



EEP

Energy and Environment
Partnership – Mekong

The Energy and Environment Partnership (EEP) with the Mekong region is a grant programme funded by the Ministry for Foreign Affairs of Finland and the Nordic Development Fund.

EEP Mekong promotes renewable energy, energy efficiency and clean technology investments in the four Mekong countries - Cambodia, Lao PDR, Thailand and Vietnam. The objective is to combat climate change while providing sustainable energy services to those who lack them. The programme is designed to facilitate the development of innovative ideas, approaches and concepts into sustainable and bankable investment projects that will bring substantial benefits to the partner countries.

The EEP Mekong is based on Calls for Proposals, which are open to public entities, companies, research institutions, universities and civil society organisations. So far, three calls for proposals have been organised. The first was launched in late 2009, where a total of 162 project ideas were presented and 13 projects were pre-selected for further development. The second call for proposals was organised in mid-2010. This time, 105 project ideas were presented, of which 14 project ideas were pre-selected. The third call closed in March 2011. Once again, 105 project ideas were presented. Twenty-one project ideas have been pre-selected. As of 15 October 2011, 13 projects are being implemented under the EEP Mekong. The following pages provide an introduction to these 13 projects.

Cambodia



Photo: Max Shapira

Around 1.5 million Cambodians live in floating communities on the Tonle Sap lake and river system and the Mekong River.

Waste converted to energy for floating communities

The Tonle Sap is the largest freshwater lake in South-east Asia. It is connected to the Mekong River by the Tonle Sap River. The ecological importance of Tonle Sap was recognised in 1997 when UNESCO registered the area on the list of Biosphere Reserves. Unfortunately, the area's ecosystem is under serious threat due to factors such as deforestation as forests are at an accelerating rate being used for fuel wood, and a lack of sanitation as faeces and waste are directly disposed of into the lake.

Currently, there is limited access to affordable and sustainable energy sources for the floating communities of the Tonle Sap and there are no affordable sanitation options available. **Live & Learn Environmental Education, Engineers without Borders Australia and Lund University Department of Water Resource Engineering** are implementing a project in the Tonle Sap

region that aims to reduce these problems. The project will develop and demonstrate appropriate climate-friendly energy solutions for floating communities. Particular focus will be on achieving sanitation benefits through biodigesters that treat human waste and other community wastes. The project will demonstrate small-scale floating biodigester technology that converts waste to energy, producing both biogas for cooking, as well as fertiliser. In addition, other suitable technologies will be demonstrated, such as low-cost micro-solar power for households and floating battery recharging stations.

Knowledge transfer to the floating communities is an important part of the project. Developing local markets, as well as training of entrepreneurs and community members in production, sales, operation and maintenance of the systems will ensure sustainable local ownership and additional local economic benefits.

Increasing rural areas' access to solar energy

A majority of Cambodians live in rural areas without access to a power grid. Many families are therefore, after dark, reliant on kerosene lamps to carry out everyday tasks such as cooking, eating and reading. These lamps pose a serious fire risk, as most rural homes are made from wood and straw, and a health risk, as adults and children are regularly exposed to smoke and soot.

There is high potential for solar power in Cambodia. However, there are two main barriers for large-scale solar rural electrification. First, the upfront investment costs for solar systems are high. Second, there is an absence of a good network for installation, maintenance and repair of these systems. **Kamworks, Pico Sol Cambodia, and Cambodia Mutual Savings**

and Credit Network (CMSC) aim to implement a project that will remove these two barriers and consequently increase access to solar energy for rural areas.

The project will provide rural areas with solar energy equipment and installations that are efficient and cost-effective. The solar home systems (SHS) and the Moon Light, which is a solar lantern, will be introduced. Kamworks will provide training in the assembly and installation of the solar equipment. In addition, solar rental schemes will be introduced and village entrepreneurs will receive training in solar entrepreneurship. Hence, the project will not only provide job opportunities to villagers but will also enable them to earn extra income through solar lantern rentals. MoonLight can be rented

for less than \$0.08/day, which is equivalent to the average daily expenditure on kerosene. At the end of this project, it is expected that about 100 village entrepreneurs will have rented out and serviced 3,000 lanterns and 200 SHS will have been installed by five trained installers. In addition, the personnel of CMSC will have been trained to provide solar loans to village entrepreneurs and SHS customers. Furthermore, an individual maintenance savings scheme will have been developed to ensure proper maintenance after the solar loans are paid off.

