


EIE-06-256 REEPRO

Intelligent Energy  Europe

Promotion of the Efficient Use of Renewable Energies in Developing Countries

REEPRO Level 1 Train the Trainer Programme –

Training Kit Editing workshop

Cambodia, March 28th-29th 2008

Report

Location:

The COPED Environmental Training Centre

Choeun Ek, Phnom Penh

March 2008

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1 Background and Objectives

The REEPRO TOT_L1_training kit editing workshop was held on 28th-29th March, 2008 at COMPED environmental training centre.

The goals of the REEPRO TOT_L1_training kit editing workshop are to considering of the feedbacks of the 1st Level I “train the trainer” 7th – 18th January 2008 and to edit the following training modules, particularly presentation slides, which have been prepared by all involved project partners.

Table 1: Level 1 training modules version 2 (prepared by DGS)

| | Cours e | Module Name |
|-----------|--------------------|---|
| BA | BM/PV | Basics |
| BA01 | BM/PV | Renewable energy resources |
| BA02 | BM/PV | Fundamentals of Electricity |
| BA03 | BM | Biomass Basics |
| BF | BM | Biofuel |
| BG | BM | Biogas |
| BG01 | BM | Microbial Basics |
| BG02 | BM | Processes and Parameters of AD Systems |
| BG03 | BM | Input and Output Materials and their Use |
| BG04 | BM | Components of AD Systems |
| BG05 | BM | Small AD Plants |
| BG06 | BM | Dimensioning of big AD Plants, Example Calculation (optional) |
| BG07 | BM | Dimensioning of small AD Plants, Example Calculation |
| BU | BM/PV | Business (EN, FI, PD) |
| BU01 | | Financial Analysis |
| BU02 | | Project Management |
| BU03 | | Financing Tools in Laos/Cambodia |
| BU04 | | Entrepreneurship |
| BU05 | | Tariff system calculation (optional) |
| CS | BM/PV | Project (Case study Biomass) |

| | | |
|-----------|--------------|---|
| CS01 | | Photovoltaic |
| CS02 | | Biogas |
| GA | BM | Gasification |
| IN | BM/PV | Introduction |
| IN01 | | The REEPRO Training Programme |
| IN02 | | Introduction of the course participants |
| PT | BM/PV | Power Transmission, Storage |
| PT01 | | Electrical transmission grids |
| PT02 | | Electrical distribution grids |
| PT03 | | Safety in electrical distribution |
| PT04 | | Generator station |
| PT05 | | Battery charging concepts |
| PT06 | | Low Voltage Hybrid grids |
| PV | PV | PV |
| ST | PV | Solar Thermal |
| EW | BM/PV | Excursion/Practical Work |

2 Workshop Methodology

The methodologies of the editing workshop were as followed:

- The PPT presentations of each module of training kit were sent and requested to the trainers two weeks before for individual review or rather giving comments, suggestions and opinions on the shown PPT presentations.
- During the 1 ½ days workshop, all participants were invited for giving comments, suggestion and opinions on each module of training kit and PPT presentations.

3 Participants

Table 2: List of participants of the first day 28th March 2008

| | |
|-----------------------|---|
| 1. Dr. Jyrki | TSE |
| 2. Dr. Jari Kaivo-Oja | Turku School of Economics |
| 3. Mr. Chau Kim Heng | Facilitator of the TOT Level 1 the editing workshop, Director -COMPED |
| 4. Mr. Uch Rithy | Organiser and reporter. Project officer-COMPED |
| 5. Mr. Than Sokun | Participant, COMPED |

| | |
|-----------------------|---|
| 6. Mr. Tang Sochettra | Participant, Ministry of Industry, Mines and Energy |
| 7. Mr. Puth Sokha | Participant, State Secretariat at Civil Aviation |
| 8. Ms. Sean Simalay | Participant, Child Welfares office of Kampong Thom |
| 9. Mr. Bun Pheng | Participant, English Teacher |
| 10. Mr. Ngor Bun Hok | Participant, Marketing Teacher |
| 11. Mr. Kim Pisey | Participant, Build Bright University |
| 12. Mr. Phin Ramine | Participant, Admin-Kompong Thom Orphanage |
| 13. Mr. Hun Bunroeun | Participant, National Technical Training Institute |
| 14. Chhay Vichet | Participant, EDC, training Center |
| 15. Mr. Bun Long | Participant, ITC |
| 16. Mr. Chrin Phok | Participant, ITC |
| 17. Mr. Mony Ratana | Participant, Mony Engineer Consultancy |

