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# Bio-Renewable Energy Financing Study (Lao PDR)

# Final Report

Vientiane, Lao PDR

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Lao Institute for Renewable Energy

# LIRE

**REPORT # FAO-RE-002**

# Bio-Renewable Energy Financing Study

Vientiane, Lao PDR

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## About us

LIRE is a non-profit organisation dedicated to the sustainable development of a self sufficient renewable energy sector in the Lao PDR. The institute offers agronomical, technological and socio-economic research services, and works to provide a free public resource of information and advice on the use of renewable energy technologies in Lao PDR. LIRE strives to support the development of the country by exploring commercially viable means to establish renewable energy technologies in rural parts of the country, in areas without connection to the national grid and with little access to technical expertise.



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## Abbreviations

| | |
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| **ADB** | Asian Development Bank |
| **AFD** | Agence Française de Développement |
| **APB** | Agricultural Promotion Bank |
| **APPC** | Agricultural Products Promotion Co. Ltd. |
| **ASEAN** | Association of Southeast Asian Nations |
| **BCEL** | Banque pour le Commerce Extérieur Lao |
| **BoL** | Bank of Lao PDR |
| **BORDA** | Bremen Overseas Research and Development Agency |
| **BOT** | Build-Operate-Transfer |
| **BRE** | Bio-renewable Energy |
| **CDM** | Carbon Development Mechanism |
| **CFL** | Compact Fluorescent Lamp |
| **CSF** | Social Development and Civil Society Fund |
| **CTTE** | Lao-Canadian-Thai Trilateral Environment Program |
| **DEPD** | Department of Energy Promotion and Development |
| **DNA** | Designated National Authority |
| **DoE** | Department of Electricity |
| **EdL** | Electricité du Laos |
| **EMI** | Ekphatthana Microfinance Institution |
| **ESMAP** | Energy Sector Management Assistance Program |
| **FAO** | Food and Agricultural Organisation |
| **FGC** | Federation Genevoise de Cooperation |
| **FONDEM** | Fondation Energies pour le Monde |
| **GHG** | Green House Gases |
| **GoL** | Government of Lao PDR |
| **IPP** | Independent Power Producer |
| **IEA** | International Energy Agency |
| **JICA** | Japan International Cooperation Agency |
| **LBC** | Lao Brewery Company |
| **LDB** | Lao Development Bank |
| **LIRE** | Lao Institute for Renewable Energy |
| **LSFC** | Lao State Fuel Company |
| **MEM** | Ministry of Energy and Mines |
| **METI** | Ministry of Economy, Trade and Industry (Japan) |
| **MFC** | Micro Finance Centre |
| **MFI** | Micro Finance Institution |
| **MMG** | Minerals and Metals Group |
| **MOU** | Memorandum of Understanding |
| **NAST** | National Authority of Science and Technology |
| **NDF** | Nordic Development Fund |
| **NDRC** | Naxaythong Development Rural Cooperative |
| **NEDO** | New Energy and Industrial Technology Development Organisation |
| **NSAPCC** | Action Plan on Climate Change |
| **NSEDP** | National Socio-Economic Development Plan |
| **ODA** | Official Development Assistance |

| | |
|---|---|
| **OECF** | Overseas Economic Cooperation Fund |
| **PDA** | Project Development Agreement |
| **PDP** | Power Development Plan |
| **PMF** | Private Energy Marketing Fund |
| **PPP** | Public Private Partnership |
| **PV** | Photovoltaic |
| **READ** | Renewable Energy Activity Database |
| **REF** | Renewable Energy Fund |
| **REP** | Renewable Energy Project |
| **REPIC** | Renewable Energy and Energy Efficiency Promotion in International Cooperation |
| **SCU** | Savings and Credit Unions |
| **SDC** | Swiss Agency for Development Cooperation |
| **SHS** | Solar Home System |
| **SIDA** | Swedish International Development Agency |
| **SME** | Small Medium Enterprise |
| **SPRE** | Southern Provinces Rural Electrification project |
| **SNV** | Netherlands Development Organization |
| **STEA** | Science, Technology and Environment Agency |
| **TBEC** | Thai Biogas Energy Company |
| **TOR** | Terms of Reference |
| **TRI** | Technology Research Institute |
| **VAT** | Value Added Tax |
| **WREA** | Water Resources and Environment Administration |
| **WWF** | World Wildlife Fund |

# EXECUTIVE SUMMARY

This report presents a description of actors and financing mechanisms available in 2010 for bio-renewable energy (BRE) projects in the Lao PDR, where in this context BRE includes small scale solar, hydropower, and any biomass-based energy source. Interventions are suggested that may help to accelerate and scale-up BRE penetration in the Lao PDR energy market.

The key observations and findings of this study are:

- Presently, there is a lack of legislation, but there is willingness from the government to focus on BRE as a priority sector in a coming national strategy for Lao PDR. The government is in the process of completing the 'Renewable Energy Development Strategy' (drafted in June 2010), which will provide an action plan to promote renewable energy use and production in Lao PDR, which should be screened accordingly for social and environmental sustainability and subsequently followed by careful implementation. Official Development Assistance (ODA) is the most common form of financing used for BRE projects, amounting to 209 million USD for 73 projects, of which hydropower are the most common energy resource to be exploited. Other sources of funding were found to be used to support projects, including loans from international banks/financial institutions, soft loans from multilaterals, private equity/venture capital, and Public Private Partnership (PPP).
- The main challenges are broken down into three broad components: institutional, financial and technical. The most significant barriers for widespread use of BRE in Lao PDR are common ones in developing countries, these include:
    - Upfront investment costs of BRE are higher than conventional technologies
    - Delivering an attractive rate of return for investors that is appropriate for the risks assumed
    - Lack of a national Renewable Energy policy and public finance mechanism
- The main recommendations of stakeholders consulted during the study include to:
    - Establish legal and regulatory frameworks that support and encourage different forms of financing

- Develop financial risk management tools for BRE projects to help investors and finance institutions better understand, quantify and mitigate risk
- Provide supportive governmental regulatory policies

The central conclusions and recommendations for improving BRE financing in Lao PDR are numerous. First, BRE financing in Lao PDR will be unable to take-off as a viable source of long-term capital until proper government policies, legal frameworks, and infrastructure are put in place, that are besides economically viable, also environmentally and sustainably sustainable. For that matter, it is important that the investments are quality investments that benefit the Lao people and the Lao government budget and not only foreign investors. It is also important that an overall coordinating body is identified and assumes overall governmental responsibility. Right now, it is imperative to implement financial incentives to mitigate risk and attract investors and financial institutions. It is also necessary to implement an awareness raising and educational campaign to stimulate the demand side of BRE from consumers' and raise the BRE I.Q. of the government and financial institutions. Furthermore, a study on environmental and social impacts, linkages to climate change, CDM and carbon financing mechanisms; tax and tariff scenarios and options; connecting the public and private sector; and the role of microfinance is recommended. Finally, in conclusion, for the BRE sector in Lao PDR to expand to a size that is environmentally, socially (rural electrification) and economically relevant; attractive and affordable financing mechanisms must be in place.

# 1 INTRODUCTION

This report presents the findings of the bio-renewable energy (BRE) financing study, commissioned by the FAO and conducted by LIRE. The study took place from 15th June to 15th September 2010, and aimed to answer two central questions:

- What are the existing financing mechanisms for BRE in Lao PDR?
- How can they be improved in order to accelerate and scale-up BRE penetration in the Lao PDR energy market?

In September - October 2009, LIRE conducted a small study on the "Status of BRE Development for Poverty Alleviation and Rural development in Lao PDR" ", in collaboration with SNV in Lao PDR and FAO Mekong Regional Office. The outcomes of that study were a database of ongoing BRE activities, a brief assessment of the constraints and possibilities associated with the BRE sector and possible plans of action to advance BRE for the benefit of rural and poor communities in the country.

At the national workshop associated with the above-mentioned study, hosted in October 2009 in Vientiane, participants identified the lack of affordable and accessible sources of financing for BRE to be a central obstacle to developing the sector in Lao PDR. As such, financing BRE activities was perceived by FAO and SNV to be a key priority for developing the sector in Lao PDR, and it was decided to investigate further the issue. In response to these needs, FAO has asked LIRE to conduct a study assessing the financing arrangements regarding the BRE sector in Lao PDR, with the objective to improve the accessibility of funding for BRE activities.

As a result, the main outputs of the study are:

- A review of the financing options for BRE projects;
- A review of the institutional and policy framework of both the BRE and financial sectors;
- An inventory of perceived barriers to BRE financing and potential solutions to overcome these;

- A list of recommendations for an action plan to chart a path forward.

## 1.1 Methodology

The study methodology involved five main steps:

- Desk study of relevant documentation and secondary data review to provide an overall picture on existing BRE projects led in Lao PDR and current policy and institutional framework by reviewing official reports on BRE, newspapers and internet-based resources.
- Face to face interviews with selected key stakeholders from the banking sector to identify and promote initiatives, strategic choices, and roles within BRE financing.
- An initial stakeholder consultation workshop was held in Vientiane on August 6th, 2010 inviting key actors within the local BRE and banking sectors to share their views about finance in BRE projects, particularly the barriers to accessing finance and how they can be overcome.
- Interaction with the AIT Vietnamese team, who conducted a similar study on the challenges and potential of BRE financing in Vietnam, to discuss common issues and approaches.
- Identification of potential financial products/propositions based on dialogues and research conducted.

BRE financing mechanisms and their successful use are highly dependent on the type of technology implemented, the nature of entrepreneurs, project developers and investors' needs as well as the BRE market and its regulation.

## 1.2 BRE Technologies

Bio-renewable energy is an inclusive term that refers to both Bioenergy and Renewable energy. Bioenergy technologies use biomass resources to produce a range of energy products including electricity, fuels and heat. Biomass is considered to be any plant derived from organic matter that is naturally replenished, these include agricultural crops, waste

and residues, wood, aquatic plants, and animal, human, and municipal wastes. Renewable energy is energy that is derived from natural resources such as sunlight, wind, water, tides and geothermal heat.

In Lao PDR the following BRE technologies have been implemented or are underway, these include:

- Solar Photovoltaic's (PV) projects consisting of solar home systems, solar pumps, recharging stations and PV mini-grids
- Hydropower projects including Pico (less than 5 kW), Micro (5kW to 100 kW), Mini (100KW to 1MW) and Large (more than 1 MW and less than 5 MW)
- Biomass projects consisting of electricity generation through gasification and direct thermal plants
- Biogas projects consisting of both small-scale (home digesters and village level systems) and commercial-scale
- Biofuel projects are small to large-scale (production, processing and use in the same area, scale transitions through possible cooperatives)

## 1.3 The Demand for BRE Financing Mechanisms

Depending on the technological choices the scales of investment for BRE vary significantly:

- Large-scale projects can reach a budget of more than 1 million USD.
- Medium-scale projects may request a budget of between 100,000 USD to up to 1 million USD.
- Small-scale projects usually build on budget of 10,000 USD to 100,000 USD.
- Finally, micro-scale projects often use a budget below 10,000 USD.

Consequently, project developers involved in the BRE market need diverse financing mechanisms to cover the capital investment cost and risk mitigation of project involving new technologies and different scale of projects. The study shows that the access to

appropriate financing mechanisms varies also greatly with the type of project developers and according to the technology implemented.

For a decade, Foreign Investors in Lao PDR have mainly been represented by consortia of foreign companies and foreign private investors interested in large hydropower generation for export. However, multiple Small and Medium Enterprises (SMEs) exist and have progressively penetrated the BRE market, with an orientation towards micro and small scale projects. Finally, the needs for energy in remote areas and progress in access to technology due to increased trade networks have established new types of demand for micro/household BRE financial mechanisms.

## 1.4 BRE Financing Supply and its Framework

Although financing mechanisms for BRE in Least Developed Countries (LCDs) are usually very limited, in Lao PDR hydropower development has opened investment opportunities to the extent that the BRE financing market is closer to the level of the Emerging Countries. Lead by International Development Banks (e.g. the World Bank and the Asian Development Bank), and Credit Export Companies, these financial mechanisms have also been greatly supported by the institutional framework and policies developed under the Official Development Assistance (ODA) and the Government of Lao PDR (GoL) strategy for socio-economic development. However, the focus on large hydropower development for electricity exportation has somehow delayed the emergence of financing mechanisms for other BRE projects and consequently BRE penetration in the Lao PDR energy market.

# 2 REGULATORY AND LEGISLATIVE FRAMEWORK

This chapter gives an overview of the institutional and policy framework for the Lao BRE and financial sectors. First the regulatory frameworks for the BRE and financial sectors are described, before examining the government policies and strategies affecting BRE projects and financing. Presently and except for large and medium Independent Power Producers (IPPs), there is a lack of regulation, but there is willingness from the government to focus on BRE as a priority sector in the coming national strategy for Lao PDR. The government is in the process of completing the 'Renewable Energy Development Strategy' (drafted, June 2010), which will provide an action plan to promote renewable energy use and production in Lao PDR.

## 2.1 BRE Sector Regulations

The most important laws and regulations that are relevant to the BRE sector are as follows:

- **Electricity Law (1997)**, amended in 2009, which introduced a licensing system that sets out the steps and conditions to be observed by private investors seeking a mandate to develop IPP projects. The law also provides a framework for the promotion of rural electrification, providing general principles of licensing concessionaires in rural areas.
- **Environmental Protection Law (1999)**. It specifies principles, rules and measures for managing, monitoring, restoring and protecting the environment in order to protect public, natural resources and biodiversity. One of the key principles is that natural resources, raw materials and energy should be utilised in an economical manner. Managed by the Water Resources and Environment Agency (WREA), Environmental Impact Assessment (EIA) is an important legislative instrument to prevent environmental degradation through development projects.

- **Draft Decree on Petrol Saving and Promotion of Biofuel Production in Lao PDR (2006)**
- **Draft Decree on Biofuel Energy Development and Promotion in Lao PDR (June 2010)**
- **Draft Decree on the Implementation of National Policy for Small Hydropower Development by Private Sector (June 2010)**. Although regulation for the large and medium IPP has been produced in the late 1990s, there is to date no clear regulation and guidelines for small hydropower. This decree argues for a progressive penetration of BRE in the energy market as well as the need for electricity generation for the Lao PDR market.

Since 2000, increasing attention has been paid to Renewable Energies, the recent draft Renewable Energy Strategy shows an increased GoL commitment to BRE. In parallel, regulations on energy savings are being developed with two draft decrees on Petrol Savings and Biofuel promotion. These decrees set the objective of a 10% shift to biofuel by 2020.

