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Renewable Energy Safety in APEC Region

Final Report

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Introduction

Background

Renewable Energy Technology (RET) becomes popular to general population throughout APEC region. In communities, RET, such as Biogas and Solar PV, is more favorable over other technologies. However, it seems that the safety aspect of these RETs has not been fully recognized by people who utilize RET, which leads to property damages, casualties, and deaths. Over the past 10 years, there were reports on accidents related to use RET in Thailand. The accidents led to over 1 million USD property damages. Moreover, more than 50 people had lost their lives. This is an example of the lack of RET safety-concern promotion. Since RET will be continuously promoted in APEC economies, accidents related should be avoided at all cost.

This project aims to raise safety awareness in using RET in selected APEC economies (Indonesia; Malaysia; the Philippines; Thailand; and Viet Nam). The method which is being implemented successfully in Thailand is using community-based renewable energy volunteers as safety ambassadors. The community-based renewable energy volunteers were selected from active and high-respected persons in communities. They were trained with safety protocols to be able to use and demonstrate safety equipment correctly. In long term, the volunteers will go back to their communities and be spokespersons on RET safety. APEC economies such as Indonesia, Malaysia, the Philippnes; and Viet Nam are selected to participate in this project since they share a common culture. So that this project could benefit in their RET promotion with a minimum number of accidents. Long-term planning for each economy will be established in order to receive support from their governments.

Objectives

1. To establish long-term planning for RET safety in chosen APEC economies.
2. To create network of community-based renewable energy volunteers for each economy
3. To build capacity on RE safety in chosen APEC economies.

Scope of Project

1. Organize a meeting with stakeholders of each economy and selection of community- based energy volunteers in Thailand to participate
2. Formulate training course content and preparing training materials
3. Organize training and experience transfer sessions
4. Develop long-term planning for further dissemination of the project of each economy
5. Develop a draft and final project report on RE safety in selected APEC economy

Implementation and Discussion

This chapter provides information about the project that had been implemented. The information includes activities and deliverables. The main activities of this project were to carry out series of workshops in order to share the renewable energy safety experiences that were implemented successfully in Thailand to selected APEC economies (Viet Nam, the Philippines, Indonesia and Malaysia).

The project was organized totally six workshops. There is the first workshop in Thailand, The second in the Philippines, the third in Viet Nam, the fourth in Indonesia, the fifth in Malaysia and the sixth in Thailand respectively. The workshops are consisted both sharing experiences in the meeting room and visiting renewable energy sites which producing or using renewable energy.

1. The first workshop in Chiang Mai, Thailand

The first workshop of "Experiences sharing on Renewable energy safety in APEC" was held on 7 – 9 April 2016 at 30Years Anniversary Building, Faculty of Engineering, Chiang Mai University. The objectives are to share the experiences on RET promotion and development in participating economies. Statistical data on accidents or difficulties in raising safety awareness were being exchanged. The workshop agenda is shown below.

The workshop is intended to be a forum to share experiences on Renewable Energy Technology (RET) promotion. The workshop sessions are separated into 10 main sessions:

Session 1 Renewable Energy Safety activities in Thailand
Session 2 Renewable Energy Promotion and Safety Issues in Viet Nam
Session 3 Renewable Energy Promotion and Safety Issues in Indonesia
Session 4 Renewable Energy Promotion and Safety Issues in Malaysia
Session 5 Renewable Energy Promotion and Safety Issues in the Philippines
Session 6 Renewable Energy Promotion and Safety Issues in China
Session 7 Renewable Energy Promotion and Safety Issues in Japan
Session 8 Site visit at Biogas Plant and Community Piping Network
Session 9 Site visit at Sahacogen Biomass Power Plant
Session 10 Discussion on Raising Safety Awareness for Renewable Energy Technology Users

Table 1 the first workshop agenda in Thailand

"The Experience sharing on Renewable energy safety" Chiang Mai, Thailand 7-9 April 2016 Venue: 30th Anniversary building, 7th Floor, Faculty of Engineering	
7 April 2016	
Time	**Activity**
09.00-09.30	Registration
09.30-10.00	Opening Ceremony - **Ms Pisamai Sathienyanon** (Renewable Energy Expert from DEDE)
10.00-10.20	Experiences Sharing on Renewable Energy Safety: Renewable Energy Safety in APEC - **Ms Pisamai Sathienyanon** (Renewable Energy Expert, DEDE)
10.20-10.50	Overview of Renewable Energy Safety activities in Thailand - **Ms Kulwaree Buranasajjawaraporn** (Director of Solar Energy Development Bureau, DEDE)
10:50-11:00	Coffee break
11.00-11.30	Section 1.1 Renewable Energy Safety activities in Thailand – **Dr Chatchawan Chaichana** (Head of Energy Technology for Environment Research Center)
11.30-12.00	Section 1.2 Renewable Energy Safety activities in Thailand - **Mr Tanachai Jarana** (Head of Community-based Energy Volunteer, Lampang province)

12.00-13.00	Lunch
13.00-13.30	Section 2 Renewable Energy Promotion and Safety Issues in Viet Nam - **Prof Hai Duc Luu** (Vice-President of Viet Nam Association for Environmental Economics (VIASEE))
13.30-14.00	Section 3 Renewable Energy Promotion and Safety Issues in Indonesia – **Prof Dr Ir Rinaldy Dalimi** (Member of National Energy Council Republic of Indonesia)
14.00-14.30	Section 4 Renewable Energy Promotion and Safety Issues in Malaysia - **Mr Edisham Mohd Sukor** (Deputy director of renewable energy technology division, Sustainable energy development authority of Malaysia (SEDA Malaysia))
14.30-15.00	Section 5 Renewable Energy Promotion and Safety Issues in the Philippines - **Asst Professor Dr Erees Queen B. Macabebe** (Ateneo De Manila University)
15.00-15.30	Coffee break
15.30-16.00	Section 6 Renewable Energy Promotion and Safety Issues in China – **Dr Li Kuishan** (Director of China Academy of Building Research Shanghai Branch)
16.00-16.30	Section 7 Renewable Energy Promotion and Safety Issues in Japan - **Prof Keiichi Ishihara** (Vice-Dean of Graduate School of Energy Science, Kyoto University)
8 April 2016	
Time	**Activity**
09.00-10.00	Depart for a Biogas Plant in Lamphun
10.00-12.00	Session 8 Site visit at Biogas Plant and Community Piping Network
12.00-13.00	Lunch
13.00-13.30	Depart for Biomass Power plant
13.30-15.30	Session 9 Site visit at Sahacogen Biomass Power Plant
15.30-17.00	Return to hotel
9 April 2016	
Time	**Activity**
09.00-12.00	Session 10 Discussion on Raising Safety Awareness for Renewable Energy Technology Users
12.00-13.00	Lunch
13.00-14.00	Session 11 Concluding
14.00-15.00	Closing ceremony