Table 3: List of participants of the second day 29th March 2008

| | |
|-----------------------|--|
| 1. Dr. Jyrki | TSE |
| 2. Dr. Jari Kaivo-Oja | Turku School of Economics |
| 3. Mr. Chau Kim Heng | Facilitator of the TOT Level 1 the editing workshop, Director COMPED |
| 4. Mr. Uch Rithy | Organiser and reporter. Project officer COMPED |
| 5. Mr. Than Sokun | Participant, COMPED |
| 6. Mr. Tang Sochettra | Participant, Ministry of Industry, Mine and |
| 7. Mr. Puth Sokha | Participant, State Secretariat at Civil Aviation |
| 8. Ms. Sean Simalay | Participant, Child Welfares office of Kampong Thom |
| 9. Mr. Bun Pheng | Participant, English Teacher |
| 10. Mr. Ngor Bun Hok | Participant, Marketing Teacher |
| 11. Mr. Kim Pisey | Participant, Build Bright University |
| 12. Mr. Phin Ramine | Participant, Admin-Kompong Thom Orphanage |
| 13. Mr. Hun Bunroeun | Participant, National Technical Training Institute |
| 14. Chhay Vichet | Participant, EDC, training Center |
| 15. Mr. Bun Long | Participant, ITC |
| 16. Mr. Chrin Phok | Participant, ITC |

17. Mr. Mony Ratana

Participant, MEC

4 General Consideration

The following consideration was taken into account while reviewing the presentations:

- The level I version 2 presentations are intended for the expert training, the targeted participants are public and private sectors, RES experts, officials and politicians. The trainees will be enabled to become Level 1 RES trainers or RES consultants.
- In Cambodia, people are lack of knowledge/experiences in renewable energy and not high educated and has different professional background.
- Only appropriated technologies were needed.
- Text book can be developed for deep understanding.

5 Outcome of Workshop

5.1 General Comments and Suggestions

- The PPT presentations must be simple, as easily understandable as possible. The second training materials as text book can be provided more technological contents.
- The beginning of PPT should be a clear explanation why we want to talk about (clear objectives, content and what do you expect from participants to be able to do or just to know), what the technologies are appropriate in Cambodia and then short explanation the process of the technologies from the beginning till the utilisation of the end products.
- Detail explanation of the necessary steps of processes
- Importance is the maintenance procedure. It needs to be explained exactly.
- If necessary, at least a video for each training module,
- Facilities for doing practical work are important.
- The participants are not students, if possible, avoid it better than use the technical words without explanation.
- It is good if possible to show successful project.
- Detailed definitions, massive text or tables with numerous of data/figures should be included into textbook or technical manual, but not in the slides
- More simple diagram or/and pictorial illustrations should be put into slides, especially where only text or numerical information in order to provide easy understanding for trainees
- Complex diagrams/graph should be avoided; they could be placed into textbook.

5.2 The general comments or suggestions for each module

5.2.1 Introduction (IN01 and IN02):

No change in

- **IN01** Introduction REEPRO Project.

- **IN02** Introduction of participants.

5.2.2 Basics (BA):

Too long as rather too much and some are too deep or complex.

The training module “basic understanding” should be divided in three courses.

- **Course 01:** Integration of the PPT presentation between **BA01** and **BA03** and called as **BA01**. Only the following slides are required in the PPT presentation **course 01**. BA01 (slide 2 includes one more picture “solar energy”; slides 3, 4 and 8; slide 10 has to be before slide 9; 11, 12, 20-34 without 25; 36, 38, 39, 40 but put data of rain fall in Cambodia; 41, 46 but put data of wind speed in Cambodia). From BA03, require only slide 2, 5 and 6; and slide 2 from **BF01**.
- **Course 02** is **BA02**: no change.
- **Course 03** is **PT_L1** and called as **BA03**, no change at all.

5.2.3 Biogas (BG):

Too much and not in order. The technology is very much appropriated in Cambodia for households and small enterprise.

Suggestion of development of training module BIOGAS: (BG06 can be in the text book).