The project will help mitigate greenhouse gas emissions as it promotes the substitution of fossil fuel by renewable energy.



Photo: Kamworks

The MoonLight solar lanterns will provide off-grid rural households with light.

Government to raise energy efficiency awareness in Siem Reap

Cambodia's energy sector, despite considerable growth over the last decade, is still struggling to meet the increasing demand of an expanding economy and a growing population. In the city of Siem Reap, in north-western Cambodia, energy consumption has grown rapidly. Energy scarcity is a major issue, but little has been done in practice to promote energy efficiency, energy conser-

vation and renewable energy technologies. Therefore, the Royal Government of Cambodia through the **Cambodian Climate Change Department (CCCD) of the Ministry of Environment**, is implementing an energy savings project in partnership with the **Department of Energy Technique**, the **UNEP Risoe Centre on Energy, Climate and Sustainable Development**, and the **Department of Environmen-**

tal Sciences of the Royal University of Phnom Penh.

The project aims to raise the general public awareness of energy efficiency, electricity savings and climate change issues by conducting public workshops and developing energy labelling for electric appliances. In addition, simple energy conservation measures will be demonstrated as solar water heaters in selected sites will be installed

and compact fluorescent lamps (CFLs), which use up to 75% less electricity than light bulbs and last up to ten times longer, will be distributed. The project will involve households, government buildings, the commercial and private sectors, and aims to change behaviour and foster a culture of energy frugality.

Lao PDR

Photo: National Consulting Group



The Houay Kapheu small hydropower project site in Lao Ngam District, Saravanh Province.

Development of Lao PDR's small-scale biodiesel production

The biofuel sector in Lao PDR is poorly developed, compared to neighbouring countries. However, a change is expected to occur as the government has stated that by 2025, 10% of the fuel in Lao PDR will be biofuel. The policy has been well received by the biofuels industry, but so far the majority of the biofuel investments have been in large scale plantations. Even though these investments would provide the required feedstock, they do not reduce rural poverty levels.

The **Lao Institute for Renewable Energy** and its partners, the **Department of Electricity of the Ministry of Energy and Mines** and **FACT Foundation** intend to demonstrate to what extent small-scale biofuel production can contribute to the

target without negatively affecting other national development objectives.

The project is actively seeking to fit into the country's existing farming and community structures. Therefore, the focus is on small-scale systems. The plan is to provide the first biofuels produced in a small plant from stock grown by smallholder farmers, in a safe and sustainable manner. The project will grow various oil feedstock crops, process them into high quality biodiesel, and sell the fuel produced within the district to locally meet the national target of 10% biofuel by 2025. Poverty levels may decrease as the farmers will earn money from growing the feedstock crops and local people will be employed to produce the fuel.

Hydropower plants to be renovated

The **National Consulting Group** and **ABB Oy** are implementing a project that will update the inventory of hydroelectric resources and determine their technical and economical viability. The project covers five small hydropower plants in three provinces, Luang Prabang, Champasak and Saravanh. Three of the plants are new small-scale plants, while the other plants need to be renovated.

The project will introduce Lao PDR to an innovative technology called **Permanent Magnetic Generator (PMG)**, which is well-suited for both new small-scale hydropower plants and the renovation of hydropower plants. The PMG technology is a gearless, environmentally friendly and safe solution that improves reliability,

increases energy efficiency and reduces both investment and maintenance costs. During the project implementation the hydropower plants' employees will receive hands-on PMG training at the respective project sites.

The project is included in the **National Climate Change Programme on Renewable Energy**.

Pico-hydro turbines introduced in 24 rural villages

Only 30% of the population in the Phongsaly region in Northern Lao PDR have access to electricity. This is far below the national rate of 60%. The hilly region has many waterways and is subject to frequent monsoons,

making the hydroelectric potential high.

Electriciens sans Frontières and **Comin Khmère Company** aim to give 24 poor villages in the Phongsaly region access to electricity by introducing pico-hydro turbines. As the villages

are very isolated, they cannot be connected to a regular electricity network and therefore, there is a need for these autonomous installations.

Capacity-building is a central part of the project. Villagers will, from both a

theoretical and a practical point of view, be trained in how to select and install pico-hydro turbines and grids. During the training sessions, two pico-hydro turbines will be installed in each village. At the end of the project, each village will have a team of trained technicians who will be able to analyse technical problems and maintain the turbines.