- **The Law on the Promotion of Foreign Investment (2004)** regulates investments in the sector, although is not specific to energy. The Law on the Promotion of Foreign Investment sets out the principles, regulations and measures regarding the promotion, protection and management of foreign investment in Lao PDR. Foreign investors may invest in all business sectors in Lao PDR, only if they are not detrimental to national security or cause a negative impact on the environment, and are detrimental to health or national traditions. Foreign investors may invest in the Lao PDR in the following forms:
    - Business partnership contract: is a business between domestic and foreign juristic entities without establishing a new entity in Lao PDR
    - Joint venture between foreign and domestic investors: an enterprise that is established and registered under the laws of the Lao PDR, which are operated and jointly owned by foreign and domestic investors
    - Foreign owned enterprise (100%): is an enterprise, in which a foreign investor only makes the investment in Lao PDR

The procedure to apply for a foreign investment license in Lao PDR is done through an application that needs to be submitted to the Committee for Promotion and Management of Investment (CPMI) either at the central or provincial level.

- In parallel a **Procurement Manual for Independent Power Producers** has been established as guidelines for investments in large and medium hydropower projects. However, no clear procurement mechanisms have been implemented for small hydropower projects and more generally for BRE.
- **Decree on Local and Rural Electrification Fund (2005)**, which regulates the newly created Rural Electrification Fund.
- Finally each entrepreneur has to obtain a business license which follows the rules of the **Business Law (1994).**

## 2.2 Financial Sector Regulations

The important laws and regulations that are relevant to the financial sector are as follows:

- **Decree on the Organisation and Activities of the Bank of the Lao PDR (1999), and the Bank of the Lao PDR Law (1999)**. The bank of Lao PDR "represents the GoL in international financial organisations, to associate, cooperate and sign financial and monetary agreements with foreign countries and international financial organisation as delegated by the government."It also has the responsibility to "raise the efficiency of payment and credit mechanisms in Lao PDR".
- **Decree of the President of the Lao PDR on Commercial Banks (2000)**
- **Regulation on Lending to Large Customers of Commercial Bank and Financial Institutions which under the supervision of the Bank of the Lao PDR (1996)**

  "Commercial banks and financial institution which are under the supervision of the Bank of the Lao PDR may extend credit to their customers within a limit of no more than 60% of the collateral value at market prices. The risk of such loans should not exceed 10% of capital and reserves of the commercial bank or financial institution concerned."

- **Regulation on the Credit Policy of the commercial Banks and Financial Institutions to the Executive Officer and Credit Related People (1996)**

## 2.3 Government Policies and Strategies

Although BRE was not clearly defined as a priority objective in the National Socio-Economic Development Plan (NSEDP) 2006-2010, the need for "promoting the development of environment-friendly private sector products such as (...) technologies that are energy efficient and clean" was highlighted. The NSEDP 2006-2010 was mostly focusing on electricity generation for export, as a source of revenue, and to achieve 90 % electrification for the population by 2020. The draft NSEDP 2011-2015 reiterates the objective to "develop hydropower sources and renewable energy in order to supply energy to the production sectors and the society, and become the battery of ASEAN"[1].

In support of this objective, a planned measure is to "improve policies, laws, regulations and coordination procedures; and increase effectiveness and transparency in the procedures for the study of project proposals and other documents, to attract more investment".[1]

However, BRE may play a strategic role to achieve the 90% electrification goal, especially in remote areas. This opportunity is likely responsible for the recent development of two strategies that emphasise BRE and Energy Efficiency.

### 2.3.1 The National Strategy and Action Plan on Climate Change

The National Strategy and Action Plan on Climate Change (NSAPCC), has identified 8 thematic priorities, including one on Climate Change Mitigation. The priority actions for Climate Change Mitigation, which are relevant to the BRE sector, are as follows:

- Study of Carbon Credit Potential of Small hydropower
- Study of Carbon Credit Potential of Biogas
- Improving Energy Efficiency in Buildings

[1] The Seventh National Socio-Economic Development Plan 2011 – 2015 (Draft), P.19.

- Study on Low Carbon Transportation
- Energy Efficiency improvement for Industries
- Solid Waste Management for GHG Emission Reduction

The strategy aims to take a holistic view of climate change adaptation, including strengthening the country's suitability to financial instruments available under the United Nations Framework Convention on Climate Change and the Kyoto Protocol, such as the Least Developed Countries' Fund and Adaptation Fund as well as the Clean Development Mechanism (CDM).

### 2.3.2 Renewable Energy Development Strategy

Upon completion in 2010, the Lao Ministry of Energy and Mines (MEM)'s Renewable Energy Development Strategy will provide an action plan to promote renewable energy use and production in Lao PDR. The draft strategy is intentionally broad, including biofuels and biomass exploitation, micro-hydropower, solar power, wind and geothermal energy. An inventory of resources has been established during the elaboration of the strategy. Although biomass is strongly considered, emphasis is still given to hydropower.

The Draft Renewable Energy Strategy set the strategic objective of 30% of BRE in the overall energy production and distribution system by 2020. The following strategic goals and actions are also of particular relevance to this study:

- Financial incentives for renewable energy projects – including income tax exemption for 12 years, import tax and fee exemption for project materials, tax reduction / exemption on profits and VAT, and tax exemption for repatriation of profits of foreign investors
- Creation of a public Renewable Energy Fund – to assist in the development and promotion of renewable energy projects in the Lao PDR
- Simplified small hydropower development process – small hydropower power plants will be exempt from concessional agreements and will not have to pay any royalties to the government.

- Competitive bidding for small hydropower development
- Non-discriminatory interconnection of small hydropower plants to the national grid – which will enable the sale of generated electricity to third parties at off-take tariffs that will be more attractive to investors
- MEM support of local banking sector – in the areas of due diligence, risk assessment and project management (specifically for small hydropower projects)
- Preferential loans for small hydropower projects – the Ministry of Finance will encourage state-owned commercial banks to provide preferential financial packages to small hydropower projects

In order to clarify the Renewable Energy Sector management, a new institutional framework has been proposed. To that effect, a new agency will be created under the MEM.

### 2.3.3 Financial Policies and Strategies

In the financial sector, there is an explicit target to increase commercial loans by 20% per year (and reach 20 – 23% of GDP). Measures to support this include the improvement of private banking regulations and supervision, and the development of a domestic capital market.

The GoL is preparing to issue Thai baht denominated bonds of 5 to 15 year terms, backed by hydroelectricity export royalties. The objective of the bond issue is to reduce the Lao PDR's reliance on overseas development assistance to finance domestic projects.

The Vientiane Times (12th May 2010) reports that the bond issue (of up to US$80m) will not take place until the end of 2010. The bond issue will give the GoL more flexibility to finance public projects, some of which will be in the BRE sector.

# 3 FINANCIAL ARRANGEMENTS FOR BRE PROJECTS

This chapter gives an overview of the existing experiences with different financial mechanisms used to finance BRE projects. These experiences are directly related to the technology and scale of investment. Overall, a total of 73 projects have been implemented till now, with an expanded value of 209 million USD. Although not directly included in the study of BRE, very large-scale hydropower projects (> 5MW) with budgets exceeding one million USD were the most numerous accounting for up to 25% of projects. The main financing mechanisms for large and medium IPP projects are risk and guarantee by International Banks and Credit Export Companies, capital investment by Foreign Companies and Investors (e.g. Holding Companies, Hedge Funds, etc...). However, Official Development Assistance (ODA) is the most common form of financing used for other BRE projects; often supported by other sources of funding such as loans from international banks/financial institutions, soft loans from multilateral organisations, private equity/venture capital, and Public Private Partnerships (PPP). As BRE projects are most often initiated on the basis of ODA, this implies that they do not automatically relate to commercial-market laws of financing; and in fact they often include low interest rates, subsidies etc.

| Sub-sector | Investment in Million | Number of Projects |
|---|---|---|
| **Solar Photovoltaic (PV)** | 47 | 17 |
| **Hydropower** | 163 | 16 |
| **Biomass** | Not identified | 7 |
| **Biogas** | 17 | 14 |
| **Biofuel** | 73 | 19 |
| **Total** | **290** | **73** |

**Table 1:** *Summary of the Renewable Energy Activity Database (READ). Please note that for some projects investment costs and financing mechanisms are not available.*

A detailed description of specific financing mechanisms for past and ongoing projects in Lao PDR is given in Appendix 1. Few existing financing mechanism are further described. They have been selected because of the precision of information available and because they clearly show attempts to overcome financing barriers.

## 3.1 Per Technology[2]

There are different types of BRE projects that have been or are being implemented in Lao PDR; these include Solar Photovoltaic (PV), Hydropower, Biomass, Biogas and Biofuels.

### 3.1.1 Solar Photovoltaic (PV)

The following types of solar photovoltaic (PV) projects are typically implemented:

- Solar home systems (SHS)
- Village-scale solar PV systems
- Solar recharging stations
- Solar water pumps
- Community Solar PV
- Commercial Solar PV systems

Solar Photovoltaic (PV) projects (from large to small scale) in Lao PDR use Official Development Assistance (ODA) as the main financing option, supporting up to 75% of all the projects in this sector. About half of solar PV projects are financed through using a combination of various financial sources, such as Official Development Assistance (ODA), loans from international banks/financial institutions, soft loans from multilaterals, private equity/venture capital and Public Private Partnership (PPP).

### 3.1.2 Hydropower

There are several scales of hydro-electricity projects that have been implemented in the Lao PDR, namely:

- Large scale (>1MW<5MW)
- Mini-hydropower (100kW to 1MW)

2 See Appendix 2 for more details regarding specific project financing mechanisms.

- Micro-hydropower (5kW to 100kW)
- Pico-hydropower (<5kW)

The majority of hydropower projects (26%), both large-scale and small-scale get financing through Official Development Assistance (ODA) and Multilateral Financial Institutions (MFIs) MFI. A large number of hydropower projects are funded through both ODA and a second financing option such as loans from international banks/financial institutions, soft loans from multilaterals, public support (bond issue/fiscal spending), and private equity/venture capital. 15% of projects were financed through Independent Power Purchase (IPP).

### 3.1.3 Biomass

Biomass is used extensively throughout the Lao PDR as a source of energy (e.g. fuel wood and charcoal). However, feasibility studies for electricity generation using biomass gasification or thermal power plants have suggested that the biomass in the Lao PDR is generally too dispersed and seasonal to be a viable feedstock.

There are very few biomass projects in Lao PDR; the reason can be attributed to studies, which indicate that the biomass is too dispersed and seasonal to be a viable feedstock as a source of energy to generate electricity through biomass gasification or thermal power plants. A few Biomass projects have been implemented, which have been financed through Official Development Assistance (ODA) and soft loans from multilaterals.

### 3.1.4 Biogas

Biogas in the Lao PDR is typically used as direct substitutes for biomass and fossil fuel energy sources (e.g. wood, charcoal, oil, etc) in cooking and heating applications. Biogas projects in the Lao PDR include:

- Domestic Biogas
- Commercial Biogas

Biogas projects in Lao PDR are mostly financed through two financing options, either a) ODA (up to 30%) or b) private equity/venture capital (40%). Only a few projects are financed using more than one source of financing. It is interesting to note, that one large-scale commercial biogas project did get financing through the Carbon Development Mechanism (CDM) (for more information refer to Appendix 1: Financing Options for BRE Projects).

### 3.1.5 Biofuels

Biofuels in the Lao PDR are in a nascent stage of development and predominantly consist of the plantation of feedstock (mainly Jatropha and Cassava). Biofuel processing facilities have yet to be established, despite a Lao government – Ministry of Energy and Mines' decree to replace 10% of petrol imports with biofuels by 2020.

Biofuels in Lao PDR use private equity/venture capital as the main financing option, supporting up to 54% of all the projects in this sector. About 30% of biofuels are financed through using ODA. Other sources of financing for biofuels are through a combination of several different sources of funding, which include ODA, private equity/venture capital, Clean Development Mechanism (CDM), and soft loans from multilaterals.

## 3.2 Example of Existing Financing Mechanisms for BRE

### 3.2.1 Financing Rural Electrification: The Rural Electrification Fund of the DOE

Although the use of funds is dependent upon project compliance with cluster plans and Provincial development plans, funds disbursement is not directly related to technological choices. However, two main limiting factors should be mentioned:

- The available funds are still limited.
- The fund is not yet set-up as an independent institution, but is still functioning as a World Bank Project Implementation Unit.

As a consequence, the fund has until now principally been used for World Bank off-grid projects. Furthermore, Small Independent Power Producers may be reluctant to subscribe to the conceptual model presented below and the associated fixed energy tariffs.

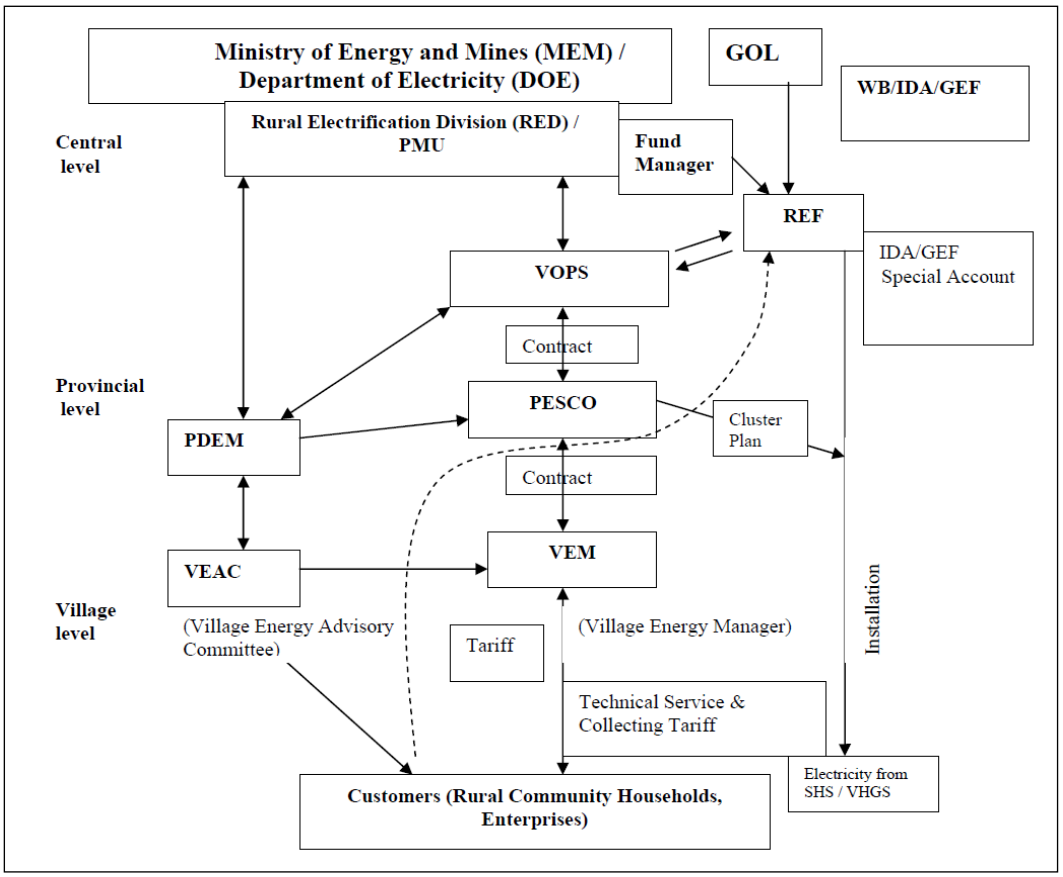


**Figure 1***: "Conceptual Design of Rural Electrification Fund", World Bank and MEM,* Rural Electrification Fund Operations Manual*, Draft Report, 2009*

### 3.2.2 IFC - MEM Micro Hydro Public Private Partnership: Lease and Purchase Agreement

Recently, the MEM consulted with potential investors/project developers on the best mechanisms to implement four Micro-Hydropower plants in the province of Huaphan. These will act as a pilot project to test the financing mechanisms and the possibility to scale it up. The project is based on a lease purchase agreement (see ***Figure 2***) where:

- The investor/project developer makes the upfront investment for the overall system (generation, distribution and supply).
- The investor/project developer operates the system for a period between five to ten years.
- The GoL pays a fixed lease term to the investor/project developer.

