

Vocational Technical Training for Cambodia and Laos rural electrification SMEs (VTCL)



Supported by the ACE through the EC –
ASEAN Energy Facility



VTCL NEWSLETTER No 2, October 2006

The project *Vocational Technical Training for Cambodia and Laos rural electrification SMEs (VTCL)* is supported by the European Commission through the EC – ASEAN Energy Facility and covers period October 2005 –October 2006

Objectives

1. Improve affordability, quality, safety and sustainability of rural electricity in Cambodia & Laos.
2. Establish high quality vocational technical training courses specially designed for rural electricity operators in Laos & Cambodia on the subjects :
 - ❖ Business management for energy service companies
 - ❖ Generator types and fuel sources
 - ❖ Energy efficiency, technical standards and government licensing requirements
 - ❖ Diesel generator sizing, operation & maintenance
 - ❖ Design / maintenance of distribution network
 - ❖ Practical skills / techniques for O&M / Safety

Project partners

1. **IED** (Innovation Energie Development) – French engineering and consulting firm, Project' Leader. www.ied-sa.fr
2. **ETC / TTP** – Technical Training Programme functioning within ETC Energy unit of the ETC Foundation, Netherlands non-profit organisation. www.etc-energy.org
3. **ITC** (Institut de Technologie du Cambodge) – High education institution in Cambodia under the Ministry of Education. www.itc.edu.kh
4. **NUOL** (National University of Laos) – High education institution in Laos under the Ministry of Education. www.nuol.edu.la

Project Highlights

February 2006

- Completion of context studies regarding vocational training in Cambodia and Laos
- Completion of surveys of training needs were completed in both countries
- Review meeting with project partners on results studies and surveys
- First design outlines curriculum of the training course

April 2006

- Completion curriculum guidelines for training Rural Electricity Enterprises in Economics for *Module A* - small energy enterprises, Cost estimation of electric projects, Finances and economic evaluations, and Customer management and billing calculations
- Completion curriculum guidelines for training Rural Electricity Enterprises in for *Module B* - Electricity basics, Genset operation, Network connection, Low-voltage network building, Regular maintenance, Safety and environmental precautions, and Battery charging (Module B)
- Completion of guidelines for designing a Business Case for training institutions offering technical trainings against commercial conditions

August 2006

- Completion Draft Modules A and B

September 2006

- Training of trainers workshop with staff from ITC and NUOL
- Pilot training courses for first batches of managers and operators of Rural Electricity Enterprises

Context study Cambodia

In Cambodia 600 - 800 Rural Electrification Enterprises (REEs) are operating. Out of this total about 120 have got a license. They serve on the average 200 – 300 customers (households, small companies). REEs work with low technical and management standards and thus have high electricity losses (about 30%), due to weak transmission structures, frequent breakdowns due to bad maintenance, and poor safety provisions. The lack of good technical skills, management competencies, work performance, and professional experience were issues of concern. The poor evaluation of the own performance was also seen as a major issue to address.

Most of the REEs (more than 75%) used to be battery chargers. They got their training mostly from equipment suppliers and some got trained from nearby REEs. Furthermore there was a lack of technical training opportunities, except for some already ongoing pilot training projects. Some training initiatives are present, but of a small scale and no coordination between them is taking place.

Context study Laos

Several renewable energy options like biomass, hydropower, solar energy, and wind energy are applied. At the same time huge exports of electricity to Thailand take place, due to the functioning of 5 big hydro plants and 39 small hydro plants that are run in all provinces.

Some genset operation is taking place, but this is in comparison with the hydro generation modest. Currently about 6 Provincial Electricity Companies (PESCOs) are providing services of electricity. They are all licensed. Over the next 4 years, the number of PESCOs is expected to grow to 10 or 15. The PESCOs vary in size: they cater from 195 to 1,249 customers (households) each. In the rural areas more than 1,000 village-based electricity facilities were running (smaller than 5 KW). This kind of units mostly served up to a maximum of 10 households. Persons from the PESCOs, technology student and graduates, as well as NGOs involved in rural energy and the national utility, were considered as part of the target group for trainings.



Genset operation in Cambodia October 2005



Review Meeting Laos February 2006

REE Review Cambodia

The Cambodia results showed that the 115 interviewed REEs and 23 students are mostly small companies with 2 - 4 employees, that nearly half of them exist 10 - 15 years (from different social classes), that the energy generation was done with diesel gensets with a capacity between 75 – 200 kVA, and that the number of customers mostly is varying between 100 – 400 households. Most of the interviewed REEs were licensed. The owner-managers of the REEs had mostly secondary education from a long time back. They came from all walks of societal life (farmer, battery charging, police, nurse, teacher, driver, businessman, student, civil officer, ice maker, seller, sugar producer, maintenance air-conditioner, karaoke shopkeeper, technicians...). The survey revealed that the difficulties in the functioning of REEs were in the areas of complying with technical standards, of technical knowledge to design & operate, and of the lack of financial or management knowledge. The REE managers / operators mostly possessed basic skills. They wished to be trained in the subjects of business management, generator types & fuel sources, energy efficiency, technical standards & licensing, diesel generator O&M, distribution network O&M, practical skills for O&M, and safety. Preference was given to practical & on the job training of one week or two weeks maximally. They are prepared to pay a course fee of US\$ 100.