The project intends to benefit around 365 families in the 24 villages, providing an average of 100 W of power source to each family. This will help reduce the use of kerosene lamps and candles, and consequently improve the families' health conditions and living standards.



Photo: Marc Gratton

A group of villagers are adjusting the water intake.

Sustainable energy planning

The **Finland Futures Research Centre** has partnered with the **Department of Electricity in the Ministry of Energy and Mines of Lao PDR** to improve the energy planning capacities of Lao PDR's decision-makers. This project is in accordance with the government's national priorities concerning renewable energy development.

There is not only a need for competence improvement, but also a need to update and complement national statistical data on sectoral energy usage. Therefore, the project aims to collect data on household energy consumption patterns and their impact on livelihoods, and data on energy use in the industry, agriculture and transportation sectors. The data will be used to develop en-

ergy planning models which suit the Laotian circumstances. These activities will be carried out in close cooperation with various ministries of the Government of Lao PDR. Increased competence among the ministries will be achieved through training in energy model development and its use in energy planning. Thereafter, energy scenarios will be created together with the ministries to facilitate the planning of future energy development and energy policies in the country.

The project objective is to increase the competence of various ministry experts on sustainable energy planning and to influence the decision-making processes towards more sustainable energy planning in the future.



Photo: Jyrki Luukkainen

Training of Lao PDR provincial authorities.

Vietnam



Rice husk: from producer to consumer.

Development of a biomass multi-fuel supply chain

In Vietnam, there is a lot of biomass feedstock available that can be used as fuel for energy production. However, using crop residues as fuel to produce energy has been problematic, mainly because energy plant investors are concerned about the reliability of getting biomass fuel all year round. Other problems include lack of knowledge regarding biomass energy technologies and lack of demonstration projects that use biomass as fuel.

The **Institute of Energy** together with the **VTT Technical Research Centre of Finland** will implement a project that will develop and demonstrate an effective and reliable biomass supply chain based on multi-fuel for combined heat and power (CHP) plants.

The project is divided into several parts. First of all, the existing supply technologies will be analysed and appropriate supply technologies and

systems will be developed. Then the new biomass supply system, based on multi-fuel, will be studied through several case studies. Thereafter, one of the case studies will be demonstrated in practice and the outcome will be analysed. The results will be disseminated through seminars and brochures.

The project will improve income generation from biomass, increase biomass use in CHP plants, and reduce the use of coal for energy production resulting in a reduction in the import of coal. In addition, the environmental impact of biomass will be reduced, since the biomass will no longer be burnt in open fires or dumped in rivers. In the long term, Vietnam will benefit from a functional biomass production and supply system as it will help the country achieve its renewable energy targets.

Improvement of household biogas technology

Household biogas technology has been promoted by a number of national and donor-funded programmes in Vietnam in order to treat animal waste and to provide affordable renewable energy to farmers. At present, more than 10,000 household composite biogas (HCB) plants are being used in Vietnam. These HCB systems are produced by a number of Vietnamese manufacturers based on Chinese designs. HCB plants have a number of advantages over other types of biogas plants, such as being suitable for weak soil and for high ground water table. They have long life spans and they are moveable. However, non-optimisation of HCB plants designs and lack of operation guidelines significantly reduce the plants' efficiency. In addition, inappropriate operation causes environmental pollution and disqualifies Vietnam's HCB plants from the Clean Development Mechanism (CDM) scheme.

The **Sustainable Energy Development Consultancy JS Company (SEDDC)** and

the **Energy Environment and Climate Change Ltd. Company (ENCC)** are implementing a project that will improve the existing household biogas technology. The design of the HCB plants will be revised and 200 optimised HCB plants will be produced and installed for demonstration. Installation guidelines will be prepared for the HCB producers and end-users will be provided with an operation manual. These activities will help optimise the efficiency of the HCB plants and thus reduce environmental pollution and help ensure that the plants can qualify for the CDM scheme.

To disseminate information about the optimised designs, a workshop will be organised among relevant stakeholders. After the workshop, the project documents including optimised designs, installation guidelines and operation manuals will be disseminated to the Ministry of Agriculture and Rural Development and to other national biogas programmes.



A household biogas digester is being installed.

Innovative financing scheme set up for hydropower plant

Carbonium, the Institute of Energy and Phuc Khanh JSC aim to set up an innovative financing scheme for a hydropower plant in the Lao Cai province in northern Vietnam. Even though the electrification rate in the country is relatively high, the northern areas are not yet fully covered. The hydropower potential in these areas is high.