Figure 1 Group photo of the first workshop in Chiang Mai, Thailand

Figure 2 Thailand energy volunteer demonstrated how to use safety equipment

Figure 3 Visiting at Biomass power plant

Figure 4 Visiting at Sahacogen Biomass Power Plant

In the workshop, the expert from each economy shared the experiences on Renewable Energy Technology (RET) promotion. The result found that, among selected APEC economies, there are a large number of Renewable Energy sources i.e. hydro, wind, biomass, biogas and solar energy. However, there are some records about accidents in the production and utilization of those RETs. To reduce the possibility of accidents, it is necessary to establish long-term planning for RET safety which includes the standard of the RE production and the handbook of RE operation and installation. In addition, the network of community-based renewable energy volunteers for each selected economy and the build capacity on RE safety are significantly concerned. The issue of Renewable Energy Technology (RET) promotion in each economy is shown in Table 2.

Table 2 the issue of renewable energy technology promotion in each economy

Economy	Technology	Safety Promotion activities	Future plan	Case study
Viet Nam	- Wind - Hydro - Biomass - Biogas - Solar energy - Solid Wastes	Energy security, have string safety solution and public awareness of utilization	Increase the share of RE; In total 3% (2010) to 11% (2050), In electricity generation 3.5% (2010) to 6% (2030)	**Biogas** - Risk of explosion and leakage cause the use of plastic pipe - Died or poisoned by toxic gas by stirring and removing scum - Fire impacted the gas by burn wild grass **Biofuel** - Car fired and exploded b using E5 petrol - Un-safety use of dry alcoholic **Hydropower** - Electric shock - Construction and operation are not safe
Indonesia	- Biogas - Hydro - Waste - Solar Cell - Wind	There is no safety promotion activities reported.	- Improving the management of Geothermal Energy - Increasing the role of national banks - Maximizing the use of RE	Report on RE accident was not found in the media. However, it is suspected that accident occurs may not be very severe.
The Philippines	- Biomass - Hydro - Solar Energy - Wind Energy - Geothermal - Biofuels	The implementation of Renewable Energy Safety, Health and Environment Rules and Regulations (RESHERR) is in place.	Renewable energy is one of the key tools for providing access to electricity to the Filipinos.	There is no report of a major accident.
Malaysia	- Biomass - Biogas - Hydro - Solar PV - Geothermal	- Guidebook on Safety & Health for RE Installations – Design, Construction, Operation and Maintenance for APEC - Requirement of Competent Persons for RE Installation - Capacity Building/Training on Safety & Health for RE Installations	- Target energy mix of 53% coal, 29% gas, 15% large hydro, 3% RE. - Target RE (FiT) capacity of 2,080 MW - Introduce Net Energy Metering (NEM) & Large Scale Solar (LSS)	There is no serious accident.

Economy	Technology	Safety Promotion activities	Future plan	Case study
China	- Hydropower - Solar - Wind power - Biomass - Geothermal - Distributed energy	There are no safety promotion activities reported.	1. Active development of hydropower 2. Accelerate the development of wind 3. Promote the diversification of solar energy utilization 4. Utilizing biomass energy according to local conditions 5. Strengthening the utilization of RE in rural area 6. The rational development and utilization of geothermal energy 7. Accelerate the development of ocean energy technology 8. Promote the development of Distributed RE	Some road accidents due to the burning of Biomass. It is due to smoke shorten viewing distance.
Japan	- PV Solar - Wind - Geothermal	- Data collection and analyst - Risk communication becomes important - Quality improvement - Establishment of international standard. - Disclosure of safety issue	N/A	- Lightning damage at wind farm damage of turbine tower - Flooding of Solar PV power plant

2. The second workshop in Manila, the Philippines

The renewable energy safety training and experience transfer session started the first economy in the Philippines. This is the second workshop of the project. The training and experience transfer sessions on renewable energy safety in the Philippines was held on 8-10 December 2016 at an Ateneo de Manila University. The agenda is shown in table 3.

Table 3 the second workshop agenda in the Philippines

"Training and Experience transfer sessions on Renewable Energy Safety in the Philippines" 8-10 December 2016 Venue: PLDT-CTC 515 Ateneo de Manila University	
8 December 2016	
Time	**Activity**
09.30-10.00	Registration
10.00-10.15	Opening Ceremony – **Asst Prof Dr Erees Queen B. Macabebe** (Lecturer, Ateneo De Manila University)
10.15-10.30	Project Background - **Dr Chatchawan Chaichana** (Head of Energy Technology For Environmental Research Center)
10.30-11.00	Thailand Safety Community Biogas - **Mr Sakda Sittikruear** (Expert of Renewable energy safety)
11.00-11.30	Break
11:30-12:00	Safety Community Base RET in the Philippines – **Mr Kenneth Abellanosa** (Chief Engineer Solar Solutions, Inc.)
12.00-13.00	Lunch
13.00-13.30	Introducing the Media Relations to promote Renewable Energy Safety - **Mr Sakda Sittikruear**
13.30-14.00	Characteristic of community-based Energy Volunteer – **Mr Suphee Dahan** (Provincial-Energy, Khon-Kaen province)
14.00 -14.30	Community-based Energy Volunteer training – **Mr Donmueang Phinich** (Provincial-Energy, Khon-Kaen province)
14.30-15.00	Break
15.00-16.00	Showing Safety Material & Equipment Protection Manual – **Mr Sakda Sittikruear** and **Mr.Suphee Dahan**
9 December 2016	
Time	**Activity**
08.00-09.30	Depart to Tondo, Manila
9.30-11.30	Solar Service Station (3S) Site
11.30-13.00	Lunch
13.00-14.00	Depart to Payatas, Quezon City
14.00-16.00	Pangea Biogas Power Plant
16.00-17.00	Return to hotel
10 December 2016	
Time	**Activity**
10.00-11.00	Discussion
11.00-12.00	Conclusion and closing ceremony

In the transfer session on 8 December 2017, the project background had been shared by **Dr Chatchawan Chaichana**, the project manager. After that **Mr Sakda Sittikruere**, an expert on renewable energy safety in Thailand presented about an experience on Thailand Safety Community Biogas. He exampled some of the biogas accidents case study that occurred and in Thailand. That case study causes a lot of damage both physical and financial damage. For the Philippines side, **Mr Kenneth Abellanosa** had been presented about "Renewable energy in the Philippines". In the detail, he presented about renewable energy safety, health and environmental rules and regulation, safety in doing solar PV system and cases related to the accident in renewable energy implementation. The Thailand community-based renewable energy volunteers were introduced to the participants by **Mr Sakda Sittikruere**. The community-based volunteers were shared about the experiences on their mission to provide a training on the safety to a worker who related with producing or using the renewable energy in factories, farms, communities or households. Moreover, the personal safety equipment was demonstrated to all participants. There is some question from the participant and some points that concluded with follows.