Training material development

The training course development in the VTCL project involved a number of stakeholders. The process used for the course development consisted of 6 steps:

1. Based on the surveys an inventory was made among the target participants of REE an identification of the topics and content details for the course curriculum. Topics were to address the practical problems faced in the field by those working in the Rural Energy Sector.
2. Based on the inventory results and discussions the topics were grouped in 10 units and a modular course structure of 3 modules was proposed. Considering the wide variety in educational background and also the wide range of tasks within the target group (operators, managers, owners / investors) a modular course structure was seen as useful and effective (possibly, in the future each module can be offered as a separate course to a selection of the participants, this depending on their tasks and responsibilities).

REE Review Laos

In total 35 electricity providers (PESCO's and others) were interviewed and 3 students. The data available show that most of the owner/technicians had an age between 30 - 50 years old, and that almost all of them are men, coming from in this business from various social classes: farmer, battery charging, police, nurse, teacher, driver, businessman, student, civil officer, and technicians. It concerned mostly small companies with 1-2 employees, handling different sources of energy generation (solar, hydro, genset), with a capacity between less than 100 kVA and a number of customers mainly below 100 households. They are newcomers in the business: the majority had been in the business less than 5 years.

All PESCOs have a license from authorities, they generate electricity exclusively by solar PV or hybrid, they did not apply different tariffs for customers, and the majority does not have/use a computer. The subjects of business management, generator types & fuel sources, energy efficiency, technical standards & licensing, and distribution network O&M were the most preferred for incorporation in the training. A one week course with a good balance between theory and practice was preferred. A further detailing of the tasks within the PESCO business is needed, as well as a clearer indication what different levels of knowledge and skills can be distinguished. They are prepared to pay a course fee.

3. A draft outline for the curriculum of the course following the modular structure was prepared and shared with all consortium partners for comments and further detailing. Especially the comments of the local partners were highly valued, because they are much closer to the intended participants' group (a national expert meeting in both countries with well-informed stakeholders to review the draft curriculum was suggested, but did not take place so far).
4. After the finalisation of the course outline, including the curriculum and an indication of the allotted time for each topic, the preparation of the written training materials and training kits took was done.
5. Draft versions of the materials were shared with the selected instructors of the two institutions responsible for implementing the course (ITC, NUoL). Since both of them teach Electrical Engineering, it is important that materials and expertise are available to the Institutions and instructors.
6. All training materials are translated from English to the national languages.

Training of Trainers

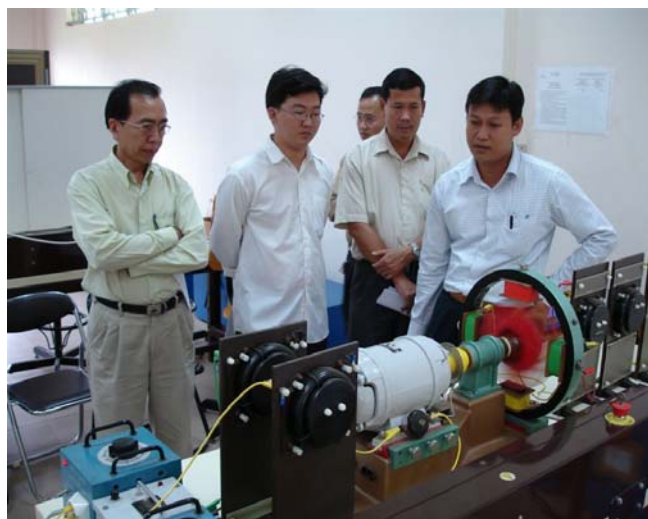
The implementation of the numerous training courses for REE participants now and in the future is the responsibility of ITC and NUoL. Before implementing the first course (the Pilot Training in September 2006) a 5 day Training of Trainers workshop (ToT) was organised at both institutions. Objective of this ToT workshop was to discuss and exchange views on how a practical training course of this type can effectively be offered by the teachers / instructors, who normally teach students, instead of adult practitioners in the Energy sector. During the ToT workshop the developers of the course material and the instructors worked closely together in the preparation of effective and practical training methods to be used during the course.



*Micro teaching during TOT Workshop Cambodia
September 2006*

Pilot Training

Shortly after the ToT workshop the trainers of ITC and NUoL implemented the pilot course for REE participants. Since it is the first in hopefully a long series, it was given the status of a pilot training. External observation and monitoring was arranged with the objective to prepare recommendations for further improvement of the course. In Cambodia the Pilot training was attended by 20 participants, while in Laos a total of 11 participants were attending the 11 day pilot training.



*Practical demonstration at Electricité du Cambodge
September 2006*

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Disclaimer

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