Vietnam's hydropower technology is relatively mature; therefore, innovation in project design lies mainly within the financing scheme. Independent hydropower producers generally face two problems. First of all, the availability of necessary water flows is irregular, reducing the hydropower plants' reliability. Secondly, the economic viability of small-scale hydro projects is subject to feed-in tariffs which are based on subsidised consumer prices. These two issues create financial and technological barriers for many independent power producers. To tackle these obstacles, the project will establish financial and technological conditions that will allow the project to be viable. In addition, high quality technology will be integrated to guarantee

a long life cycle of the equipment and to capture maximum energy out of the water flows.

During implementation, participants in the project will analyse the current situation for the independent power producers and review national and international incentives for the development of environmentally friendly projects. Thereafter, the participants will estimate the potential reduction of greenhouse gas emissions of the project and recommend the most suitable mechanism to obtain additional revenues necessary for the viability of the project. A project design document for the Clean Development Mechanism will be developed. Then negotiations for the sale of the carbon credits can start. The incentives and the carbon finance element will be integrated in the financial structure of the project.

To ensure that results and solutions of the project are made available to other independent power producers, the participants will record their experiences throughout the project and a guidebook for independent power producers will be developed.



A hydroelectric power station in Vietnam

Stimulating a commercial biogas digester market in Vietnam



Photo: SNV

Most manure is currently deposited in open lagoons. Methane is emitted from the lagoons and the overflows end up in rivers, polluting the groundwater.

Medium and large sized farms are the fastest growing segment of the livestock production sector in Vietnam. They generate significant levels of waste, pollute waterways and release millions of tonnes of greenhouse gas into the atmosphere. SNV Netherlands Development Organisation, together with the Institute of Energy (IE), the Global Energy Consultancy Investment and Trading Company (GECI) and Stockholm Environmental Institute (SEI) are implementing a pilot project that will develop a sustainable commercial medium-scale biogas digester market in Vietnam.

To stimulate an accessible medium-scale digesters market in the country, the project aims to introduce a cost-effective plug-flow biogas digester at 10 farms. The biogas digester will solve the manure management problem of medium-size

farms, while providing gas and electricity, and supporting the reduction of carbon emissions.

The four project partners have developed a new public-private partnership and were specifically chosen to enable the pilot project to have the optimal market introduction, technology and a sustainable project approach. The new plug-flow technology was developed by the IE, who will certify the technology for the Vietnamese market, thereby making it a public intellectual property, which can be adopted by other companies.

The project will link to key stakeholders, such as government departments, research institutes, the private sector and NGOs through the Biogas National Steering Committee and the Vietnam Biogas Association.

Thailand / Regional

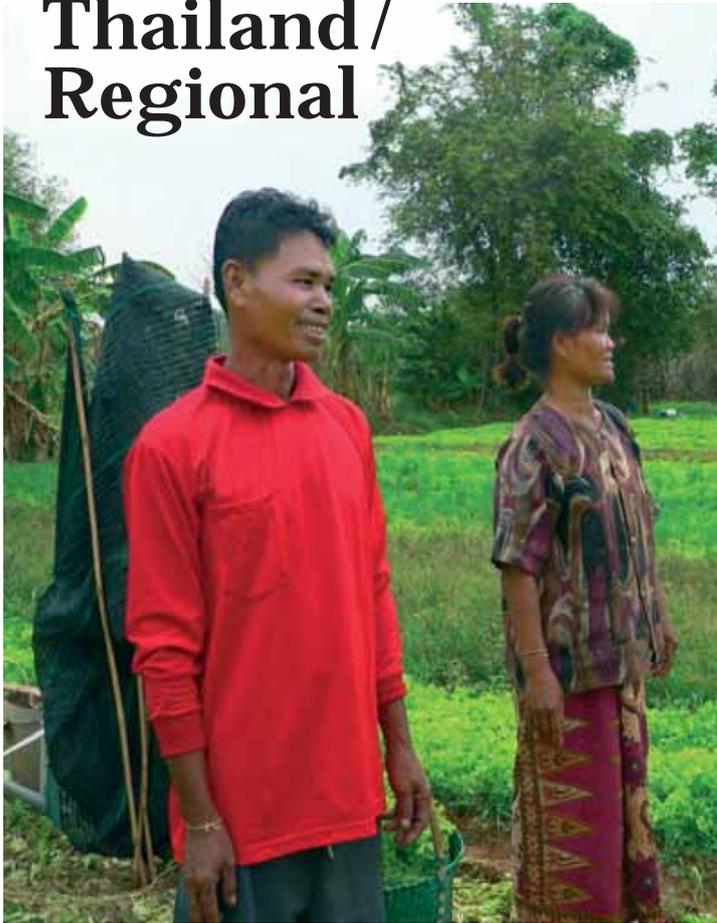


Photo: Dr. Wolfgang Frank

Villagers will participate in the construction, operation and maintenance of the solar-powered water systems.