- **Mr Sakda Sittikruere** mentioned more about why some factory or farm in Thailand still have an accident related to renewable energy after the energy volunteers went to give a training. He said that the first point because the man workers in the factory or farm do not pay attention to safety training as much as they should. The second point is the trainee who has been trained do not transfer safety knowledge to their friend or weak of transferring the knowledge.
- The participant asked about there is a safety officer who will give the knowledge to the employee in Thailand factory or not. **Dr Chatchawan Chaichana** answered that there is a safety officer in the factory but they transfer safety knowledge by their own way. The content is academic language that the worker did not understand. The energy volunteer is speaking in a common language that useful for the worker to understand easily.

Figure 5 Dr Chatchawan Chaichana is presenting the project background

Figure 6 Exchanging the idea between the Thailand volunteers and the Philippines speaker

Figure 7 Visiting at Solar Service Station (3S) Site

Figure 8 Visiting at Pangea Biogas Power Plant

3. The third workshop in Ha Noi, Viet Nam

The third workshop was held on 8-10 January 2017 at La Thanh Hotel, Ha Noi. The workshop agenda is shown in the following.

Table 4 the third workshop agenda in Viet Nam

"Training and Experience transfer sessions on Renewable Energy Safety in Viet Nam" 8-10 January 2017 Location: La Thanh Hotel, Ha Noi	
8 January 2017	
Time	**Activity**
07.00-10.00	Depart to site visit 1
10.00-12.00	Site visit 1 (Bac Hai, Nam Cuong commune, Tien Hai district, Thai Binh province)
12.00-13.00	Lunch
13.00-13.30	Depart to site visit 2
13.30-16.00	Site visit 2 (Bac Hai, Nam Cuong commune, Tien Hai district, Thai Binh province)
16.00-18.00	Return to hotel
9 January 2017	
Time	**Activity**
08.30-09.00	Registration
09.00-09.15	Opening Ceremony – **Ms Nguy Thi Khanh** (Executive Director of Green Innovation and Development Centre)
09.15-09.30	Project Background - **Mr Sakda Sittikruear** (Expert of Renewable energy safety)
09.30-10.00	Thailand Safety Community Biogas - **Mr Sakda Sittikruear**
10.00-10.20	Break
10:20-11:00	Safety Community Base RET in Viet Nam - **Mr Nguyen Tien Long** (Deputy Director, Centre for Sustainable Development of Water Resources and Climate change Adaptation)
11.00-11.30	Question and Answer
11.30-13.00	Lunch
13.00-13.30	Renewable Energy in Viet Nam - **Mr Le Ngoc Son** (Program Coordinator, GreenID)
13.30-14.00	Introducing the Media Relations to promote Renewable Energy Safety - **Mr Sakda Sittikruear** (Expert of Renewable energy safety)
14.00-14.30	Characteristic of community-based Energy Volunteer – **Mr Sakda Sittikruear** and **Mr Jirawat Promjeen**
14.30-14.45	Community-based Energy Volunteer training - **Mr Tanachai Jarana** (Provincial-Energy)
14.45-16.00	Break
16.00-16.30	Showing Safety Material & Equipment Protection Manual – **Mr Jirawat Promjeen** and **Mr Tanachai Jarana** ((Provincial-Energy)
16.30-16.35	Group photo
10 January 2017	
Time	**Activity**
10.00 - 11.00	Small Group Discussion
11.00 - 12.00	Conclusion
12.00 - 13.00	Closing ceremony

In the transfer session on 9 January 2017, the presentation of "Safety in the use of renewable energy in Thailand" had been presented by **Mr Sakda Sittikruear** – Renewable energy expert from Thailand. The presentation was shown that more than often and causing more serious consequences are accidents related to biogas energy type. He also highlighted that the purpose of the sharing of examples of accidents occurring while using renewable energy is not limited to people using this energy that is actually helping to raise awareness on the issue, taking more careful in the application. Although there are so many accidents happen, we just need to be more careful, rather than not using it any more facilities. In addition, Thailand team (staffs and community-based energy volunteer) had introduced characteristic of community-based Energy Volunteer, the media relations to promote Renewable Energy Safety and lastly showing safety material & equipment protection manual.

In 2nd and 3rd sessions, the presentation of renewable energy development and safety issues in the use of renewable energy in Viet Nam and current status of renewable energy development in Viet Nam and safety issues in the development of renewable energy had been presented by **Mr Nguyen Tien Long** and **Mr Le Ngoc Son** respectively. Current status of renewable energy development in Viet Nam, renewable energy development and safety of renewable energy in Viet Nam. Biomass and Biogas scenario in Viet Nam, Project case study – Biogas and Biomass had been shared during the sessions.

In Q&A session, the questions between participants from Thailand and Viet Nam are as:

Q: What are the health effects of biogas emission which need releasing to keep the construction safe?
A: **Mr Sakda Sittikruear** answered that when waste has been burned, the rest will not smell and can be fertilizer.

Q: It is possible to store biogas and sell bottles of biogas?
A: **Mr Sakda Sittikruear** answered that on the technical theory, it is completely possible, however, the fact that in Thailand we can because that we have the gas compression device to store and we also sell the biogas market to re-use them industry.

Figure 9 Mr Le Ngoc Son is presenting about the renewable energy in Viet Nam

Figure 10 Personal safety equipment demonstration

Figure 11 Visiting the biogas site at Thai Binh province-1

Figure 12 Visiting the biogas site at Thai Binh province-2

4. The fourth workshop in Jakarta, Indonesia

The fourth workshop was held on 23-25 February 2017 at Trisakti University, Jakarta, Indonesia. The workshop agenda is shown in table 5.