The Training module of biogas should be divided in **7 courses**:

- **Course 1 (BG01):** showing the **benefits of using of biogas technologies** is necessary. Successful study cases or projects should be given. (COMPED will contact NBP asking for report and pictures).
- **Course 2 (BG02): Anaerobic Degradation (AD)** (definition and generation of biogas, input materials, anaerobic degradation, functions and rule of micro organism, influent of different factors). Local pictures are needed in PPT presentations for better view and understanding.
 - BG01 (retain slides 3, 6, 7, 8, 9, 10, 12, 13,)
 - BG02 (slide 3 can be deleted; only the point about temperature can be taken and put into slide 2, keep slides 4-8 and 14)
 - BG03 (slides 3, 5 only relevant in Cambodia; slides 7, 9, 14, 15, and 16 but change to local pictures like waste of agriculture, agro-industry waste like palm oil residue, tapioca)
 - BG04 (keep slide 2, the presentation should have only 2 or 3 slides about the general information of different types of AD system with local pictures)
- **Course 3 (BG03): Design and construction of AD plant** (different types of AD plants, appropriated, video)

- BG05 (slides 4,5,6, slides 8-10 should be only in one slide; slides 11, 12; 13 and 14 in one slide; slides 17-20 only one slide; slides 21, 23 including drawing pictures; slides 24 and 26-29 only one slide for floating and fix dome; information of local material is needed; slides 35-38 only one slide; slides 50, 60 and 66-69 in two slides; 73 and 74 in one slide)
- **Course 4 (BG04): Operation and maintenance, control system.** No slide is available. Need help from experts.
- **Course 5 (BG05): Utilisation of biogas and slurry**
 - BG03 (slide 18)
 - BG05 (slide 41, 63, 64 and 65 in one slide; 57 and 59 in one slide, slide 77)
- **Course 6 (BG06): Calculation of AD plant and biogas yields**
 - BG05 (slides 39 and 40 in one slide, 42-48 summarize only in one slide,)
 - BG07 (excel file for calculation small scale plant is necessary).
- **Course 7 (BG07): Practical works/excursion.**

5.2.4 Biofuel (BF01):

It is not so much appropriated in country like Cambodia economical aspect. The PPT presentation is not necessarily long.

Suggestion:

- **BF01:** (slides 2,3,4,5,7, slide 8 should be replaced with the local name, plants in slides 10, 11 and 12 are not existing in Cambodia. If possible, put local plants into the slides, slides 15-26 and plant Jatropha should be also included, slide 20 should also be included the yield/ha; keep slides 25, 27, 30, 31, 33, 34, 40,41 and 42). Slides 7, 8 and 9 in **BA03** and slide 27 in **BA01** can be integrated.
- BF02: Video (It is important).

5.2.5 Gasification (GA):

Rocket stove is much appropriated for household using.

Suggestion:

- **GA01: Types of gasifiers, basics and definitions** (keep slides 2, 3, 5 – 8, 10-12, 21-31, 33-37 and slide 43)
- **GA02: Principal and advantage of using rocket stove.** PPT presentation made by COMPED, is ok.
- **GA03** Practical works/Video

5.2.6 Photovoltaic (PV)/Solar Thermal (ST):

Training module level 1 version 2 PV and ST are missing.

Suggestion:

5.2.6.1 Photovoltaic (PV):

- **PV01** Principal and advantage of using PV,
- **PV02** Basic understanding technically (function of each important part, installation and maintenance),
- **PV03** Practical work/excursion

5.2.6.2 Solar Thermal:

- **ST01** Principal and advantage of using ST,
- **ST02** Basic understanding technically (function of each important part, installation and maintenance),
- **ST03** Practical works/excursion

5.2.7 Business (BU):

Suggestions are as followed:

- **BU01:** Information of policy and law in Cambodia for establishing business in electricity. COMPED will prepare some slides for that according guidebook.
- **BU02:** Project development and management (too general, Dr. Jurki TSE will modify the PPT presentation according the real situation in Cambodia, COMPED should provide like investment law in Cambodia)
- **BU03:** Financial planning instead of financial analysis
- **BU04:** Entrepreneurship (it should be integrated into BOU2)
- **BU05:** Tariff system calculation (optional). Slide 4 should be at the link to tariff calculation model. Slide 5 should be slide 4 and it should be different tariff. Billing system and collection fee should be adapted the real situation in Cambodia. Slide 7 is not understandable. .
- **BU06** Financial tools.