Solar power technology will provide communities with water

The Population and Community Development Association (PDA), Grundfos Holding A/S and the Joint Graduate School of Energy and Environment (JGSEE) are implementing a project in the Mekong countries that combines renewable solar energy technology with water supply systems.

Many villages in the Mekong region are still without electricity and satisfactory water supply. Therefore, there is a large potential for local solar-powered water supply systems. The inherent advantages of these types of systems are that water is pumped up to storage tanks during day-time hours allowing gravitational force to distribute water to users without the need of costly transportation of energy

and water. The pilot project will not only focus on the technology aspects but will also put strong emphasis on community participation. The objective of the project is to promote renewable energy, mitigate climate change and alleviate poverty, hence improve the selected communities' quality of life.

The implementation of the project will be carried out in eight communities, four in northeastern Thailand, two in Cambodia and two in Lao PDR. Training and dissemination activities will also reach out to participants from Vietnam. Project results will be disseminated through meetings, seminars, media and publications ensuring outreach far beyond the direct beneficiaries.

Multi-fuel biomass utilisation plan to be developed for the Mekong countries

Solid biomasses are not fully utilised in EEP Mekong countries. Wiltrain Consulting Oy, together with seven partners Prince of Songkla University of Thailand, VTT Technical Research Centre of Finland, ENERTEAM, Jyväskylä University, STFE Co. Ltd., National University of Laos, and COMPED will implement a project that aims to develop a multi-fuel biomass utilisation plan for the Mekong countries.

The project is strategy-driven and includes several activities. Among other things, the project will explore the potential of using several alternative biomasses as fuels in new biomass power plants. The restrictions for arable land usage in non-food biomass production will be analysed and the obstacles for biomass utilisation and energy

entrepreneurship in the different countries will be discussed. In addition, biomass energy clusters in the region will be identified to find possible synergies. Furthermore, plans will be developed for the region regarding combustion research on local biomasses and capacity-building on multi-fuel biomass usage.

The project will have positive impact on the environment as it promotes the use of solid biomasses as a fuel for energy generation thus increasing the use of renewable energy and consequently reducing dependence on fossil fuels.

The project aims to increase the farming of non-food biomass such as elephant grass.



Projects under implementation*



Country	Lead Partner	EEP Financing (EUR)
1. Cambodia	Cambodian Climate Change Department	299 400
2. Cambodia	Kamworks	137 000
3. Cambodia	Live & Learn Environmental Education	23 000
4. Lao PDR	Electriciens sans Frontières	100 000
5. Lao PDR	Finland Futures Research Centre	400 000
6. Lao PDR	Lao Institute for Renewable Energy	125 000
7. Lao PDR	National Consulting Group	239 200
8. Vietnam	Carbonium	56 000
9. Vietnam	Institute of Energy	175 000
10. Vietnam	SNV Netherlands Development Organisation	191 500
11. Vietnam	Sustainable Energy Development Consultancy JS Company	98 600
12. Regional	Population and Community Development Association	195 000
13. Regional	Wiltrain Consulting Oy	189 500

* As of 15 October 2011

The Energy and Environment Partnership (EEP) Programme with the Mekong region is funded by the Ministry for Foreign Affairs of Finland and the Nordic Development Fund. EEP offers grants to promote the use of renewable energy, energy efficiency and clean technologies.

Four regional EEP Programmes are now in operation, in the Andean region, in Central America, in the Mekong region and in southern and east Africa. In addition, there is one national EEP Programme in Indonesia. The EEP network provides an excellent framework for north-south and south-south collaboration. Dissemination and exchange of information through thematic forums and web pages are important modes of EEP's communication.

More information about the Partnership and the Calls for Proposals is available at
www.eepmekong.org
www.finland.or.th/en
www.ndf.fi