Table 5 the fourth workshop agenda in Indonesia

"Renewable Energy Prospects and Safety in Indonesia" **23-25 February 2017** Venue: Trisakti University	
23-24 February 2017	
Time	**Activity**
09.00-09.30	Registration
09.30-09.45	Welcome and Opening Statement - **Prof Dr Indra Surjati** (Dean of Industrial Faculty, Trisakti University)
09.45-10.15	Introduction to Renewable Energy - **Prof Chalillullah Rangkuti**
10.15-10.45	Background of the project - **Dr Chatchawan Chaichana** (Head of Energy Technology For Environmental Research Center)
10.45-11.00	Break
11.00-11:30	RE Safety Community on Biogas - **Mr Sakda Sittikruear** (Expert of Renewable Energy Safety)
11.30-12.00	Solar power products and systems for sustainable energy solutions – current trends and technologies. – **Mr Turinto Murjono** (PT. Preformed Line Products Indonesia)
12.00-13.00	Lunch
13.00-13.30	Biogas applications – Palm Oil Mill and Livestock farms - **Dr Chinnapong Wangnai** (Researcher, King Mongkut's University of Technology Thonburi (KMUTT)Thailand)
13.30-14.00	Waste Utilization EFB for alternative fuels - **Mr M. Sijabat** (Director of PT. Toba HijauSinergi)
14.00-14.30	Media Relations to promote Renewable Energy Safety - **Mr Sakda Sittikruear**, **Mr Sayan Taweerat** and **Mr Chamni Puangmaeklong** (Provincial-Energy)
14.30-15.00	Break
15.00-16.00	Project case study – Biogas and Biomass - **Mr Sonson Garsoni**
25 February 2017	
Time	**Activity**
09.00-12.00	Site visit (solar cell) at Bodyshop PT Monica Hijau Lestari Sentosa Building, Bintaro Jaya Central Business District
12.00-13.00	Lunch
13.00-15.30	Discussion at Trisakti University and closing ceremony

In the transfer session, **Prof Dr Indra Surjati**, Dean of Industrial Faculty, Trisakti University had been welcomed all of the participants. The Introduction to Renewable Energy was presented by **Prof Chalillullah Rangkuti**. **Dr Chatchawan Chaichana** had been presented about the project background. After that **Mr Sakda Sittikruere**, an expert on renewable energy safety in Thailand presented on a renewable energy accidents case study. He showed some picture of energy safety campaigned in Thailand, a network of energy volunteer. For the Indonesia side, the solar power products and systems for sustainable energy solutions – current trends and technologies had been presented by **Mr Turinto Murjono** (PT. Preformed Line Products Indonesia). Additional, **Dr Chinnapong Wangnai**, a researcher from King Mongkut's University of Technology Thonburi, Thailand presented about biogas applications – Palm Oil Mill and Livestock farms. And the last session, the Thailand community-based renewable energy volunteers were introduced to the participants. The community-based volunteers were shared about the media relations to promote renewable energy safety, experiences on their mission to provide a training

on the safety to whom producing or using the renewable energy in factories, farms, communities or households. The question and answer during the workshop are concluded as follows.

Q: How many big plants of biogas, biomass and solar PV type in Thailand?
A: **Dr Chatchawan Chaichana** answered that he thinks there are around thousands of plants. In Thailand, the government encouraged renewable energy farmer to generate electricity from those renewable energy type to sell to the government. They will get the extra high price.

Q: Who support for the renewable energy community-based volunteers training?
A: **Dr Chatchawan Chaichana** answered that the government support for the training course, volunteer's transportation from their hometown to the factory or farm. There is no Per Diem or salary for the renewable energy community-based volunteers for doing the mission.

Figure 13 Group photo of participants in the fourth workshop in Indonesia

Figure 14 During the sharing session in the meeting room

Figure 15 Visiting the Solar cell site at Bodyshop, Bintaro Jaya Central Business District-1

Figure 16 Visiting the Solar cell site at Bodyshop, Bintaro Jaya Central Business District-2

5. The fifth workshop in Kuala Lumpur, Malaysia

The fifth workshop was held on 25-26 May 2017 at University of Malaya, Malaysia. The workshop agenda is shown in table 6.

Table 6 the fifth workshop agenda in Malaysia

"Training and Experience transfer sessions on Renewable Energy Safety in Malaysia" 25-26 May 2017 Venue: University of Malaya, Malaysia	
25 May 2017	
Time	**Activity**
09.00-09.30	Registration
09.30-09.45	Opening Ceremony
09.45-10.15	Project Background - **Dr Chatchawan Chaichana** (Head of Energy Technology For Environmental Research Center)
10.15-10.45	Thailand PV Status – **Dr Teerasak Somsak** (Head of Clean Energy System Unit Research, Rajamangala University of Technology Lanna)
10.45-11.00	Question and Answer
11.00-11.20	Break
11:20-11:50	PV safety issue in Malaysia - **Dr Jeyraj Selvaraj**, Deputy director of UM Power Energy Dedicated Advanced Centre (UMPEDAC)
11.50-12.00	Question and Answer
12.00-13.00	Lunch
13.00-13.30	PV System Applications and Safety in Thailand – **Dr Teerasak Somsak**
13.30-14.00	PV System Application and Safety in Thailand (Cont.) – **Dr Teerasak Somsak**
14.00-14.30	Community-based Energy Volunteer training – **Mr Serm Duangdej** and **Mrs Sineenart Patjanasunton**, an experienced Community-based Energy Volunteer Thailand
14.30-14.45	Question and Answer
14.45-15.00	Break
15.00-15.30	Introducing Safety Protection Materials & Equipment - **Mr Serm Duangdej** and **Mrs Sineenart Patjanasunton**, an experienced Community-based Energy Volunteer Thailand
15.30-16.00	Question and Answer
16.00-16.15	Group photo
26 May 2017	
Time	**Activity**
08.00-09.30	Depart to site 1
9.30-11.30	Site 1 (Biogas plant at Gan teng Siew Realty Sdn.Bhd)
11.30-13.00	Lunch
13.00-14.00	Depart to site 2
14.00-16.00	Site 2 (Solar PV)
16.00-17.00	Return to hotel

In the started with warm welcomed by **Prof Dr Nasrudin Abd Rahim** , director of UM Power Energy Dedicated Advanced Centre (UMPEDAC), University of Malaya. Afterward, the project background had been shared by **Dr Chatchawan Chaichana**. **Dr Teerasak Somsak** (Head of Clean Energy System Unit Research, Rajamangala University of Technology Lanna) had been presented about Thailand PV Status. For Malaysia side, **Dr Jeyraj Selvaraj,** Deputy director of UM Power Energy Dedicated Advanced Centre (UMPEDAC) presented on "PV safety issue in Malaysia". In the detail, he presented about Renewable energy scenario in Malaysia, Current status of PV technology – PV safety issue, current trends and technologies in Malaysia. Project case study – Standalone and Grid-connected PV system. In the afternoon, the Thailand community-based renewable energy volunteers were shared their experiences on a mission to provide a training to the employee in the factory or farm and they

had been introduced safety protection materials and equipment. The questions between participants from Thailand and Malaysia are as follows.

Q: Does Thailand has a guideline or standard about safety for workmanship?
A: **Dr Chatchawan Chaichana** answered that we have safety regulation for general safety but not specific on the safety of renewable energy. We have some guideline or standard for equipment such as generator or pipe but we do not have guideline or standard for workmanship.