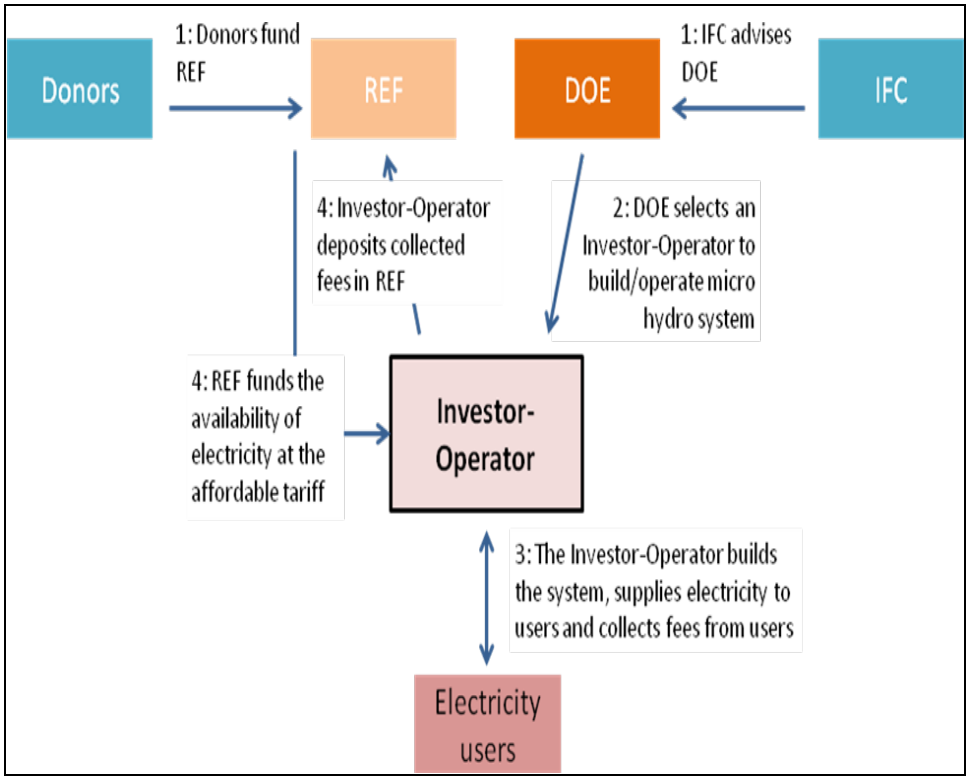


**Figure 2:** *Model for Micro Hydropower Public Private Partnership*, presented by the DOE at a consultation with potential investors – operator, 24th September 2010

This financing mechanism is principally based on the availability of funds in the REF and GoL subsidies on electricity tariffs. It is meant to overcome institutional and financial risks. The initiative will make use of a bidding system, where the selected investor/project developer is selected on the basis of cost-efficient proposal. Although the price will be a key factor of the proposal investors/project developers have no interest in under evaluating the

project costs. In other words, the fixed leasing payment agreed at the proposal stage acts as a guarantee of project return on investment.

As a consequence the only risks left to the investor/project developer are:

- The System Design,
- The technological Risk or the risk of equipment failure. However, this risk may be offset by the equipment supplier guarantee.

Although it has not been envisaged that the REF act as a guarantee for lending, the safety of the project design in itself may be enough to facilitate access to credit. But, to attract even further investors/project developers the MEM may consider a 50% advance on the lease payment for the equipment and installation costs.

### 3.2.3 Other model of Public Private Partnership for Rural Electrification

Projects involving distinct public and private assets are conducive to public-private partnership (PPP) financing models. When possible, such arrangements can work to leverage the partners, with the benefit of market access on the part of the private body, and the achievement of challenging development goals for the public entity.

A transparent separation of funding streams is essential for any PPP: public money cannot finance private business, and this must be clearly observed. One common means to achieve this is to categorise project components according to fixed (non-recoverable) or moveable (recoverable) assets, where the moveable assets can attract private investment, and the fixed assets are more appropriately financed by unsecured donor funds.

Fortunately, some BRE technologies are highly suitable to such an approach, thanks to high value moveable assets that can remain the property of an energy service provider. Moreover the typically high initial capital investment followed by relatively low costs associated to operation and maintenance are favourable to the different roles of public and private bodies: the former seek a fixed term involvement, whereas the latter are interested in a sustained service and source of revenue.

Different BRE projects have started under the model of Public Private Partnership. The concept is vague and takes different forms. It can involve ODA support to the Private Sector to implement BRE projects and/or models involving the GoL, local communities and the Private Sector for Decentralised Generation (DG).

*Sunlabob Renewable Energy Ltd,* a Private Energy Service Provider has proposed such a model as expressed in the following figure:

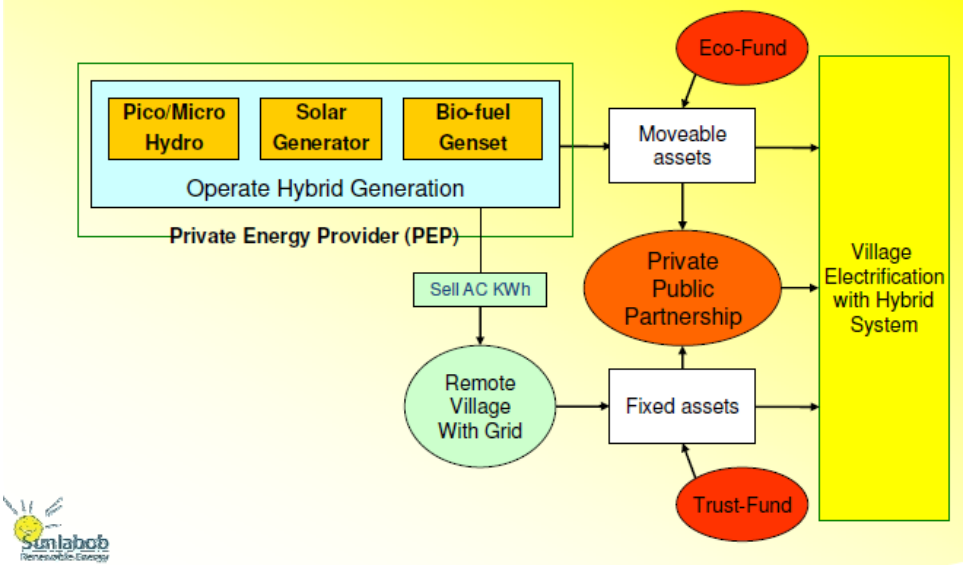


**Figure 3**: *Sunlabob, Business Models for Mini-Grids in Developing Countries: Village Hybrid Grids, Paying for the Service not the Hardware.*

This model was utilised in one hybrid village grid project at Nam Kha in Xiengkhouang province, in northern Lao PDR. As the private partner, Sunlabob invested in generating equipment and operated the system as a locally operated decentralised energy service. The NGO Helvetas was the primary public partner, and financed electricity network infrastructure and community capacity building activities.

### 3.2.4 Rental Schemes for Energy Systems

The financial risk of high capital investment for many BRE technologies remains a primary barrier to its uptake in rural areas, especially for new products. Rental schemes offer a means to transfer this risk from the end user to a service provider, which must therefore absorb the cost into a long term business plan. Given the difficulty for low income

households to make large investments, and a generally poor awareness of comparative operational costs amongst potential users, a rental scheme has the potential to greatly improve uptake of BRE. Further advantages of rental schemes include the inherent incentive for service providers to invest in high quality, long lifetime products in preference to less expensive options, and the opportunity to provide technical support services as part of rental subscriptions.

The critical requirement is a rental fee that is both commercially viable for the service provider and affordable for the user. Although other criteria are needed to determine overall viability, this single measure can be used to indicate the economic feasibility of any technology for a given socio-economic context.

In the Lao PDR, rental services for rural energy supplies were pioneered by Sunlabob Renewable Energy Ltd, initially for Solar Home Systems (SHS) from 2000 and later for a range of other services including solar water pumps and recharging stations. Sunlabob's rental services were propagated through the Lao PDR by developing an extensive network of franchisees, trained by the company in installation and maintenance services. The Sunlabob SHS product was discontinued in 2008 due to competition with the Rural Electrification Programme financed by the World Bank, which provided a subsidised SHS package on a lease basis with limited after sales service.

According to Sunlabob, there were also other limitations to SHS rental systems. The company found that, even on a rental basis, only the top third of village households could afford the SHS package it offered. Secondly, systems and services needed to be carefully adapted to existing consumer behaviour. For the SHS, money was collected by the franchisee from the end-users on a monthly basis. This was difficult for most rural households, which neither have regular monthly incomes nor are used to putting money aside on a monthly basis for their expenses. Additionally, the training of village energy committees and technicians to manage services was found to be too expensive without donor support, even though the company found that such community engagement activities are essential for service delivery.

# 4 KEY PLAYERS INVOLVED IN THE BRE FINANCING SECTOR

This section presents the mapping of key stakeholders that are currently or could potentially be involved in funding BRE activities ranging from government offices, banks to operating private companies in the sector, their strategies, and general interactions or relationships if any. Firstly, the public institutions involved in the BRE sector are outlined, followed by a structural overview of the financial sector, which include both public and private financial institutions.

## 4.1 Institutional Framework for the BRE Sector

### 4.1.1 Ministry of Energy and Mines

The Ministry of Energy and Mines (MEM) is the key government body responsible for the BRE sector. At the national level, the MEM has primary responsibility for renewable energy, power sector development, policy formulation and strategic planning. It is also mandated to prepare and implement legislation and regulations related to the power sector and renewable energy.

The MEM has one representative office in each of the 17 provincial capitals of Lao PDR, which implement elements of the master plan at the provincial level. The provincial departments are also responsible for administering electricity facilities, approving small-scale power facilities (up to 5 MW), and own and operate isolated rural grids and generating facilities. MEM is also in charge of coordinating administration, and inspection of production, transmission, distribution and equipment standards of electricity within the provinces.

The MEM is sub-divided into six departments, of which the most important for BRE management are:

**Department of Electricity**

The Department of Electricity (DoE) is the leading department in the MEM. Its main roles are to:

- Develop national energy policy
- Prepare strategic planning for power sector development
- Regulate the electricity sector
- Administer and inspect electricity enterprises, and seek funding for electricity sector development including mobilization of the Rural Electrification Fund and implementation for off-grid power projects (including pilot programs)
- Encourage the efficient use of electricity; through the promotion of research and development into renewable, sustainable and alternative forms of Energy Efficiency/Energy Conservation
- Monitor the compliance industry with policies and support the Clean Development Mechanism (CDM) in order to maximize the benefits to the Government of Lao PDR

The Department of Electricity is organized into five divisions:

- **The Environment and Renewable Energy Division –** which supports environmental regulations and formulates renewable energy policy, strategy and planning, except off-grid rural electrification.
- **The Rural Electrification Division –** which manages and utilizes the rural electrification-revolving fund for the implementation of off-grid rural electrification projects (i.e. micro/village hydro systems, solar photo-voltaic and biomass based technology systems).
- **The Power Sector Planning Division –** It has the responsibility of collecting data on electricity production and consumption and recommends future investment projects.
- **The Electric Power Management Division –** compiles and summarizes statistical data regarding national electricity production and consumption. It is also

responsible for regulations, restrictions and enforcements of technical and safety standards on electricity.

**Department of Energy Promotion and Development**

The Department of Energy Promotion and Development (DEPD) supports the development of power plants in the country. It advises and informs Independent Power Producer (IPP) developers, processes project proposals, and advises decision makers for approvals. Until now this department has mainly addressed large hydropower projects and Large scale foreign investment, as the driving goal in the 7th NSEDP is to achieve 8% GDP growth and exit LDC status by 2020.

### 4.1.2 Ministry of Planning and Investment

The Department of Investment and Foreign Investment oversees domestic investments, Foreign Direct Investments, and international cooperation and development projects. The primary function of the Promotion Department (IPD) is promoting investment in Lao PDR, offering investment incentives, screening investment proposals, correcting investment data and monitoring investment practices.

### 4.1.3 Other Relevant Government Bodies

The following government bodies are also relevant to the BRE sector:

| Institutions | Tasks Related to Energy |
|---|---|
| **Ministry of Industry and Commerce** | Manages the importation and distribution of petroleum products and its pricing policy. Issues business license for investors. |
| **Ministry of Agriculture and Forestry** | Formulates policy and strategic planning for agriculture and forestry development. |
| **Ministry of Public Work and Transportation** | It works on the policy formulation and strategic planning for agriculture and forestry development. Its main tasks are forest law management and regulations, forest recovery and conservation promotion, forestry research and development overview, forests and forestry activities. It administers and oversees the strategic policy and guidelines, the management of water resources and regulation. |

### 4.1.4 Relevant Public Institutions

The former Sciences Technology and Environment Agency (STEA) has been divided in two main institutions.

**Water Resources and Environment Administration**

The Water Resources and Environment Administration (WREA) oversees water use and environmental permits. It has established a management and operation plan to mitigate potential negative impacts from electricity development projects. WREA is also responsible for the implementation of the National Strategy and Action Plan on Climate Change (NSAPCC), and is the Designated National Authority (DNA) for CDM projects.