Table 4: Level 1 training modules version 2 (after recommendation and suggestion)

| | Course | Module Name |
|----|--------|--------------|
| IN | BM/PV | Introduction |

| | Course | Module Name |
|-----------|--------------------|---|
| IN01 | BM/PV | The REEPRO Training Programme |
| IN02 | BM/PV | Introduction of the course participants |
| BA | BM/PV/FE/PT | Basics |
| BA01 | BM/PV | Renewable energies, resources and advantage of using it |
| BA02 | FD | Fundamentals of electricity |
| BA03 | PT | Power transmission, storage. |
| BG | BM | Biogas |
| BG01 | BM | Benefits of using of biogas technologies |
| BG02 | BM | Anaerobic degradation |
| BG03 | BM | Design and construction of AD plant |
| BG04 | BM | Operation and maintenances, control system |
| BG05 | BM | Utilisation of biogas and slurry/sludge |
| BG06 | BM | Calculation of AD plant and biogas yields. |
| BG07 | BM | BG07 Practical works/excursion |
| BF | BM | Biofuel |
| BF01 | BM | Definitions, sources and biofuel generation, production. Utilization and advantage and disadvantage |
| BF02 | BM | Video |
| GA | GA | Gasification |
| GA01 | GA | Types of gasifiers, basics and definitions |
| GA02 | GA | Principal and advantage of using rocket stove. |
| GA03 | GA | Video, instruction of rocket stove construction, Practical work using rocket stove. |
| PV | PV | PV |
| PV01 | PV | Principal and advantage of using PV, |
| PV02 | PV | Basic understanding technically (installation and maintenance), |
| PV03 | PV | Practical works/Excursion |
| ST | PV | Solar Thermal |
| ST01 | PV | Principal and advantage of using ST, |
| ST02 | PV | Basic understanding technically (installation and maintenance), |
| ST03 | PV | Practical works/Excursion |
| BU | BU | Business |
| BU01 | BU | Investment Law in Cambodia |
| BU02 | BU | Project planning and management, Entrepreneurship |

| | Course | Module Name |
|------|--------|--------------------------------------|
| BU03 | BU | Financial planning |
| BU04 | BU | Tariff system calculation (optional) |
| BU05 | BU | Financing tools in Cambodia |

6 Other Related Matters

- Practical training and preparation of the first level 2 training on 25-26 April, 2008 at training centre COMPED, Choeng Ek, Phnom Penh.

Table 5: Day 1, hands-on participation on small-scale Solar and Biomass Installation

| | Group 1 | Group 2 | Group 3 |
|--------------|--|--|--|
| Units | | | |
| 9:00-9:30 | Introduction <ul style="list-style-type: none"> • Workshop objective and content • Presentation of the 3 workshop stations and background information on Station 1- rocket stove construction; Station 2 - Solar Home System SHS installation; and Station 3 - PV experiments • Formation of 3 groups for the hands-on training <i>Antje Klauß-Vorreiter, DGS and Chau Kim Heng, COMPED</i> | | |
| 9:30-12:30 | Station 1- Rocket stove Introduction, joint construction and operation of a brick Rocket Stove for wood gasification <i>Uch Rithy, COMPED</i> | Station 2- SHS* Joint construction of a Solar home system, measurement and trouble shooting and experiments <i>NN, Kamworks</i> | Station 3- PV experiments Performance of several experiments on PV to demonstrate the function of PV systems <i>Dr. Matthias Klauß, DGS</i> |
| 12:30-13:30 | Lunch break | | |
| 13:30-16:30 | Station 2- SHS | Station 1- rocket stove | Station 2- SHS |

Table 6: Day 2, REEPRO Hands-on training on small-scale Solar and Biomass installation

| | Group 1 | Group 2 | Group 3 |
|--------------|---------------------------|---------------------------|-------------------------|
| Units | | | |
| 9:30-12:30 | Station 3- PV experiments | Station 3- PV experiments | Station 1- rocket stove |
| 12:30-13:30 | Lunch break | | |

| | |
|-------------|---|
| 13:30-15:00 | <p>Presentation of the Pilot communities and fixing the time, schedule and trainers for the first Level I and II trainings in:</p> <ul style="list-style-type: none">• Phnom Penh and Vientiane• The Kampong Thom Orphanage, Cambodia• The OKJAY Village, SANGKAE District, Battambang province, Cambodia• The Ban Mane Village, Laos <p>Formation of thematic teams on Bio-energy, Solar energy and Business Management or training teams and fixing of the further training preparation meeting.</p> <p><i>Chau Kim Heng, COMPED; Dr. Khamphone Nanthavong, NUOL</i></p> |
| 15:30-16:30 | Training Evaluation |

- Some days between the 21st and the 29th of June a REEPRO workshop at the Orphanage in Kampong Thom during the installation of 4-SHS work that:
 1. The TOT participants can participate in the installation of the systems
 2. We can provide special lectures for the TOT participants on the dimensioning of SHS
 3. The TOT participants prepare and offer their first training for level 2 participants at the orphanage.

Uch Rithy
Project officer

Chau Kim Heng
Director