Q: How to manage or install the large-scale solar farm more than 10 MW in Thailand?
A: **Dr Chatchawan Chaichana** answered that In Thailand, we will see the grid capacity first. If that zone is supported, the investor will be installed. Normally, the investors will choose to invest in less expensive area because of that zone is rarely used electricity, so the capacity of the remaining electricity can be installed.

Q: How do you select the volunteer?
A: **Dr Chatchawan Chaichana** answered that we select the volunteer from those who have some press knowledge already and they are a bit achieve in their own province, that means we select some experienced people. The network volunteer funded by the Department of Alternative Energy Department and Efficiency, Ministry of Energy. They have a budget for a volunteer to do their task. Energy safety program in Thailand has been implemented for 3 years.

Q: How do you measure the efficiency of the energy safety program?
A: **Dr Chatchawan Chaichana** answered that it quite difficult to measure the efficiency in number. At the moment we try to keep track on a number of accident happens reported in the newspaper. After this program had been started, the trend of the major accidents had been reduced.

Figure 17 Some of the participants is interesting on safety equipment and safety handbooks

Figure 18 The speaker from Malaysia is presenting about the recent implementing solar cell project

Figure 19 Visiting the biogas plant at Gan teng Siew Realty Sdn.Bhd

Figure 20 Visiting the Solar PV at SunEdison

6. The sixth workshop in Chiang Mai, Thailand

The sixth workshop was held on 20 September 2017 at Faculty of Engineering, Chiang Mai University. The workshop agenda is shown in table 7.

Table 7 the sixth workshop agenda in Thailand

"Long term planning for further dissemination on Renewable Energy Safety in APEC" Chiang Mai, Thailand 20 September 2017 Venue: 8th floor, 30th Year Anniversary Building Faculty of Engineering, Chiang Mai University	
Time	**Activity**
09.00-09.30	Registration
09.30-09.35	Welcome - **Dr Chatchawan Chaichana** (Head of Energy Technology For Environmental Research Center)
09.35-09.45	Opening Statement- **Dr Yaowateera Achawangkul**, Mechanical engineer-senior professional level at DEDE, Ministry of Energy / Group Photo
09.45-10.00	Overview of the first– fifth workshop (Thailand, the Philippines, Viet Nam, Indonesia and Malaysia) - **Dr Chatchawan Chaichana**
10.00-10.30	Roll of EIT in safety Promotion - **Assoc Prof Dr Sermkiat Jomjunyong**, Chairman of The engineering institute of Thailand under H.M. The King's Patronage, Northern branch 1
10.30-10.45	Break
10.45-11.30	Lesson learned and Possible long-term RE safety plan in the Philippines – **Dr Erees Queen B. Macabebe**
11.30-11.45	Question & Answer
11.45-13.00	Lunch
13.00-13.45	Lesson learned and Possible long-term RE safety plan in Viet Nam - **Mr Le Ngoc Son**, Program Coordinator at Green Innovation and Development Centre
13.45-14.00	Question & Answer
14.00-14.45	Lesson learned and Possible long-term RE safety plan in Indonesia - **Dr Eddy Rusly**, Faculty of Industrial Technology, Trisakti University, Indonesia
14.45-15.00	Question & Answer
15.00-15.15	Break
15.15-16.00	Lesson learned and Possible long-term RE safety plan in Malaysia - **Dr Jeyraj Selvaraj**, **Dr CHE Hang Seng** and **Dr Mohamad Fathi Mohamad** Elias from UM Power Energy Dedicated Advanced Centre (UMPEDAC)
16.00-16.15	Question & Answer
16.15-16.30	Conclusion / Closing

The final workshop was organized on 20 September 2017 in Chiang Mai, Thailand. The objectives of the workshop are to establish long-term planning for RET safety in selected APEC economies and to build capacity on RE safety in selected APEC economies.

In summary, the development of long-term planning for RET safety is necessary to be based RE scenario in each economic. For instance, in selected APEC economy, there are still barriers and challenges as RE policy, technical knowledge, the awareness of RE safety, communication between experts and technicians.

Long-term planning for RET safety in selected APEC economies is as follows:

The Philippines

1. RE safety promotion-Promoting safety everywhere/ workplace imparts public/ workers awareness and discipline.
2. Increase in the awareness of RE safety– Technician who works with jobs which involve dangers must always be briefed and required to wear safety gears.
3. Another essential part of being/keeping safe is "Planning". Accident or incident can be prevented with careful planning.
4. The Safety and Health Association of the Philippine Energy Sector, Inc. (SHAPES) was invited to be one of the private sector partners of the DOE in minimizing the dangers or hazards that are inherent in the power sector.

Viet Nam

1. The motivating mechanism on solar development and draft circular on its guidelines.
2. Raising awareness and training for local people/users at communities.
3. There is no safety regulations/policies for RE in particular in Viet Nam. The policies and regulations related to RE safety need to be put into enforced soon.

Indonesia

1. Safety is important in RE projects from conceptual to operation and maintenance, for sustainable future growth, RE safety plans must be developed and implemented**.**
2. The ministry of energy and mineral resources is an organization which responsibility for RE safety in Indonesia.

Malaysia

1. The National RE Policy and Action Plan Strategic Thrusts were established in 2010 for Promote RE safety. The plan is as follows:
    a. Introduce legal and regulatory framework
    b. Provide conductive business environment for RE
    c. Intensify human capital development
    d. Enhance RE research and development
    e. Create public awareness and RE policy advocacy programs.
2. Creating Public awareness and RE policy advocacy programs.
3. Increase in RE safety promotion, particularly in an urban area.
4. The Sustainable Energy Development Authority of Malaysia (SEDA Malaysia) is a statutory body formed under the Sustainable Energy Development Authority Act 2011 [Act 726]. The key role of SEDA is to administer and manage the implementation of the feed-in tariff mechanism which is mandated under the Renewable Energy Act 2011 [Act 725].