**National Authority for Science and Technology**

The National Authority for Science and Technology (NAST) works on policy formulation and planning on science, technology and environment across all sectors. It works on adaptive research and demonstration projects on science, technology and environment, and provides technical advice on environmental protection Law and standards. Under its umbrella are regrouped different research institutions, but the coordination between these institutions remain low:

**Technology Research Institute:** works on the demonstration of solar PV technology, on the research on biomass conversion technology and advises on appropriate technology for rural electrification. Currently, TRI is limited by a lack of skilled staff.

**Engineering and Renewable Energy Centre:** conducts applied and adaptive research on renewable energy technology and traditional technology for local conditions. However, better coordination would allow improving the transfer of technology and research results.

**Lao Institute for Renewable Energy:** provide advisory services, capacity-building, training modules development, and conducts applied innovative research and feasibility studies on renewable energy technologies and their possible implementation that are sustainable and suitable for the local conditions.

### 4.1.5 Electricité du Laos

Electricité du Laos (EdL) is a state-owned corporation under the jurisdiction of the Ministry of Energy and Mines. EdL's role in the sector has expanded; while in the past it focused on domestic utility operations in Vientiane, it now supplies many districts in the provinces of Lao PDR. It owns and operates Lao PDR's main generation, transmission and distribution assets. It also manages electricity imports into its grids and exports from its stations, whilst promoting and developing sources of power supply.

EdL remains a state agency directly under the responsibility of the Department of Electricity. It implements government power projects, and is nominated by the GoL as its shareholder in the ownership of IPP projects. It promotes a commercial approach to off-grid electrification, but the Rural Electrification Division directly manages off-grid renewable energy.

## 4.2 Structure of the Financial Sector

### 4.2.1 Ministry of Finance

The Ministry of Finance is responsible for the centralized and uniform management of the finance sector in the country, and also for implementing fiscal policy on behalf of the GoL. There are 12 departments within the Ministry of Finance – Cabinet, Accounting, Customs, Tax, State Owned Enterprise Financial Management, Treasury, State Asset, Inspection, Personnel, Budget, External Finance and Fiscal Policy.

The Ministry of Finance is also responsible for preparing the fiscal budget and coordinating with the other GoL ministries and committees. The budget is completed by the end of September each year, and is then submitted to the National Assembly for approval.

### 4.2.2 Bank of the Lao PDR

The Bank of the Lao PDR (BoL) is the central bank that supervises and oversees the Lao banking sector. In the hierarchy of the Lao government, the BoL holds a position that is equivalent to a ministerial level. The BoL:

- Enacts monetary policy on behalf of the GoL
- Develops legislation for the monetary and financial system for the GoL
- Manages the foreign currency reserves and exchange on behalf of the government
- Manages the printing of paper currency for circulation (on behalf of the GoL)
- Represents the GoL in international finance
- Supervises and regulates the banks and financial institutions under its authority
- Collects and analyses data on the macroeconomic and financial situation of Lao PDR
- Manages the BoL account holders

Currently, BoL does not have any policy on the financing BRE projects. However, they are willing, and would like to play a key role in this sector in the future. One of the main roles that the BoL can play in financing BRE is through two possible approaches. An option would be to attract grants from international donors, where MPI would play a lead role in this. The funds could then be put into the Agricultural Promotion Bank and Nayobai Bank, and divided into two components: for example 500,000 USD is put aside for grants, while 300,000 USD for TA. Another possible way for financing BRE is through micro financing, where at the moment the BoL wants to raise the limit of loans to 10 million kip (USD 1,200) for end users who must be under grant coverage/grant project. Borrowers would need to pay back the loan on a regular basis, within a maximum timeframe of five years. Borrowers would not need any physical or individual collateral, but it can be a 'group collateral'. Furthermore, BoL can play a leading role in attracting grants as a means to facilitate financial issues at a macro level for MPI. Moreover, BoL can also promote BRE projects through wider advertisement in the city and rural areas, as well as increase awareness on BRE technologies.

### 4.2.3 Banking Sector

The Lao banking sector is still relatively small, with total assets of around US$2.2 billion (as of the fourth quarter 2009). A previous study 'Access to Finance, Lao PDR' has been conducted by SNV in 2008, which gives detailed information about financial services offered by each institution, please refer to this study for more detailed information[3]. The terms and conditions of loans for each bank do vary, but in general loans are awarded on the basis of some or all of the following criteria:

- government policy, social and environmental impact,
- feasibility study and evaluation of financial return on investment
- the 5 Cs: Character of the borrower, Capability (ability to pay back), Cash flow (physical assets), Client history (development of customer), and Collateral.
- The 3 Rs (right person, right amount and right time)

There are five major categories of actors in the banking sector, whose financial records are summarised in the following table:

| | Number | Assets Millions USD | Deposits Millions USD | Loans Millions USD | Loan-to-Deposit Ratio |
|---|---|---|---|---|---|
| State Owned Banks | 4 | 1,486.98 | 1,035.95 | 654.29 | 63.16% |
| Joint Venture Banks | 2 | 138.65 | 77.20 | 80.73 | 104.58% |
| Private Banks | 4 | 152.58 | 134.78 | 97.77 | 72.54% |
| Affiliated Banks | 3 | 142.41 | 55.72 | 53.29 | 95.64% |
| International Banks | 8 | 284.96 | 117.32 | 152.86 | 130.29% |
| TOTAL | **21** | **2,205.59** | **1,420.97** | **1,038.94** | **73.11%** |

*SOURCE: Bank of the Lao PDR, 4th Quarter Review 2009*

**State-Owned Commercial Banks**

The state-owned banks dominate the banking sector, accounting for 67.41% of all banking sector assets, and 62.98% of all bank loans (as of the fourth quarter 2009). There are four

[3] Access to Finance Study, Lao PDR, February 2008, Commissioned by SNV, Heinz Williams & Bouasavanh Khanthaphat

state-owned commercial banks in the Lao PDR: Banque pour le Commerce Exterieur Lao (BCEL), Nayoby Bank, Agricultural Promotion Bank (APB) and Lao Development Bank (LDB).

The Agricultural Promotion Bank (APB) and the Lao Development Bank (LDB) were approached in order to understand how they operate, get a clear picture as to their current role in financing the BRE sector, and their willingness to finance this sector.

The Agricultural Promotion Bank (APB) does not have any formal BRE policy; however it has supported several biogas and Biofuel projects. APB is willing to expand its activities beyond biogas and Biofuels to also support both solar and Pico-hydro projects in the future. There is no limit when it comes to scale of investment and the assessment of funding is centrally based on the reality and feasibility of a project. The APB invests in both small and large-scale projects (maximum loan up to 1,300 billion Kip). The maximum loan per company cannot exceed 25% of the capital registered by the business license. In terms of micro credit, the maximum loan per borrower is 1,220 USD, short terms loans (up to one year) have an interest rate of 10-14% and medium and long-term loans (up to 3 years) are at 12-15%. One practice that works effectively up till now is the practice of group collateral. The legal procedure to request financial support is through the certification of the village chief, which is to be signed by both spouses and a project feasibility study, needs to be certified by the relevant ministry.

The Lao Development Bank (LDB) is a public enterprise, which provides credit/banking services to SME customers who want to borrow or save money. LDB does not have a specific policy on financing BRE projects, but it does provide funds to small and medium scale projects in Lao PDR. For example, LBD is financing the 'Namlong Hydropower Project' with a capital investment requirement of 9 million USD, LDB is providing 1 million USD, where the rest of the financing is derived from a loan from BCEL Bank and the project owner's fund. The legal procedure to request financial support are based on customer interviews, certified applications by the village chief and spouses, feasibility study that are certified by the line government departments, collateral (land title), and contribution fund of the borrower.

**Joint Venture Banks**

There are two joint venture commercial banks in the Lao PDR: Joint Development Bank and Lao-Viet Bank. The joint venture banks account for 6.29% of all banking sector assets and 7.77% of all bank loans (as of the fourth quarter 2009).

**Private Commercial Banks**

There are four private commercial banks in the Lao PDR: Phongsavanh Bank, Indochina Bank, ST Bank and Booyong Lao Bank. The private commercial banks account for 6.92% of all banking sector assets and 9.41% of all bank loans (as of the fourth quarter 2009).

**Affiliated Banks**

There are three affiliated banks in the Lao PDR: ANZV Bank, ACLEDA Bank, and International Commercial Bank. The affiliated banks account for 6.46% of all banking sector assets and 5.13% of all bank loans (as of the fourth quarter 2009).

Several face-to-face interviews were conduct with two of the Affiliated banks namely ANZV Bank and ACLEDA Bank to understand how they operate, get a clear picture as to their current role in financing the BRE sector, and their willingness to finance this sector.

ANZ VCB does not have any formal policy to support the BRE sector; however the ANZ group in Singapore has financed two large-scale hydropower projects in Lao PDR. ANZ acted as arranger for USD currency lead for PRG/PRI providers and Export Credit Agencies. There is no limit to the size of a loan. The bank is more interested in investing in large-scale projects rather than micro or small-scale entrepreneurs. The reason for this is that larger well-established companies are better prepared and constitute a less risky investment.

The ACLEDA bank was established in 2008, and now has branches across four provinces. The ACLEDA bank does not have any formal BRE policy to support the BRE sector. It is however open to all types of businesses (as BCEL, APB, and LDB are) to borrow money from the bank, particularly SMEs. On average the total loan size is 300,000 USD and interest rates vary from 19% (small loans) to 13% (large loans). The legal procedure for requesting financing is based on an assessment of home/business.

**International Banks**

There are eight international bank branches or representative offices in the Lao PDR: Siam Commercial Bank (Thailand), Thai Military Bank (Thailand), Bangkok Bank (Thailand), Krungthai Bank (Thailand), Ayudhya Bank (Thailand), Public Bank (Malaysia), Sacom Bank (Vietnam), and Standard Chartered (UK – representative office only). The international banks account for 12.92% of all banking sector assets and 14.71% of all bank loans (as of the fourth quarter 2009).

A number of the above mentioned international banks have been involved in the financing of medium and large hydropower projects. They facilitated Project Bonding and Thai Bath currency for debt financing.

### 4.2.4 Microfinance Institutions

There are four deposit-taking microfinance institutions registered in the Lao PDR: Ekphatthana Microfinance Institute (EMI), Lao Postal Saving Institute, Saynhai Samphanh Microfinance Institute, and Microfinance Centre (MFC).

A face-to-face interview was conducted with the director of EMI and MFC, to understand how they operate, get a clear picture as to their current role in financing the BRE sector, and their willingness to finance this sector.

EMI and MFC do not have any policy on financing the BRE sector. However, there is a positive trend towards the green energy market, as more people are aware of climate change and the funding available in this field. In general, MFIs still need more information on BRE technologies before they can finance this sector. MFIs would most likely not be able to finance hydropower, as these types of projects require a huge amount of funds. The main reason why MFIs do not finance the BRE sector is because there is a low profit margin. However, the driving force for MFIs to finance BRE projects in the future is to raise awareness amongst people on the MFIs concerns for the environment, as well as part of the companies' social marketing strategy to build up market and recognition.

The target customers of MFIs are small-scale entrepreneurs such as market vendors, business people, and farmers in urban and peri-urban areas. MFIs such as EMI give loans out to their customers, which do not exceed 10 million Kip, as EMI has a revolving fund of

2.4 billion Kip. The interest rates for the loans are set at 4% per month. MFIs criteria for screening and approving loans are based on the 5 Cs. The legal procedure to request financial support is a certification from the village chief, which is signed by both heads of the household; this is done to avoid future conflicts.

### 4.2.5 Other Deposit Taking Institutions

There are a number of other deposit taking institutions throughout the Lao PDR in the form of Savings and Credit Unions (SCU) and credit cooperatives. These include Naxaythong Rural Development Cooperative, Credit Cooperative for Promotion of Small Producers / Fonds Cooperatif and Lao Farmer Production Cooperative.

Besides the SCUs there are also several types of microfinance structures in Lao PDR, these include Village Savings and Credit Groups and Village Revolving Funds[4]

Several face-to-face interviews were conduct with two Deposit Taking Institutions namely The Lao Farmer Production Cooperative and the Naxaythong Rural Development Cooperative to understand how they operate, get a clear picture as to their current role in financing the BRE sector, and their willingness to finance this sector.

The Lao Farmer Production Cooperative is a company deals with agricultural products such as jams, tea, coffee etc, from the rural areas of Lao PDR. Presently, they have twelve Fund Cooperatives in eleven provinces in Lao PDR. The cooperative does not have a specific BRE policy. Microfinance is the key business and funds come partially from the ACLEDA bank. The portfolio is about 5 billion Kip, with an extremely high interest rate of 36% per year. This network aims to build up the capacity through trainings on agricultural production and processing, and marketing of products of rural people to be self-sufficient and self-sustained. The criteria of approving loans are based on the assessment of need of investment and the borrower must have a savings account. The borrower can lend up to 80% of their savings and must have at least 1 share (10,000 Kip ~ 1.2 USD).

The Naxaythong Rural Development Cooperative was established in 2001, with the participation of four villages and a total fund of just 50 million Kip (~1,220 USD). However,

[4] Access to Finance Study, Lao PDR, February 2008, Commissioned by SNV, Heinz Williams & Bouasavanh Khanthaphat

by 2009 the fund accumulated 4.8 billion Kip with the participation of fifty-two villages within Naxaythong district. Loans are provided to three main sectors: agriculture, industry and service. The criteria for giving out loans are that the borrower must be a member of the cooperative, hold at least 1 share (10,000 Kip ~ 1.2 USD), and have a savings account. The interest rate for borrowing is 28-30% per year.

## 4.3 Position of Existing Entrepreneurs/Investors/Project Developers

Entrepreneurs in BRE projects in Lao PDR are:

- Foreign Companies and Funds investing in large scale projects, such as hydropower generation for export or buying equity in a local medium and/or small scale project such as biofuel and hydropower supplying local consumption.
- Although they are few in the market, small local enterprises also invest in the provision of energy services by BRE technologies. A non exhaustive list of these entrepreneurs include[5]: Sunlabob, Provincial Energy Services Company (PESCOs), Kolao, etc.[6]

It is interesting to note that almost all these companies started under a Public-Private partnership agreement. In other words, they have been financially supported by public institutions and/or financing mechanisms (i.e. subsidies for technology, tax exemption, equity capital, etc…)

The main characteristic is that these entrepreneurs are very different by nature and as such face different institutional and financing barriers, whilst not benefiting the same opportunities in terms of capacity to invest and access sources of funds.

[5] For more details regarding the companies' activities see Appendix 1 page 54.

[6] See Appendix 1 for an exhaustive list of local entrepreneurs.

