronggo Kuncahyo  
Senior Assistant to the Minister of Energy and Mineral Resources of Indonesia



Opening Remarks by H.E. Ambassador Linggawaty Hakim  
Director General for Legal Affairs & International Treaties, Ministry of Foreign Affairs,  
Director of NAM CSSTC



Class Session at the Royal Surakarta Heritage Hotel, Solo



Field Session at Supardi's Biogas Plant in Karangnongko Village, Boyolali District



Field Session at Sambi Mulyo's Biogas Plant in Sambi Village, Boyolali District



Presentation of Action Plan



Participants' representative delivering Vote of Thanks to the Training Committee on the Closing Session



Certificate Awarding on the Closing Session



Closing Remarks by Representative of NAM CSSTC on the Closing Session