Figure 21 Group Photo of sixth workshop in Chiang Mai, Thailand

Figure 22 Dr Yaowateera Achawangkul is opening the workshop and presenting on energy of Thailand situation and energy development plan

Figure 23 During the workshop-1

Figure 24 During the workshop-2

Table 8 the summary of workshop venue and information

Workshop	**Venue**		**Date**	**No. of participants**
1	Experience sharing	Faculty of Engineering, Chiang Mai University	7-9 Apr 2016	22
	First Site visit	Biogas Plant and Community Piping Network		
	Second Site visit	Sahacogen Biomass Power Plant		
2	Transfer session	Ateneo De Manila University, the Philippines	8-10 Dec 2017	15
	First Site visit	Solar Service Station (3S) Site, Tondo, Manila		
	second Site visit	Pangea Biogas Power Plant,Quezon City		
3	Transfer session	La Thanh Hotel, Ha Noi, Viet Nam	8-10 Jan 2017	25
	Site visit	Bac Hai, Nam Cuong commune, Tien Hai district, Thai Binh province		
4	Transfer session	Trisakti University, Indonesia	23-24 Feb 2017	48
	Site visit	Body shop, Bintaro Jaya Central Business District		
5	Transfer session	University of Malaya, Malaysia	25-26 May 2017	27
	First Site visit	Biogas plant at Gan teng Siew Realty Sdn.Bhd		
	second Site visit	Solar PV at SunEdison		
6	Developing long-term planning	Faculty of Engineering, Chiang Mai University	20 Sep 2017	21
Total				158

Table 9 the presentation issues of the second to fifth workshops.

Workshop	**Venue**	**Issue**
2	Ateneo De Manila University, the Philippines	**Thailand**: • Background of the project • The result of hazardous event in the production and use of renewable energy accident in Thailand

Workshop	Venue	Issue
		• Renewable energy accidents in Thailand • Renewable energy accident in Japan • How to prevent these accidents to happen. • Introducing the Media Relations to promote Renewable Energy Safety • Characteristic of community-based Energy Volunteer • Community-based Energy Volunteer training and Showing Safety Material & Equipment Protection Manual. **The Philippines:** • Renewable energy in the Philippines • Renewable energy safety • Health and environmental rules and regulation • Safety in doing solar PV system • Cases related to the accident in renewable energy implementation.
3	La Thanh Hotel, Ha noi, Viet nam	**Thailand**: • Background of the project • Some Accidental Case of Biogas in Thailand • Biogas Safety Campaign in Thailand • Introducing the Media Relations to promote Renewable Energy Safety • Characteristic of community-based Energy Volunteer • Community-based Energy Volunteer training and Showing Safety Material & Equipment Protection Manual. **Viet Nam:** • Current status of RE development in Viet Nam • RE development and safety of renewable energy in Viet Nam • Biomass and Biogas scenario in Viet Nam • Project case study – Biogas and Biomass.
4	Trisakti University, Indonesia	**Thailand**: • Background of the project, RE accidents in Thailand • RE Safety Community on Biogas • Biogas applications – Palm Oil Mill and Livestock farms • Introducing the Media Relations to promote Renewable Energy Safety Characteristic of community-based Energy Volunteer • Community-based Energy Volunteer training and Showing Safety Material & Equipment Protection Manual. **Indonesia:** • Solar mount: basic design calculation, • Introduction to Renewable Energy, • Solar power products and systems for sustainable energy solutions – current trends and technologies, • Waste Utilization EFB for alternative fuels, Project case study – Biogas and Biomass
5	University of Malaya, Malaysia	**Thailand**: • Background of the project, RE accidents in Thailand

Workshop	Venue	Issue
		• Introducing the Media Relations to promote Renewable Energy Safety • Characteristic of community-based Energy Volunteer • Community-based Energy Volunteer training and Showing Safety Material & Equipment Protection Manual. **Malaysia:** • Renewable energy scenario in Malaysia • Current status of PV technology – PV safety issue, • Current trends and technologies in Malaysia. • Project case study – Standalone and Grid-connected PV system.

Annex 1
Participants List

This annex contains

- Annex 1.1 Participants list of first workshop in Chiang Mai
- Annex 1.2 Participants list of second workshop in Manila, the Philippines
- Annex 1.3 Participants list of third workshop in Ha Noi, Viet Nam
- Annex 1.4 Participants list of forth workshop in Jakarta, Indonesia
- Annex 1.5 Participants list of fifth workshop in Kuala Lumpur, Malaysia
- Annex 1.6 Participants list of sixth workshop in Chiang Mai, Thailand

Annex 1.1 Participants list of first workshop in Chiang Mai

Economy	Name	Organization	Position
Group 1 Speakers			
Indonesia	Prof.Dr.Ir. Rinaldy Dalimi	National Energy Council Republic of Indonesia	Member
Japan	Prof. Keiichi Ishihara	Graduate School of Energy Science, Kyoto University	Vice-Dean
Malaysia	Mr. Edisham Mohd Sukor	Sustainable energy development authority of Malaysia (SEDA Malaysia)	Deputy director
China	Dr. Li Kuishan	China Academy of Building Research Shanghai Branch	Director
Thailand	Mr. Chamni Puangmaeklong	Provincial-Energy, Chumphon province	Community-based Energy Volunteer
Thailand	Mr. Sakda Sittikruear	Energy Safety and Environment CO., Ltd.	Expert of Renewable energy safety
Viet Nam	Prof. Hai Duc Luu	Viet Nam Association for Environmental Economics (VIASEE)	Vice-President
Group 2 Participants			
Indonesia	Ms. Dini Novayanti	Pertamina	Member
The Philippines	Asst.Prof.Dr. Erees Queen B. Macabebe	Ateneo De Manila University	Lecturer
The Philippines	Mr. Kenneth Garcia Abellanosa	Solar Solutions Inc.	Chief Engineer
Viet Nam	Assoc.Prof. Anh Tuan Nguyen	Viet Nam national university	Lecturer
Viet Nam	Dr. Tu Thanh Dang	Institute of environmental technology	Researcher
Thailand	Dr. Prasert Sinsukprasert	Energy Policy and Planning Office, Ministry of Energy	Deputy Director-General
Thailand	Ms. Kulwaree Buranasajjawaraporn	Solar Energy Development Bureau, DEDE, Ministry of Energy	Director
Thailand	Asst.Prof.Dr.Nut Vorayos	Engineering Institute of Thailand, Northern Branch 1	Chairperson
Thailand	Mrs. Munlika Sompranon	Department of alternative, Energy development and efficiency, Ministry of Energy	Senior Policy and Plan Analyst
Thailand	Mr. Krissana Kijprachakorn	Public Relation Officer	Department of alternative, Energy development and efficiency, Ministry of Energy
Thailand	Dr. Chatchawan Chaichana		
Thailand	Mr. Tanachai Jarana	Provincial-Energy, Lampang province	Community-based Energy Volunteer
Thailand	Mr. Suphee Dahan	Provincial-Energy, Khon-khan province	Community-based Energy Volunteer
Thailand	Mr. Serm Duangdej	Provincial-Energy, Ratchaburi province	Community-based Energy Volunteer
Thailand	Mr. Tanin Siriwan	Provincial-Energy, Chonburi province	Community-based Energy Volunteer