### 4.3.1 Common Perceived Risks and Constraints

- BRE is very capital intensive. By consequence, small and medium enterprise require a stable cash-flow and access to long term financial schemes.
- BRE industry is volatile because of the innovations. In Lao PDR this constraints is accentuated by the proximity of Chinese and Vietnamese markets. The most striking example is pico-hydro turbines sold on local markets by traders. Although the price is generally convenient for households there are no quality guarantees or customer services. However, entrepreneurs who are proposing services and better quality equipment will have difficulties in convincing households, because of their low capacity of payment and a general practice to pay for the cheapest product. In this context competition is even harder and may well explain the reluctance of entrepreneurs to open and integrate this market.
- Furthermore, the low quality of equipment can impact the trust of financial institutions. Incentives programmes and subsidies may be lowered or withdrawn at a short notice.

### 4.3.2 Institutional Barriers and Regulation Frameworks

According to the research on factors influencing power generation investment in Lao PDR (2009)[7]:

"The most influential factors is the legal factor wherein the GoL issues laws assuring foreign investors in repatriating capital and dividends. In addition, the GoL issues laws governing tax exemption or waivers relating to project construction, infrastructure and certain activities regarding process and industrial activities that use modern technologies. There are also laws concerning tax exemption on imported machinery. Tools, spare parts and relevant vehicles including raw materials that are unavailable or inadequate in the country.

[7] Kiatisak T., Alsua C., Mujtaba B. G., "Factors Influencing Power Generation Investments in Lao PDR", *Asian Journal on Energy and Environment*, 2009, Vol. 10 Issues 04, pp. 201-213

Generally the study shows that the most influential factor influencing investors is legal practises (72% of the entrepreneur/project developers declared it as important factor). However, the legal framework for small scale BRE project is still underdeveloped.

Other constraints are expressed as follows:

- Complexity of institutional responsibilities, despite the guidelines set in the electricity law. Depending of the size of the project the authority is at national, provincial or district level. However, in practise the responsibilities depend more on the ability of the entrepreneur to navigate with the administration procedures.
- At village level, the entrepreneur may face difficulties related to weak/strong social organisation. In other words, it may be difficult to collect the fees for energy services if there is no clear engagement of local leaders and formal institutions to support the entrepreneurs.
- The complexity of institutions leads to high transaction cost both for entrepreneurs and households. For entrepreneurs this requests the development of complex institutional settings to ensure the fees collection, the maintenance of the system, etc. as for the PESCOs model. The result is high administration cost of the system, whilst the energy services tariff remains very low.
- For foreign investors it is important to find a skilled and reliable Lao counterpart. This means that the institutional context must provide a trustful environment for investors to ensure that this step is not perceived as a risk.
- Decentralised generation is still a general idea. There is no acceptance yet on the cost-benefit of a decentralised system as opposed to economy of scale generated by national cover of energy services. Without recognition of cost-benefit of DG, it is difficult for entrepreneurs to establish the benefit of their system. Because of the long history of large energy systems, cost-benefit analysis does not always take into consideration the full implementation and operation cost of a traditional system (e.g. recycling costs, cost of grid extension often offset by ODA, cost of the raw material without subsidies, environmental costs, etc.).

### 4.3.3 Market Constraints

Electricity prices in Lao PDR are very low, although Independent Power Producers for large and medium hydropower power producers have been able to negotiate highly competitive feed-in tariffs. There is not yet clear regulation or system to estimate feed-in tariffs, which is a constraint concerning prospective entrepreneurs and project developers. For small and medium entrepreneurs this represents a strong barrier because it adds on the risks and the transaction costs.

Furthermore, despite the demand for energy, the capacity and willingness to pay for these services remain very low. People in remote areas are aware of the electricity prices from the national utility and are reluctant to pay higher prices. The capacity of payment for energy services is within a range of 1 USD/Month. Parallely, the GoL maintains a policy of subsidies to energy prices in remote areas to align the tariffs nationally.

Entrepreneurs/investors and project developers have also to face strong competition of "traditional" sources of energy. Subsidies on electricity and fuel price represent a serious market bias constraining BRE penetration.

Without clear regulation small and medium enterprises encounter more difficulties to negotiate the prices, especially because of the GoL policy of maintaining low electricity prices. These prices do not reveal production and distribution costs. Even though they are not directly subsidised the subsidies on transmission lines and taxes exemption for imported equipment that benefit foreign investors partly explain how the low tariffs are first made possible and secondly represent a market distortion constraining other power generation type.

### 4.3.4 Access to Funds

Loan interests in Lao PDR are very high and access to long-term loans is difficult, which is a major constraint for small and medium entrepreneurs.

# 5 CURTAILING CHALLENGES TO BRE FINANCING

This study has identified a series of challenges, constraints and hurdles to BRE financing in the Lao PDR. Before all other issues, the lack of public sector commitment is of paramount concern. Government leadership is vitally needed to both remove barriers and set a comprehensive and constructive framework for promoting BRE financing; this is essential to stimulate and drive action among the various stakeholders that make up the sector. Even with strong and visible commitment and leadership on the part of the public sector, barriers cannot be overcome without concrete action. Only with direct support to tackle the inherently high initial investment costs, in the form of subsidies or other incentives, can BRE technologies be competitive with subsidised fossil fuels and grid electricity.

## 5.1 Constraints Assessment

Several challenges to BRE financing have been identified through face-to-face interviews, desk study[8] and the stakeholder consultation workshop. They are divided according to the nature of the barriers: institutional and regulatory frameworks, market, and existing financing mechanisms.

The following summary tables underline 6 main needs for BRE financing and consequently to scaling-up BRE investments and market penetration in the Lao PDR:

- Need for appropriate energy finance mechanisms

[8] Principal reports and articles used are:

- Heinz W., Khanthaphat B., *Access to Finance,* Study Commissioned by SNV, Lao PDR, 2008.

- Kiatisak T., Alsua C., Mujtaba B. G., "Factors Influencing Power Generation Investments in Lao PDR", *Asian Journal on Energy and Environment*, 2009, Vol. 10 Issues 04, pp. 201-213.

- LIRE, *Rural Electrification Stakeholders' Consultation Report*, CAP-REDEO Project, 2009.

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- Reducing transaction costs
- Reducing perceived risks
- Promoting/Mainstreaming BRE in the energy and socio-economic development policies
- Dealing with cost-benefit of BRE
- Strengthening capacities

In the context of Lao PDR these needs are strongly interrelated and moving forward will request participation and support of all the actors.

- World Bank and Kfw, *Financing Renewable Energy: Instruments, Strategies, Practise, Approaches*. Discussion Paper, 2005.

**Table 2:** Summary Table of Identified Constraints

| | Entrepreneurs/Investors/Project Developers | Banks | Large Financial Actors | Development Agency | Households |
|---|---|---|---|---|---|
| **Institutional Arrangements** | | | | | |
| **No clear responsibilities** | - Increase transactions costs.<br>- Increase investors perceived risks<br>- Lack of understanding of what is the regulatory agency for small and medium scale projects. | - Increase Bank perceived risks. | - Increase FIs perceived risks | - Difficult harmonisation of development programs and projects | - |
| **Communication/Partnership** | - Lack of coordination between entrepreneurs/investors/ project developers and the Energy Sector agencies and research institutes.<br>-Bank system perceived as inaccessible.<br>-Difficult for the private sector to attract development aid.<br>- Lack of visibility of the private sector on the energy market. | - No skills to advise entrepreneurs with their business plan, feasibility study, fund raising and completing loan applications. | - Not committed yet to private sector for BRE in Lao PDR. No technical advisory services for business plan, feasibility study, fund raising and completing loan applications. | - Very few projects to support private sector small and medium scale BRE initiatives such as technical advisory services for business plan, proposal writing, fundraising, ESIA, feasibility study or public-private partnerships.<br>- Lack of education programs geared towards the skills required for a strong BRE sector. | -Bank system perceived as inaccessible. |

| | Entrepreneurs/Investors/Project Developers | Banks | Large Financial Actors | Development Agency | Households |
|---|---|---|---|---|---|
| **Policy and Regulatory Frameworks** | | | | | |
| **Lack of BRE strategy** | - Lack of proactive leadership by the GoL to both remove barriers and set a comprehensive and constructive framework for promoting BRE financing. | - Banks need government commitment.<br>- Low understanding of BRE investment needs conditions and risks. | - FIs need government commitment.<br>- Thailand and Vietnam already set RE, more attractive. | - Recent support to RE strategy, but still more focused on grid extension.<br>- Not enough commitment to BRE yet | - |
| **Lack of BRE consideration in the Power Sector Policy** | - Considering the cost of BRE, feed in tariffs, incentives and tax holidays should be proposed to support investment. | - Banks need government commitment.<br>- Low understanding of BRE investment needs conditions and risks. | - FIs need government commitment.<br>- Thailand and Vietnam already set RE. More attractive. | - Technical Advisory services a long time engaged with large hydropower and infrastructure projects (e.g. grid extension). | - |
| **Lack of contracting system model for small BRE projects** | - High transaction costs for concession agreement.<br>-Lack of procurement regulation for small and medium scale BRE projects. | - Increase Bank perceived risks. | - Increase FIs perceived risks.<br>- Thailand and Vietnam already set contracting models. More attractive. | - Technical Advisory services a long time engaged with large hydropower and infrastructure projects (e.g. grid extension). | - No monitoring requirements to ensure well functioning services and equipment. |
| **Market** | | | | | |
| **Technological constraints** | - Lack of access to equipment and supplies.<br>- Upfront investment costs of BRE are higher than conventional technologies.<br>- Long payback period | - Low understanding of BRE investment needs and risks. BRE projects are regarded as any other activity. | - Low understanding of BRE investment needs conditions and risks in LCDs. | - | - Technological failure is provoking more reluctance to the use of BRE.<br>- BRE technologies not always adapted to |

| | | | | | |
|---|---|---|---|---|---|
| | - Quality of equipment not always adapted to climate and environment.<br><br>- Lack of experts/technical staffs. | - Lack of experts/technical staff | | | socio-economic and cultural context.<br>- Lack of technical capacity and knowledge |
| **Market Bias** | - Private Sector has to face competition of large scale projects and traditional energies which are benefiting of:<br><br>- Technological support such as High and Medium voltage transmission line installed by donors<br>- A strong bargaining power to negotiate feed in tariffs, raw material prices, etc.<br>-An established system of incentives and tax holidays<br>-Price subsidies to electricity and fuel oil<br>-Availability of competitive inputs for production and processing (e.g. land, skilled labour, quality technologies, etc.) | - More trust on large projects using conventional technologies, because identified risks lower and better investment rate of return. | - More trust on large projects using conventional technologies, because identified risks lower and better investment rate of return. | - Follow models of socio-economic development. Their infrastructure support may become a veritable market bias as for large hydropower for export opposed to small hydropower projects for the local demand.<br>- Competing development models (e.g. cash crop such as Jatropha and food security) | - Strategy of use of the cheapest available energy resources. For example wood availability constraint the use of efficient charcoal.<br>- Aware of low tariffs of the national utility and may prefer to wait grid connection than investing in costly technologies.<br>- Household are reluctant to use animal waste as energy resources, whilst using it as fertilizer. |
| **Demand Side Problems** | - Face lack of understanding and awareness on the possible benefits of BRE and rural electrification.<br>- No attractive rate of return consistent with the risks assumed, due to lack of customers solvability and general environment.<br>- Too much focus on grid extension, large-scale infrastructure and hydropower projects | - Bank reluctant to lend to projects where demand is not clearly established. | - If the demand is not established, MFI will be reluctant to act as guarantee and/or lend money. | - Past projects have met problems with lack of ownership and maintenance of BRE technologies.<br>- Donors are following the “best strategy” for socio-economic development. It resulted in prioritising large hydropower project for electricity export. | - Lack of willingness and payment capacity.<br><br>- Lack of understanding on the possible benefits of BRE. |

| | Entrepreneurs/Investors/Project Developers | Banks | Large Financial Actors | Development Agency | Households |
|---|---|---|---|---|---|
| **Financing Mechanisms (Size of loans, type of loan, rate of interest, modalities of allocation of funds…)** | | | | | |
| **Loan type and modalities** | -Most of the available loans are based on short to medium (1-5 years) term.<br><br>- High collateral requested (e. g. 100-130% of the loan amount), whilst most of the entrepreneurs in Lao PDR are Small and Medium enterprise with little assets and cash-flow.<br><br>-Difficult to find guarantee for the project.<br><br>-High Equity requested.<br><br>-Low bargaining power and creditworthiness.<br><br>-High transaction costs for accessing loan (e.g. need to make feasibility study, find guarantee, etc...) | - Lack of BRE policies.<br><br>- Lack of skills to evaluate project.<br><br>- Financial mechanisms are not tailored to BRE project needs.<br><br>- Lack of skills for credit management. Strategy not well established between short term loan and long term loan.<br><br>- High transaction costs for short term and small loans. Almost the same than for long term and high loan.<br><br>-Although donors borrow at low interest rate and on a long term, BOL borrow at higher interest rate and on a shorter term.<br><br>- Loans and grants allocated to projects can be very long to be disbursed by the Bank of Lao PDR. | - Lack of BRE policies.<br><br>- Donors and investors request high and fast return on investment. In some cases, FI can expect up till 40-50% (e.g. Hedge Funds, Export Credit Agencies, etc...)<br><br>- Lao PDR not among the most attractive country in terms of investment environment (e.g. perceived high political risk)<br><br>- High conditionalities attached to the loan, which are not always directly related to the project. | - Some donor agencies cannot borrow directly to the private sector, only to government agencies.<br><br>- Need to follow development strategies and best practises.<br><br>-Some donor' agencies are very bureaucratic, which add on the project administrative costs and consequently diminish the amount available for the implementation. | - Micro-Credit new to the household.<br><br>- High collateral requested, whilst most households don't have any asset and saving.<br><br>- Low bargaining power and creditworthiness. |

| | Entrepreneurs/Investors/Project Developers | Banks | Large Financial Actors | Development Agency | Households |
|---|---|---|---|---|---|
| **Financing Mechanisms (Size of loans, type of loan, rate of interest, modalities of allocation of funds…)** | | | | | |
| **CDM** | - Except for industries, low level of green house gas emissions. This make difficult to attract CDM project and/or to ensure return on investment.<br><br>- Long payback period.<br><br>- Association between entrepreneurs and energy consulting companies still limited by the lack of skills, understanding of the mechanisms and perceived high risks.<br><br>- Energy consulting companies reluctant to be contracted on the Energy Performance Services model, because of the lack of cash-flow and the lack of skills to evaluate Green House Gas emissions reduction potential. | - High risk of small projects, prefer to invest in industrial projects.<br><br>- No skills to evaluate the project feasibility and return on investment. | - | - Donors' programmatic approach not always adapted to CDM procedures.<br><br>- No exhaustive and updated inventory of Green House Gas Emissions by Sector. | - No capacity to invest in such projects.<br><br>- Strategy of use of the easiest accessible and cheapest energy resources.<br><br>- No understanding and fear of the complexity of such projects.<br><br>- Lack of community level organisation and low energy consumption. |
| **Other funds** | - Currently, no fund which may act as project guarantee.<br><br>- Purpose and modalities of use of funds are not clear to the private sector.<br><br>- Lack of public financial mechanism to mitigate some risks. | - Lack of capacity to manage such funds. No previous experiences.<br><br>- No skills to evaluate the project feasibility and return on investment. | - Not yet interested to invest to trust fund in Lao PDR, except GEF for the REF.<br><br>- Neighbouring countries: Thailand and Vietnam more attractive.<br><br>- Lack of public financial mechanism to mitigate some risks. | - | - Lack of capacity to organise/manage community trust fund.<br><br>- In the poorest areas lack of social cohesion which makes household reluctant to put their saving on a community fund.<br><br>- Low level of savings. |

## 5.2 Facilitating BRE Investments

Before prescribing a detailed set of recommended actions to improve BRE financing, the following section first offers a discussion of financial products themselves and two types of packages that could be introduced. Making such instruments available in the Lao PDR could be seen as a more general objective of efforts to stimulate BRE financing sector.