Annex 1.2 Participants list of second workshop in Manila, the Philippines

Economy	Name	Organization	Position
Group 1 Speakers			
Thailand	Dr. Chatchawan Chaichana	Energy Technology For Environmental Research Center	Head of Energy Technology For Environmental Research Center
Thailand	Mr. Sakda Sittikruear	Energy Safety and Environment CO., Ltd.	Expert of Renewable energy safety
Thailand	Mr. Suphee Dahan	Provincial-Energy, Khon-Kaen province	Community-based Energy Volunteer
Thailand	Mr. Donmueang Phinich	Provincial-Energy, Khon-Kaen province	Community-based Energy Volunteer
The Philippines	Mr. Kenneth Abellanosa	Solar Solutions, Inc.	Chief Engineer
Group 2 Participants			
The Philippines	Mr. Juric Lim		
The Philippines	Ms. Christine Creayla		
The Philippines	Mr. Mathew Danlou		
The Philippines	Mr. Arthur Creez		
The Philippines	Dr. Erees Queen B. Macabebe	Ateneo De Manila University	Lecturer
The Philippines	Mr. Robert Alfie S.PENA	Pangea Biogas Power Plant	
The Philippines	Mr. Touie S.	Pangea Biogas Power Plant	Engineer
Thailand	Mr.Gengwit Wattakawigran	Energy Technology For Environmental Research Center	Engineer
Thailand	Ms. Parichat Yalangkan	Energy Technology For Environmental Research Center	Researcher
Thailand	Ms. Ruttikan Jindaloung	Energy Technology For Environmental Research Center	Administration officer

Annex 1.3 Participants list of third workshop in Ha Noi, Viet Nam

Economy	Name	Organization	Position
Group 1 Speakers			
Thailand	Mr. Sakda Sittikruear	Energy Safety and Environment CO., Ltd.	Expert of Renewable energy safety
Thailand	Mr. Jirawat Promjeen	Provincial-Energy, Kom Phaeng Phet province	Community-based Energy Volunteer
Thailand	Mr. Tanachai Jarana	Provincial-Energy, Chiang Rai province	Community-based Energy Volunteer
Viet Nam	Mr. Le Ngoc Son	Green Innovation and Development Centre	Program Coordinator
Viet Nam	Mr. Nguyen Tien Long	Centre for sustainable Development of Water Resources and Climate change Adaptation	Deputy Director Renewable Energy expert
Group 2 Participants			
Viet Nam	Mr. Do Khac Uan	Ha Noi University of Science and Technology	Teacher
Viet Nam	Ms. Phung Nguyet Anh	Ngan Ha Media	Deputy Director
Viet Nam	Mr. Phan Anh Tuan	Clean Energy and Development Laboratory	Staff
Viet Nam	Mr. Hoang Van Vi	Bac Hai Commune People's Committee - Thai Binh province	village leader
Viet Nam	Mr. Vu Quang Thien	Hai Ha Commune People's Committee - Nam Dinh province	Land Officer
Viet Nam	Mr. Nguyen Van Thu	Hai Ha Commune People's Committee - Nam Dinh province	Leader of Young Union
Viet Nam	Mr. Nguyen Van Ngo	Hai Chinh Commune People's Committee - Nam Dinh province	Communication officer
Viet Nam	Mr. Lai Duc Mien	Hai Chinh Commune People's Committee - Nam Dinh province	Agricultural staff
Viet Nam	Mr. Nguyen Thanh Dam	Nam Cuong Commune People's Committee - Thai Binh province	Communication officer
Viet Nam	Ms. Nguy Thi Giang	Green Innovation and Development Centre	Accountant
Viet Nam	Mr. Tran Dinh Sinh	Green Innovation and Development Centre	Deputy Director
Viet Nam	Mr. Nguyen Hai Long	Green Innovation and Development Centre	Project officer
Viet Nam	Mr. Hoang Van Duong	Center of Industrial Encouragement and Industry Development Conselling - DOIT Thai Binh	Vice head of Energy Saving and Cleaner Production division
Viet Nam	Mr. Ha Ngoc Cuong	Center of Industrial Encouragement and Industry Development Conselling - DOIT Thai Binh	Staff
Viet Nam	Ms. Nguyen Hong Thuy	Green Innovation and Development Centre	Project officer
Viet Nam	Ms. Tran Minh Phuong	Centre for Sustainable Development of Water Resources and Climate change Adaptation	Project officer
Viet Nam	Ms. Paula Gill	Greenhub	Environment Communication Officer

Economy	Name	Organization	Position
Viet Nam	Ms. Tran Kim Hoan	Centre for Development of Community Initiative and Environment	Program Coordinator
Viet Nam	Mr. Minh Hoang	Centre for Marinelife Conservation and Community Development	Development Manager
Viet Nam	Ms. Dam Thi Phuong Thao	Green Innovation and Development Centre	Project officer

Annex 1.4 Participants list of forth workshop in Jakarta, Indonesia

Economy	Name	Organization	Position
Group 1 Speakers			
Thailand	Dr. Chatchawan Chaichana	Energy Technology For Environmental Research Center	Head of Energy Technology For Environmental Research Center
Thailand	Dr. Chinnapong Wangnai	King Mongkut's University of Technology Thonburi (KMUTT)Thailand	Researcher
Thailand	Mr. Sakda Sittikruear	Energy Safety and Environment CO., Ltd.	Expert of Renewable energy safety
Thailand	Mr. Sayan Taweerat	Provincial-Energy, Krabi Province	Community-based Energy Volunteer
Thailand	Mr. Chamni Puangmaeklong	Provincial-Energy, Chumphon Province	Community-based Energy Volunteer
Indonesia	Prof. Chalillullah Rangkuti	Trisakti University	Professor
Indonesia	Mr. Turinto Murjono	PT. Preformed Line Products Indonesia	
Indonesia	Mr. Sonson Garsoni		
Indonesia	Mr. Martiaman Sijabat	PT. Toba HijauSinergi	Director
Group 2 Participants			
Indonesia	Daniel Suwono Halim	Perorangan	
Indonesia	Adrian	PT Esa; Mhs S2	
Indonesia	Sacha J.	Technology Wise	
Indonesia	Yemima Agnes		
Indonesia	Liane Nadia		
Indonesia	Dodi Mahendra Putra	PT Bumiarmada sdn bhd	
Indonesia	Sony Jafar Wasono	PT Distra Bhumi Swadipha	
Indonesia	Akhirudin	CV Putra Mandiri	
Indonesia	Adisurya		
Indonesia	Habibullah	PT Karya Langgeng Mandiri	
Indonesia	Krisna Tjendera	PT Karya Langgeng Mandiri	