The outlook for BRE in the Lao PDR is on the whole positive, with a clear increase in interest on the part of the government and their international partners as expressed by recent an upcoming improvements to the regulatory and legislative framework for this sector. On face value, finance is available in the Lao PDR, which is packaged into loans of appropriate magnitude for a range of BRE investments. However on closer inspection, the nature of current finance is in fact incompatible with such projects for a single underlying reason: marginal economic viability of BRE services. Most BRE projects are characterised by large initial capital investments and slow returns due to the small revenue collected from the users of energy services. Indeed this issue is illustrated by the predominance of ODA in the financing of BRE projects to date. The short term and high interest rates of most loans currently available to developers and individuals are not suitable to finance BRE alone. It is therefore this specific constraint that deserves special attention, and can be adopted as a focal point for efforts.

### 5.2.1 Financing BRE Investments for Individual Households

Isolated BRE systems are particularly sensitive to the specific financial circumstances of rural households, characterised by irregular and low monetary income. This is important to consider in a discussion of finance, because it reveals that households are unlikely to be able to afford initial investments into energy services, and the amortisation of energy equipment would need to match a timescale equivalent to local energy expenses. Fortunately, due to the long product lifetimes enjoyed by some BRE technologies (over 20 years for certain biogas digesters and solar photovoltaic panels), such periods are at least feasible from a technical perspective, even if they are not commercially viable for private banks.

Opportunities therefore exist to facilitate the introduction of financial products specially adapted for BRE investments by individual households and to energy service providers offering isolated BRE products. The particular nature of this finance would differ depending on whether the system largely comprises moveable assets (e.g. solar PV) or fixed assets (e.g. biogas). For the former, protection against defaulting repayments can be achieved by using part of the system as collateral, and high quality, long-life products should be favoured for this purpose. In either case, the most important requirement to enable repayment over a long term is however the sustainable operation of the BRE system, which can only be assured through well managed maintenance by trained technicians.

Supporting investments by individual households would request a facilitated access to loans with lower interest rates, but also operation and maintenance to be subcontracted to local technicians. For service providers, the investment package could include contractual obligations for after sale service.

To achieve this, specific legislative and regulatory structures must be developed, including the creation of a fund for this purpose, and also capacity for both technical and coordination duties. This is a precondition to create an enabling environment and offer different components to public and private entities.

### 5.2.2 Improved Finance for Isolated and Interconnected BRE Projects

In the Lao PDR renewable energy resources often exceed rural electricity demand, and therefore decentralised energy generation offers a real opportunity for rural electrification. For systems that exploit the resource potential beyond local demand, interconnection with the national grid is a necessity to achieve economic viability. If such interconnection can be established, the financial model of these projects is greatly simplified by the opportunity to sell energy whole-sale to the distribution network, and the purchasing agreement with the buyer (EdL in the case of electricity) becomes the main consideration to compare with a financial package. For isolated supplies, public finance is essential in order to enable affordable tariffs. Improving the environment for PPP arrangements of the form described in preceding sections therefore offer an opportunity to facilitate isolated and interconnected community BRE services.

It is therefore essential to introduce or advocate tailored BRE financial products in partnership with the local banking sector. Funds for moveable assets could be provided by banks in the form of a medium-term loans (e.g. 5 years), whilst fixed assets would be financed by donor funds either as a direct grant or revolving fund.

Applicants would be required to provide details on costs categorised according to moveable and fixed assets, and on the expected revenue through sale of the energy service. Based on these, the financial package would be awarded accordingly: a medium-term loan for private assets, to be repaid using the net revenue for the energy service; a long-term loan (based on amortisation period) or grant for fixed assets. For the latter, in the case of a loan, repayments could optionally commence after payment completion of the moveable assets.

The next steps in determining the actual potential of such a financing mechanism would be discussions with the banking community to determine the required level of return and whether additional financial guarantees would be necessary, and also discussions to identify sources of donor funds, and possible integration with the proposed Renewable Energy Fund (as part of the Renewable Energy Development Strategy).

## 5.3 Programmatic Approaches to Support Investments in BRE Projects

The identified needs and constraints clearly underline the main issues of the Lao PDR energy context (i.e. increasing energy access in remote areas and energy security for industrial and commercial development). In this context, energy financing mechanisms can be proposed to progressively initiate actions integrating BRE as an alternative solution to the identified energy issues and to meet the GoL socio-economic development goals.

Due to the very different nature of these two objectives, in the following text they are treated as two entirely separate issues. It will be clear to the reader that the approaches described below are neither disconnected in their objectives nor in their impacts. The different components discussed in the following chapters are answering cross-cutting issues. Nevertheless, they are discussed separately as to facilitate the different stakeholders

in identifying components more in line/adapted to the nature of support they can provide or to the actions they can initiate.

**1) BRE for rural electrification in remote areas:**

Even with improved financing mechanisms, entrepreneurs, investors and project developers may not be able to recover their investments if the services are not affordable for a majority of customers. That is why public support is essential on a short and medium term.

- **Increasing synergies between the Public and Private Sectors**

  As described in the previous chapters different Public-Private Partnership have been used as an answer to the BRE financial barriers and to promote RE , especially with regards to risks allocation, capacity building and financial mechanisms (i.e. ODA soft loans and subsidies). The lack of payment capacities in rural areas and the related GoL policy of energy tariffs alignment and subsidies have conducted to concentrate financing models on a development fund to cover the difference between the price paid by end-users and a fixed selling price covering initial investment, implementation and O&M costs. Possibilities to reinforce this model are available such as Climate Funds, Tender regime, etc... They could be used as an opportunity to enlarge benefits of PPP models to mainstreaming RE and consequently reinforce cost-benefit of BRE as well as to support market penetration without distorting much the energy market.

- **Energy Finance Development**

  Access to loans is a major constraint in Lao PDR. It is both a consequence of an embryonic bank and credit market as well as the unstable creditworthiness of borrowers. This consider initiatives at local Financial Institutions level to increase willingness and capacities of lending to the SMEs as well as diversifying financing mechanisms to answer specific needs of BRE entrepreneurs/investors/project developers (incl. Households access to micro-credit).

## 2) Support to BRE market penetration as an alternative solution to energy security

Energy production capacity and supply may become a bottleneck for Lao PDR industrial and commercial development. Even though the potential for hydropower and regional interconnection are presented as an opportunity to supply reliable and quality power in the long term, the present situation as expressed in the Power Development Plan indicates an urgent need for increasing the local energy production. BRE may play a significant role, but besides financing mechanisms their penetration in the energy market will request public support.

- **Policy to support market penetration**

  As in other countries, BRE must confront the long supply history of conventional energy resources. In Lao PDR, the same constraints can be observed, but other barriers such as lack of consumer's capacity to pay for services, development issues favouring least cost and centralised energy systems as well as energy exportation for income generation add to the difficulty of investing in the BRE market. Although it seems hardly achievable in a short term, the GoL is engaged in a process of enhancing policy and regulation framework for RE. This may directly reduce transaction costs and promote investments in BRE. Actions to promote demonstration and commercial projects will be essential to widen impacts of BRE market penetration support.

# 6 RECOMMENDATIONS AND ACTION PLAN

The Consultation Workshop and Face-to-Face Interviews were used to give stakeholders an opportunity to put forward suggestions of remedial action to improve the availability, affordability and accountability of finance for BRE projects. They have been analysed and cross-referenced with the identified barriers and challenges to formulate a comprehensive set of recommendations, which aims at integrating BRE as an alternative solution to the identified energy issues to meet the GoL socio-economic development goals. These recommendations are the precursor to establishing an Action Plan to progressively initiate measures for meeting these needs and curtailing the barriers, provided later in this report.

## 6.1 BRE for Rural Electrification

### 6.1.1 The Clean Energy Fund: An Integrated Financing Strategy

- **Setting-up a Clean Energy Fund (CEF)**[9] in Lao PDR could be a transitional measure to open and stimulate the lending market for such projects. In the long term this could allow the development of large and sustainable financing flows from commercial banks, which at the moment remain the main constraint. It would propose financial packages whether to allocate funds and/or act as guarantee, with regulatory mechanisms to expand hybrid financing initiatives through Public Private Partnerships. In order to develop commercial BRE activities it is that the fund has close and well established relationships with the commercial banks, who will have the responsibilities not only to disburse adapted funds to BRE projects, but

[9] It is only named Clean Energy Fund in this study to clarify the differences between the existing Rural Electrification Fund and the purpose of the proposed fund. However, this does not mean establishing a parallel fund because this will divert and reduce the available financial resources and as a consequence weakened the fund targeted impacts. In other words, the proposed activities of the CEF may be understood as a way forward to further develop the existing fund and strengthen its access to financial resources.

a full business management follow-up package. Technical Assistance within the CEF should be foreseen to train capacities in evaluating loan application.

- **Establish BRE Credit Assessment Bureau:** Work with banks to simplify and streamline the loan approval process for BRE entrepreneurs/investors/project developers. Absorb the cost of screening and assessing the credit worthiness of applicants into a dedicated office that can assess the technical viability of a proposed BRE project. Currently, lenders lack knowledge of their client's credit profiles and histories, reinforcing the perception of the high risk involved in lending to BRE activities. This will also increase the ability of small producers to access various alternative forms of financing by providing simple business development services such as proposal writing, basic accounting, strategic planning etc. This increases the capability and possibility of small growing concerns to obtain market based financing and increases the potential for partnership opportunities with NGOs/INGOs. This assessment office would be integrated in the CEF organisation and in its modalities of loans disbursement. It could for example be thought to develop an independent committee within the CEF, regrouping banks representatives, technical experts from the different ministries and researchers.

- **Business Development Training Seminars** Management weaknesses constrain the bankability of many small and medium projects and producers and severely limit their ability to secure financing. Common modules include basic accounting, business planning, strategy, marketing and loan application procedures.

- **Securing funds for the Clean Energy Fund:** The CEF could secure funds by a levy on mega energy producers or industries that is available to support BRE with guarantees, warranties and the facility to test innovative options. Other existing international trust funds could potentially provide technical and financial support to the REF such as the Global Energy Efficiency and Renewable Energy Fund (GEEREF) and the other Climate Funds. In the context of development aid harmonisation, the fund may also attract loans, grants and technical advisory services for Rural Electrification, Energy Efficiency and Climate Change mitigation Programs.

- **A Study on How to Set-Up the REF** is highly recommended. In Lao PDR the lack of skilled human resources will remain the main challenge, especially if the different components described above are integrated. Therefore careful consideration to identify the necessary steps to developing an adapted fund is needed.

### 6.1.2 Increasing Synergies between the Public and Private Sectors

Although access to funds is essential to stimulate investments in BRE, the BRE costs associated with the lack of customers' capacity of payment will still represent a high risk for entrepreneurs/investors/project developers. Risk allocation is therefore important to integrate in a programmatic support to BRE financing mechanisms.

- **Allocate responsibilities:** Within the CEF framework and building on the existing investment and financing mechanisms, it will be essential to define the different models of Public and Private responsibilities (e.g. Public subsidies to tariffs, Public investment and/or preferential loans for fixed assets, Risk Guarantee for long term loan, Lease and Purchase Agreement, etc...).

- **Establish legal and regulatory frameworks that support and incentivize different forms of financing:** Although various promising forms of financing such as leasing, factoring, soft loans, micro-credit and venture capital have been introduced in most financial markets, its implementation in Lao PDR is slow and not always satisfactorily enforced. This will request revisions of the Law on the Bank of Lao PDR and the Decree on Commercial Banks as well as implementation of Procurement modalities for Small and Medium Scale BRE projects. It could be supported by a combined program between a Multilateral Development Bank and the Clean Technology Fund.[10]

- **Encouraging Public investments in private BRE projects** Mechanisms are required to facilitate the collaboration of public and private actors (e.g. Public-Private Venture Capital or Public- Private Equity Fund). Public investments in private ventures are justified if those ventures contribute to development

[10] The IFC recently introduced such a program in Vietnam: The Sustainable Energy Finance Program.

objectives, and thus can be viewed as reducing the overall costs of achieving these objectives for the government. The evaluation of projects in terms of their potential to achieve such goals must lie at the centre of any mechanism that facilitates public-private collaboration.

- **Promote integrated and/or community based energy systems** that can answer public development priorities. This will allow BRE investors and/or local authorities to widen the source of funds (for direct use or to be allocated to the CEF) and may stimulate technological R&D and innovations, whilst answering development objectives. Small and Medium BRE projects targeted to specific community needs may favour the technological penetration as the technology will not be transfer as a consumption pattern but as a tool for productive use or "modernisation". These small-scale development projects as an alternative or complementary to megaprojects should favour integrated and cross-sectoral ideas including but not limited to agro-forestry, pooling resources through voluntary farmer organisations, and exploring linkages of BRE with community forestry, farmer field schools, etc.

## 6.2 Support to BRE Market Penetration as an Alternative Solution to Energy Security

Although the CEF may play a role in supporting BRE market penetration, investments in BRE for feeding-in the grid and/or generally increasing the local production capacity is not as much a challenge than BRE development for rural electrification. The fundamental reason is a higher potential for an attractive return on investment. Therefore, in the following sections other mechanisms/initiatives are presented to ensure a favourable investment climate.

- **BRE mainstreaming[11]:** Implement BRE related Decrees and Laws. Include BRE potential in the Socio-Economic Development Plan and in the Public Investment

[11] Mainstreaming BRE involves that clean and sustainable aspects of energy production and supply become the main focus and target for: policy development, research, legislation, resource allocation, and of programmes and projects.

Plan as an integrated component of a comprehensive energy strategy. Promote BRE as clean and energy efficient solutions to rural electrification and energy security.

- **Create a Renewable Energy Unit:** assumed to fall under the purview of MEM/DoE, this unit will serve to coordinate BRE development in Lao PDR, improve the flow of information and support and maintain BRE projects database. It would be replicated at the provincial level to provide extension services through training and a local facility.

- **Develop financial instruments and incentives to support the private sector**: income tax exemptions for a predetermined start-up period, import tax and fee exemptions for project materials, profit tax exemptions, feed-in tariffs, Off-take power tariffs, partial credits, etc.

- **Labelling and certification** as tools for technological push. This will also ensure better quality of equipment with direct impacts on projects sustainability and on customers perceived benefits of BRE.

- **Awareness campaign**: Develop awareness and education campaigns/programs and communications materials. The Programmes should focus on the benefits of rural electrification and the use of renewable energies to improve living conditions and create new income generating activities. But as knowledge mitigates risk, human resources capacity building for BRE is also required for government staff, small-scale investors/producers and financial institutions. Furthermore, development organisations supporting education programs could consider mainstreaming BRE in the curriculum. [12]

[12] The Centre for Environmental and Development Studies introduced in 2005 the renewable energy into the curriculum related to environment.

In the following section, a programmatic approach is used to propose preliminary actions ensuring that the targets defined in the recommendations are met. Four Priority Actions (PA) are presented:

1) **Public Sector Ownership and Coordination**
2) **BRE Sector Empowerment**
3) **Developing Financing Instruments**
4) **Data Management & Capacity Building**

## 6.3 Action Plan

| Priority Area | Goals/Achievements | Actions | Main Constraints | Driving Force |
|---|---|---|---|---|
| **PA1: Public Sector Ownership and Coordination** | Goal 1.1: Establish standards and promote BRE financing through relevant institutional mechanisms laws and regulations | A 1.1.1: Review existing laws/ regulations and study applicable examples from other countries<br><br>A1.1.2: Study on setting-up a public Clean Energy Fund (as building upon the existing Rural electrification fund) and impementation<br><br>A 1.1.3: Promote Government - Company – NGO partnerships to improve surveying, stakeholder engagement and harmonisationas well as to secure pool of resources for the CEF. | Lack of understanding/ commitment to CSR/ among some companies<br><br>Limited tools and/or no internal expertise to conduct projects impact assessment studies. | Awareness on climate change, energy and RE security/ Attention to triple bottom line<br><br>People are used to working together on small-scale initiatives |
| | Goal 1.2: Create a department for RE within MEM | A1.2: Create a RE unit in MEM > DoE (with training and facility) | Most attention paid to large-scale infrastructure, rather than small-scale projects with more local benefits | |
| | Goal 1.3: Raise awareness on the use and benefits of renewable energy to create productive activities for end-users | A1.3.1: Conduct education programs and produce information materials<br><br>A1.3.2: disseminate the message through media communication | Lack of skilled staff and funds for implementation<br><br>Operate a shift in mentalities and move from traditional bad practices | |

| Priority Area | Goals/Achievements | Actions | Main Constraints | Driving Force |
|---|---|---|---|---|
| **PA2: BRE Sector Empowerment** | Goal 2.1: Support entrepreneurs to build strong financial skills | A2.1.1: Increase offer of financial and business consulting/advisory services to write good loan and technical proposals<br><br>A.2.1.2: Increased technical assistance in partnership with professional rural associations and NGOs/INGOs. | Low offer, poor quality | Government and external support |
| | Goal 2.2: Define incentives for private sector (feed-in tariffs, tax) | A.2.2.1: Conduct study on tariffs for all RE<br><br>A2.2.2: Discussion with other ministries and EDL<br><br>A.2.2.3: The development of Guarantee funds in partnership with local commercial banks and micro finance institutions. | High collateral requirements for lenders | Government to act as warrantor<br><br>Guarantee reserves dedicated to backing loans for SMEs |
| | Goal 2.3: Raise awareness on the real lost of energy end-users in off-grid areas | A2.3.1: Conduct study and produce information material<br><br>A.2.3.2: Improved information flows about RE technologies and applications. | | |

| Priority Area | Goals/Achievements | Actions | Main Constraints | Driving Force |
|---|---|---|---|---|
| **PA3: Financing Instruments** | Goal 3.1: Increase public/ private sector investments | A3.1.1: Improve access to finance (rules/ regulations) in securing long-term credits<br><br>A3.1.2: Promote hybrid public-private financing partnerships<br><br>A3.1.3: Promote RE Micro finance potential study<br><br>A3.1.4: Feasibility study on mobile banking and reduce transaction costs | Non-existing appropriate financial products<br><br>High collateral requirements for lenders in fixed assets | Current investments show an interest in the sector<br><br>Government to act as warrantor |
| | Goal 3.2: Strengthen capacity building on environment and social impact assessment of RE projects and risk management mechanisms | A.3.2.1: Promote trust fund and create of a Lao guarantee/securities fund or revolving fund to finance RE projects (in partnership with local commercial banks and MFIs) | Exchange rate of currency not always reliable/ Lack of transparency and management issues | Willingness from banks to back support the implementation of such funds |
| | | A3.2.2: Development of instruments through PPP. (Public-private financial risk management tools for small-scale projects can be Partial Credit or Risk Guarantee mechanisms that allow a risk sharing between public and private financial institutions for instance) | Poor knowledge and no expertise on RE projects risk management tools and instruments | Education about the most appropriate RE risk mitigation solutions for project developers, investors and public bodies. |

| Priority Area | Goals/Achievements | Actions | Main Constraints | Driving Force |
|---|---|---|---|---|
| **PA4: Data Management & Capacity Building** | Goal 4.1: Better understanding of BRE technologies and financing mechanisms | A4.1.1: Capacity building and training through central and local actors of the sector<br>A4.1.2: Improved support from REF and DoE<br>A4.1.3: Research on the RE demand assessment and promotion strategies of RE use. | Limited software and hardware | Willingness of government agencies and ministries |
| | Goal 4.2: To raise awareness via education system | A4.2: Human resource development / higher education (national university) | Lack of BRE in education sector/ Limited human resources | More donors' coordination effort and partnership |
| | Goal 4.3: To facilitate and coordinate in setting up good information and data sharing among and within stakeholders | A4.3: Setting up BRE database for data structure | Difficulty to access information and collect on-field accurate data | Collaboration required from RE business to share information of their project past and current operations |
| | Goal 4.4: To have good tools for project management and impact assessment | A4.4: Identify sources, prepare a thoughtful methodology package of evaluation and study | | |

# 7 CONCLUSIONS

***"Build it and they will come."***

BRE Financing in Lao PDR will be unable to blossom as a viable source of long-term capital until the proper governmental policies, legal frameworks, and infrastructure are in place. BRE policy needs to be embedded in the governmental long term planning documents such as NSEDP and NGPES in order to create an environment of security in the market. When investors have certainty, the money will come.

Investors and financial institutions are waiting for the public sector to step up and take ownership and coordination of BRE, and to establish standards and promote BRE financing through relevant laws and regulations. It is imperative that a main coordinating body is identified to assume overall governmental responsibility. There must be greater clarity regarding which department will be responsible for what. It is assumed that the overarching organization will be Ministry of Energy and Mines.

Additionally, NAST, as a specific BRE unit with training facilities, should be reinforced to provide support, training, and perform research on promising pathways to BRE success. The BRE department would be responsible for working with financial institutions and investors to research, identify, and select appropriate products and tools to finance BRE projects. The BRE Unit will support capacity building at financial institutions in areas of due diligence and risk management and assessment of renewable energy products.

***"It's all about the money"***

BRE is rarely competitive with conventional sources of energy generation. Additionally, there are high up-front start-up costs and long payback periods that exacerbate the risk algorithm for investors and financiers. Investors and financial institutions always have alternatives and other investments competing for their capital. At this stage in the BRE maturation curve, it is necessary to implement financial incentives to mitigate risk and attract investors and financial institutions. Without financial incentives for investors or a strong, clear policy framework, BRE will remain an overpriced, subsidized, unsustainable fringe product utilized by the few.

***"What you don't know, can't help you"***

It is necessary to implement an awareness raising and educational campaign to stimulate the demand side of BRE from consumers' and raise the BRE I.Q. of the government and financial institutions. Lao community members and the government staffs need to better understand the technologies and benefits of BRE. This suite of educational training services will stimulate people to contribute to production, efficient usage and management of BRE. This can be accomplished through conducting education programmes, developing information materials, and disseminating the message through media communication.

Educational programs at the financial institutions would focus on strengthening technical financial management aspects of BRE to include risk management, risk assessment and the creation of specific in-house BRE lending policies.

Certainly there is space for more research on BRE. Further study is required on environmental and social impacts, linkages to climate change, CDM and carbon financing mechanisms; tax and tariff scenarios and options; connecting the public and private sector; and the role of microfinance. Research needs to also look "outside the box" and analyse more innovative approaches such as: Mobile banking services to reduce transaction costs and designing hybrid public-private financing mechanisms that co-share start-up risk.

**Parting shot**

To conclude, for the BRE sector in Lao PDR to expand to a size that is environmentally, socially (rural electrification) and economically relevant; attractive and affordable financing mechanisms must be in place. While private sector investments are the pathway to sustainability in any new market, public sector guidance through strong policy, legal frameworks and financial incentives is required to get the ball rolling by providing an attractive investment environment.

The one thing that markets and investors hate most is…uncertainty.

# 8 APPENDIXES

**Appendix 1: Finance Arrangements for BRE Projects**

**Appendix 2: Persons Interview and Minutes**

**Appendix 3: References**

## 8.1 Appendix 1: Finance Arrangements for BRE Projects

### 1.1 Large Scale Projects (>$1m)

- **Independent Power Purchase (IPP)**
- **Public support (bond issue, fiscal spending)**
- **Official Development Assistance (ODA)**
- **Soft loans from multilaterals**
- **Loans from international banks / financial institutions**
- **Guarantees / insurance**
- **Private equity / venture capital**

Village-Scale Solar PV Systems

**Houay Se** – is a hybrid solar / micro hydropower system in Muang Nga, Oudomxay province supplying electricity to 10 villages and 520 households. There is a large solar PV component of 100kW. Completed in March 2005, this project had a capital cost of US$3m and was funded by an ODA grant from the Japanese Ministry of Economy, Trade and Industry (METI) and the New Energy and Industrial Technology Development Organisation (NEDO).

**The World Bank** – has installed over 15,000 SHS throughout the Lao PDR via its Southern Provinces Rural Electrification (SPRE) project (1996 – 2004), Rural Electrification Project (REP) Phase I (2006 – 2010) and Phase II (ongoing). These three projects aim to provide approximately 23,800 households with SHS on hire-purchase (i.e. rent-to-buy) agreements with a repayment period of 5 to 10 years. The now completed SPRE and REP Phase I projects connected around 6,000 and 9,000 households with SHS respectively. The three projects were all financed by the World Bank through partially subsidised soft-loans (i.e. via the hire-purchase agreements).

Commercial Biogas

**Lao Brewery Company (LBC) Biogas** – a project initiated by Lao Brewery Company and Proact International (Japan) to install two biogas boilers utilising the methane captured from an anaerobic wastewater treatment plant. The biogas boilers are used as a partial substitute for heavy oil-based boilers for steam generation. This project was registered as a CDM project in April 2007 (the first in the Lao PDR) with a 10 year crediting period leading to an estimated emissions reduction of 3,338 $tCO_2$ per year. The project was privately financed by Lao Brewery Company.

**Private Energy Marketing Fund** – is a Finnish sovereign investment fund which has a 75% shareholding in Thai company, Thai Biogas Energy Company (TBEC). In November 2009, TBEC signed an agreement with Laos-Indochina Group to build and operate biogas facilities in the Lao PDR with a reviewable 10 year concession period. Laos-Indochina Group is a Lao operator of starch production plants and the biogas plants will use its organic waste.

Private Sector Projects

**Kolao Farm** – Production under contract farming and own management. Processing plant to be made in Lao and end use product to supply national consumption. Export to Korea is also planned. On-going. 15 Million without processing plant (additional 10 M). KOLAO mentioned yield problem in several production zones and this aspect remains a major concern. The model of contract farming is linked to rural development, but the oil production is sold to the company and no biofuel is used at community level. In 2006, Plan to plant 25000 Ha in 2009 and 240 000 Ha production in total. Private sector; Feedstock: Jatropha only

**Mekong Agro Industrie** – private sector, 2007, domestic consumption/export, $5m USD / China

**Xaysomboun Agriculture Development Co., Ltd** – private sector, domestic, 1996, $1.5m USD/ Malaysian, 56 ha in Pakngum, 800 ha in Mongfuang and 300 ha in Karsy

**Lao Agro-tech Co., Ltd** – Phonhong district, VTE, private sector, 2009, Both domestic and export, $5,040, 000USD/Lao company supported by Japanese investor

**Agricultural Products Promotion Co., Ltd (APPC)** – under cooperation of Olio-SUD (French company), 1 ha in Houay pan, 7 ha Xieng Khouang, APPC has introduced demonstration plots. The global target is to plant 120 000 ha. For now the company does not have concession land and plan to work with small holder farmers. They should establish several small scale processing units. Their major objective is to create a market and promote local use but exporting may also be an option if the results are not promising on the local market, 230 000 USD until 2009 (French), 10 Million USD until 2020 (French), APPC is financed by 2 investors that are a French company, Oléosud (with experience on Jatropha cultivation in West Africa) and AFD (Agence française de développement). Their main issue is to build strong links with communities and farmers

**Lao Agro Promotion Co., Ltd** – Private sector, 2009, the project creates direct employment opportunities in the establishment, maintenance, harvesting, and processing of the products throughout the project cycle in the project area. Also, it will attract foreign exchange by means of foreign investments and also by the sale of organically produced agricultural products to local and foreign buyers. Total cost: $26.25 million USD

Additional knowledge will be given to local communities in training on clearing of lands, techniques to establish and maintain Jatropha agro-forestry plantations with highest levels of returns. The company has registered for CDM.