Economy	Name	Organization	Position
Indonesia	Meliesa	PT Karya Langgeng Mandiri	
Indonesia	Ariani Widiawati	PT Akura Bina Citra	
Indonesia	Hari Rachmat	PT CRE	
Indonesia	Mokhamad Khanafi	PT PPLI	
Indonesia	Yudha Pratikno	PascaSarjana Unisada	
Indonesia	Ir. Bambang Purwohadi	PII	
Indonesia	Ir. A.L. Mulyono	PII	
Indonesia	Senoadi	Mechanical	
Indonesia	Zainul	Mechanical	
Indonesia	Yusep	Mechanical	
Indonesia	Tamara	Mechanical	
Indonesia	Dody Prayitno	Mechanical	
Indonesia	Sjahrul	Mechanical	
Indonesia	Gunawan	Electrical	
Indonesia	Ishak	Electrical	
Indonesia	Nadjih	Informatika	
Indonesia	Edo	TMED	
Indonesia	Fadiel MA	TMED	
Indonesia	Bhima S.	TMED	
Indonesia	Hubert H.	TMED	
Indonesia	Aditya K.	TMED	
Indonesia	Syahir	TMED	
Indonesia	Rivandy Fathur Rachman	TMED	
Indonesia	Aditya Rizky Rangga	TMED	
Indonesia	Denny Amriyani	TMED	
Indonesia	M. Junian Nurrahman	TMED	
Indonesia	Luan M. Fauzi	EL	
Indonesia	Pandeka R.	EL	

Annex 1.5 Participants list of fifth workshop in Kuala Lumpur, Malaysia

Economy	Name	Organization	Position
Group 1 Speakers			
Thailand	Dr. Chatchawan Chaichana	Energy Technology For Environmental Research Center	Head of ETE
Thailand	Dr.Teerasak Somsak	Clean Energy System Unit Research, Rajamangala University of Technology Lanna	Head of Clean Energy System Research Unit
Thailand	Mr. Serm Duangdej	Provincial-Energy, Ratchaburi Province	Community-based Energy Volunteer
Thailand	Mrs. Sineenart Patjanasunton	Provincial-Energy, Nakhon Ratchasima Province	Community-based Energy Volunteer
Malaysia	Dr. Jeyraj Selvaraj	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Deputy director
Group 2 Participants			
Malaysia	Qi Xun	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Graduate student
Malaysia	Goh Kuan Thai	Tan Chong Group (Solar division)	Project executive
Malaysia	Kwok Yew Hoe	Sime Darby Group	
Malaysia	Yeo Eng Kian	Lightup Borneo	
Malaysia	Ong Boon Keong	Tan Chong Group (Solar division)	
Malaysia	Nareind A/L Kumaresan	Tan Chong Group (Solar division)	
Malaysia	Ahmad Safwan bin Jauhari	Tan Chong Group (Solar division)	
Malaysia	Darvin Anthonysamy	Tan Chong Group (Solar division)	
Malaysia	Lim Fang Sheng	Monash University Malaysia	Graduate Student
Malaysia	Muhammad Yazid Mohamad Yunus	Samaiden Sdn Bhd	Asst Manager - Project Development
Malaysia	LE LIANG WEI	MATTAN RESOURCES SDN BHD	Project engineer
Malaysia	Taufiq Hussain	TerraForm Global Operating (Malaysia) Sdn. Bhd.	Asst. Manager – Field Services
Malaysia	Ahmed El Khakel		
Malaysia	Dr.Rebena Nasrin	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Postdoctoral Fellow
Malaysia	Prof. Ir. Dr. Ab Halim Abu Bakar	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Professor
Malaysia	Dr. Dr. Siti Rohani Sheikh Raihan	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Senior Lecturer
Malaysia	Dr. Che Hang Seng	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Senior Lecturer
Malaysia	Dr. Tan Chia Kwang	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Senior Lecturer
Malaysia	Dr. Adarsh Kumar Pandey	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Visiting Research Fellow
Malaysia	Wong Kim Seng	Sime Darby Group	
Malaysia	Tanfiq Hussain	TerraForm Global Operating (Malaysia) Sdn. Bhd.	
Malaysia	Hairi Aeron	Sime Darby Group	

Annex 1.6 Participants list of sixth workshop in Chiang Mai, Thailand

Economy	Name	Organization	Position
Group 1 Speakers			
Thailand	Mr. Sakda Sittikruear	Energy Safety and Environment CO., Ltd.	Expert of Renewable energy safety
The Philippines	Dr. Erees Queen B. Macabebe	Ateneo de Manila University	Assistant Professor
Viet Nam	Mr. LE NGOC SON	Green Innovation and Development Centre	Program Coordinator
Indonesia	Dr. Eddy Rusly	Faculty of Industrial Technology Universitas Trisakti	Member
Malaysia	Dr. Jeyraj SELVARJ	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Associate Professor
Malaysia	Dr. CHE Hang Seng	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Senior Lecturer
Malaysia	Dr. Mohamad Fathi Mohamad Elias	UM Power Energy Dedicated Advanced Centre (UMPEDAC)	Senior Lecturer
Group 2 Participants			
Thailand	Mrs. Jitapha Phuangmanee	Provincial-Energy, Surat Thani Province	Community-based Energy Volunteer
Thailand	Mrs.Chuwan Kaewyaem	Provincial-Energy, Krabi Province	Community-based Energy Volunteer
Thailand	Mrs. Siraphatson Charoeysuksuwan	Provincial-Energy, Nonthaburi Province	Community-based Energy Volunteer
Thailand	Ms.Laddawan Denleemoa	Provincial-Energy, Nonthaburi Province	Community-based Energy Volunteer
Malaysia	Dr. Zawani Zainuddin	Energy Sector, Ministry of Energy, Green Technology and Water, Malaysia	Assistant Secretary
Malaysia	Mr. Ahmad Syafiq Rosli	Feed-In Tariff Department, Sustainable Energy Development Authority (SEDA) Malaysia	Assistant Director
The Philippines	Mr. Kenneth G. Abellanosa	SOLAR SOLUTIONS INC.	Principal Solutions Engineer
Viet Nam	Mrs. Ho Thi Lan Huong	VN Biogas Association	Secretary-General
Viet Nam	Dr. DO Khac Uan	University of Science and Technology	Associate Professor, Deputy Head
Indonesia	Dr. Daisman Purnomo Bayyu AJI	Mechanical Engineering, Universitas Trisakti	Faculty Member
Indonesia	Dr. Ahmad Zuhdi	Faculty of Industrial Technology Universitas Trisakti	Vice Dean for Development and Collaboration
Thailand	Dr. Sermkiat Jomjunyong	The engineering institute of Thailand under H.M. The King's Patronage, Northern branch	Chairman
Thailand	Dr. Chatchawan Chaichana	Chief of ETE	Chief
Thailand	Dr. Yaowateera Achawangkul	Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy	Mechanical engineer- Senior professional level