Micro-Hydropower

| Name | Description | Financing Details | Financing Details |
|---|---|---|---|
| **Nam Kha I** | 12kW, Xiengkhouang, 1994 | | Originally built by the Chinese, this facility was refurbished as a hybrid hydro/ solar/ diesel plant in 2007. Refurbishment was funded by ODA grants from the Federation Genevoise de Cooperation (FGC), the Renewable Energy and Energy Efficiency Promotion in International Cooperation (REPIC), the Blue Moon Fund and the Social Development and Civil Society Fund (CSF). |
| **Nam Kha II** | 81kW, Xiengkhouang, 1995 | | Originally built by the Chinese, this facility is currently undergoing refurbishment, which includes interconnection to the EdL grid. Funding is the same as per Nam Kha I. |
| **Nam Et** | 80kW, Huaphan, 1995 | | $1.3m ODA grant by USAid through the Ministry of Agriculture and Forestry |
| **Ban Paksobma** | 55kW, Xiengkhouang, 1995 | | No financing details available |
| **Nam Pa** | 16kW, Luang Prabang, 1998 | | No financing details available |
| **Nam Mong** | 70kW, Luang Prabang, 2000 | | ODA by Japanese Ministry of Economy, Trade and Industry (METI) and the New Energy Foundation (NEF) |
| **Houay Se** | 80kW, Oudomxay, 2005 | | ODA grant from Japanese Ministry of Economy, Trade and Industry (METI) and the New Energy and Industrial Technology Development Organisation (NEDO) |

Pico-Hydropower

**The World Bank** – as part of its Rural Electrification Project Phase II (2010 – 2015), will also install pico-hydropower turbines as an alternative to SHS. As with the SHS component of REP, the pico-hydropower component will be financed by the World Bank through partially subsidised soft-loans.

## 1.2 Medium Scale Projects ($100,000 to $1m)

- Overseas Development Assistance (ODA)
- Public support (bond issue, fiscal spending)
- Soft loans from multilaterals

- Private equity / venture capital
- Public Private Parnership (PPP)
- Clean Development Mechanism (CDM)

Village-Scale Solar PV Systems

**Ban Phakeo** – is a hybrid solar/ diesel system in Luang Prabang province which supplies around 70 households. The systems uses a 5kW solar PV array and diesel generator backup. Completed in June 2009, this project had a total capital cost of €105,888 for implementation and was funded by an ODA grant from the Fondation Energies pour le Monde (FONDEM).

Solar Water Pumping and Purification

**Minerals and Metals Group (MMG)** – operates the Seppon copper-gold mine in Savannakhet province and are currently engaged in a project to provide water pumping, purification and distribution for 12 villages around the mine site. The project has a total budget of $777,925USD and is privately financed by MMG.

**Global Environment Facility (GEF)** – is investing in a water pumping, purification and distribution project for 5 villages in Khammouane province. The project has a total budget of $77,094USD and is co-financed by an ODA grant from GEF (59.1%) and private capital from Sunlabob (20.4%), other project partners (18.5%) and the communities (2.0%).

Private Sector Project

**Italian-Lao Group Co.,** Ltd – 497 ha in Borlikhamxay, 43 ha in Savannakhet, 180 ha in Champasack, private sector, 2007, $260,000 USD/Italy

### 1.3 Small Scale Projects ($10,000 to $100,000)

- Overseas Development Assistance ODA
- Clean Development Mechanism (CDM)
- Soft loans from multilaterals

Solar Water Pumping and Purification

**Ban Sor** – is a pilot water pumping and purification project in Vientiane province. With a total cost of approximately $22,700USD, the project was co-financed by an ODA grant from the German Embassy and the Bremen Overseas Research and Development Agency (BORDA) and private capital from Sunlabob and OurWorld Rural Development.

Domestic Biogas

**UN-Habitat / NAST / TRI Biogas Pilot** – a 2008 initiative to construct biogas digesters in Oudomxay province. The project had a cost of $52,000USD and was funded by a grant from UN Habitat.

Public / Non-Profit Sector Projects

**Lao State Fuel Company (LSFC)** – have research plantations in Vientiane aimed at providing LSFC with proven facts to develop Jatropha feedstock or to reorient their research to another feedstock. LSFC is mandated by the GoL to conduct this research and integrate biofuel production in the national fuel distribution grid. LSFC is 100% state-owned.

**LIRE-LEAP Jatropha Information for Smallholder Farmers** – is a capacity-building project to provide decision-making tools and cultivation manuals for small-holder farmers. The project has a budget of $10,000USD and is funded by a grant from the Swiss Agency for Development Cooperation (SDC).

**LIRE Jatropha Research Programme** – LIRE engaged in agronomic research to optimise Jatropha cultivation in the Lao PDR. $30,000USD cost.

**NAST** – Researching the feasibility of producing Biodiesel based on Jatropha. R&D site for Jatropha with processing facilities and agronomic trials. 2008.

Pico-Hydropower

**Shared Pico Hydropower** – a demonstration project for village-scale shared pico-hydropower was implemented at Ban Ang Sang, Huaphan province in late 2009. This project capital cost was $21,906USD and was funded through ODA from the German

Embassy (45.7%), the Lao Institute of Renewable Energy (LIRE) and BORDA (49.3%) and capital from the local community (5%).

Private Sector Project

**Y&P Company** – Domestic onsumption and export to Kolao, private sector, 2006, 169,652,000 LAK ($20514 USD)/Lao, 60 ha in Xayabouly and 30 ha in Xekong province

### 1.4 Micro Scale Projects (<$10,000)

- Cash / savings
- Loans from local banks
- Microfinance
- Overseas Development Assistance (ODA)
- Clean Development Mechanism (CDM)

Community Solar PV

**Sunlabob Renewable Energy** – has installed over 1,000 community solar PV systems throughout the Lao PDR. These systems are usually installed as part of rural development projects and are typically financed by ODA grants from international development organisations.

Domestic Biogas

**BORDA-LIRE Decentralised Wastewater Treatment** – is based on a set of cascading anaerobic digesters, with the potential to produce biogas. This program is funded by an ODA grant from BORDA. A demonstration project was implemented at the National University of Lao PDR in Vientiane Capital, financed by a grant from the Finnish Turku School of Economics (through its ICI project) and LIRE.

**SNV Biogas Pilot Program (BPP)** – is a project aimed at establishing a sustainable market for household biogas digester systems as a substitute for fuel wood and charcoal. Seed funding for the program is provided by an ODA grant from the Dutch government (via SNV), which finances the capacity building, technical assistance and advisory role of SNV.

Financing the capital cost of individual biogas digester systems is split between the household / end-user (between $210USD and $657USD depending on the system size) and a fixed subsidy from the Dutch government ($219USD per system). The Agricultural Promotion Bank has recently approved loans to households for the initial capital cost of the bio-digester systems.

**Domestic Biogas Chinese Demonstration** – 2005 project, no information available, Demonstrate viability of Chinese approach to domestic biogas, Most systems not functioning as planned

**STEA Domestic Biogas Demonstration** – 1995 project, Demonstrate the concept and technology, Most systems not functioning as planned, Chinese designed concrete domestic bio digesters

**Thai-German Demonstration** – 1995 – 2000, Demonstrate the concept and technology, Most systems not functioning as planned

Biomass

**SNV Improved Cookstoves Programme** – is aimed at promoting more fuel efficient biomass cookstoves and consequently slowing the rate of deforestation. This programme is funded by ODA from SNV Netherlands Development Organisation, World Wildlife Fund (WWF) and Oxfam Novib. The project is also trying to secure CDM financing.

**Remaining undefined projects to categorize (Small or Medium?)**

Solar Home systems (SHS)

**Japan International Cooperation Agency (JICA)** – in conjunction with the Ministry of Industry and Handicrafts (MIH), conducted a pilot project for solar home systems (SHS) in Vientiane province. The pilot project installed a total of 254 SHS in Don Xayoudom Island, and was financed through an ODA grant from JICA.

**Technology Research Institute (TRI) / Science, Technology and Environment Agency (STEA)** – conducted a solar PV demonstration project between 1997 and 2000 to install 7 combined solar home – battery charging systems in Vientiane municipality. The equipment was abandoned when the national grid expanded to the target village. The project was

financed by an ODA grant from the New Energy and Industrial Technology Development Organisation (NEDO).

**Sunlabob Renewable Energy** – offered a private-sector solar home system rental scheme for off-grid rural electrification between 2003 and 2009. Under this rental scheme, end users paid a monthly fee to rent the solar PV equipment. Sunlabob took care of the installation, maintenance and repairs. The rental scheme was terminated in 2009. Around 1,700 SHS were installed between 2003 and 2009, of which around 1,000 units were returned after the rental scheme was terminated. The capital cost for the scheme was financed privately by Sunlabob.

Village-Scale Solar PV Systems

**Ban Nam Kha** – is a hybrid micro hydropower / solar / diesel power system in Xiengkhouang province which supplies around 90 households. The system has a 1.8kW solar PV component. Completed in 2007, this project was funded by an ODA grant from a consortium of Swiss development agencies administered by Helvetas (the Federation Genevoise de Cooperation (FGC), the Renewable Energy and Energy Efficiency Promotion in International Cooperation (REPIC), the Blue Moon Fund and the Social Development and Civil Society Fund.

Solar Recharging Stations

**Japan International Cooperation Agency (JICA) –** conducted a pilot project for battery charging stations (BCS) in Vientiane and Bolikhamxay provinces. The pilot project installed 5 battery charging stations across the two provinces and was financed by and ODA grant from JICA.

**Technology Research Institute (TRI) / Science, Technology and Environment Agency (STEA) –** installed 2 battery charging stations in Savannakhet province in 1997 as part of a demonstration project. This project was financed by an ODA grant from the Swedish International Development Agency (SIDA) and the Lao-Canadian-Thai Trilateral Environment program (CTTE).

**Sunlabob Renewable Energy –** installed 4 battery charging stations in Xiengkhuang and Khamuane provinces in 2010.

Commercial Biogas

**CP Company Lao PDR** – is a subsidiary of Thai company Charoen Pokphand Foods PCL and is engaged in a livestock farming and animal feed mill production business in the Lao PDR. Ban Dong Bang Xaithany (plus CP is building more plants at other private), Large scale biogas (Covered Lagoon type), Private system.

**Commercial Biogas at CP Piggery** – Large scale biogas, private system.

Biomass

**Biomass Thermal Power Pilot Project** – a pilot project for a biomass (rice husk) thermal power plant with installed capacity of 160kW was trialled near Vientiane Capital, however this facility is not currently operational.

**Wood Gasification Pilot Project** – a pilot project for a wood gasification power plant with installed capacity of 48kW was completed in Champasak province, however this facility is not currently operational.

## 8.2 Appendix 2: Persons Interviewed and Minutes

| No | Organization | Name | Position |
|---|---|---|---|
| 1 | Bank of Lao PDR (BoL) | Mr. Phanthaboun Sayaphet | Deputy Director general |
| 2 | Microfinance Center (MFC)<br>Ekphatthana Microfinance Institution (EMI) | Mr Somphone Sisenglath | Director |
| 3 | ANZ VCB | Mr. Kerrod Thomas | Managing Director |
| 4 | Agricultural Promotion Bank (APB) | Mr. Sisaleow Phongsavath | General Director |
| 5 | ACLEDA Bank | Mr. Narin Phon | CEO |
| 6 | ANZ VTE commercial Bank | Mrs. Bounta Dalavy | Managing Director |
| 7 | Director of Lao Farmer Production Cooperatives | Mr. Sisaliao | Director |
| 8 | Naxaythong Development Rural Cooperative | Mr. Somchit | Director |
| 9 | Sunlabob | Andy Schroeter | Director |
| 10 | Sunlabob | Stephanie Robert Oksen | Energy Policies Specialist |
| 11 | LIRE | Thongsanti B.Vongsaly | Co-Managing Director |
| 12 | LIRE | Leon Gaillard | Head of Academic Research |
| Interviews realised during previous LIRE assignments | | | |
| 13 | Different representatives of Provincial Department of Energy and Mines | | |
| 14 | Representatives of the Ministry of Energy and Mines (RED, ED, etc...) | | |
| 15 | Different representatives of Provincial Energy Service Providers | | |

## Interview Minutes

**1. Interview with Mr. Phanthaboun, Deputy Director of Department of International Relation (Tuesday July 20, 10:00am)**

- There is no formal policy on BRE financing so far. However, there has been some cooperation between BoL and the SNV on BBP project financing.
- He recommended two possible ways for financing BRE. One is to attract "pure" grant from international donor where MPI can play a major role in this. Fund to be put into Agricultural Promotion Bank and Nayobai Bank. Funds can be divided into two components: for example $500k for pure grant while $300k for TA
- Possible way for financing BRE is through micro financing where at the moment the BoL wish to raise the limit of loan to 10 million kip or 1,200 dollars for end user who must be under grant coverage/grant project. Borrowers must pay back the loan on regular basis in the maximum of five years. Borrower does not need physical collateral or individual collateral but it can be a group collateral
- No hydro project has been financially supported due to that it takes long time to pay back (42 years)
- BOL has a key role to play in attracting grant as a means to facilitate financial issues at macro level for MPI. To promote BRE projects through wider advertisement in the city and rural areas and increase awareness on BRE techniques.

**2. Interview with Mr. Somphone, Director of Micro Finance Center, at Lao Women Union Training Center (Tuesday July 20, 2:00pm)**

- There are two main offices that Somphone is managing. One is Micro Finance Center which consists of two components: training center on micro finance related activities and a consulting component. The other office is EMI – Ekphatthana Microfinance Institute - which is a deposit taking and provides micro finance services to customers.
- Target areas including urban and peri-urban areas in several province

- Target customers: market people, business people, farmers
- Nature of loan: basically, the loan duration is at one year at the maximum where it should not exceed 10 million as the EMI has the revolving fund of 2.4 billion kip. The interest rate for the loan is 4% per month.
- Business trend is positive and growing fast due to better service i.e. approaching customer at home, there is no long paper work/form to be documented. But still cannot compete with APB and Nayobai banks because they have government subsidies.
- Soon, EMI will expand its service through mobile bank as does the BCEL to go to schools and market places
- EMI existing policy on financing BRE: no policy so far. However, there is a positive trend on the green energy market as more people are more aware of climate change. There may be a policy for financing this.
- If invested in BRE then Biogas could be the first financing as it already has some basic information from SNV during its training service for BBP project of SNV. EMI still needs further information on BRE before carry out financing for this sector, but probably not hydropower as it requires large amount of fund. EMI finds that there is a little profit margin for financing biogas but still will be willing to provide the financing service for this in the future in order to raise awareness of people on EMI's concerns on environment and it is part of company social marketing strategy to build up market and recognition
- Kinds of investment EMI finance (not BRE): direct investment and retail
- Criteria for screening/approving loans: There are five Cs criteria: character of the borrower (is he a good man), capability of the person (possibility and ability to pay back), cash flow (not asking for bank statement but observational looking at physical assets), client history (means how the borrower develop himself from, e.g. having bicycle to having a car/truck), and lastly, collateral

- Legal procedure to request for financial support: all requests need to be certified by village chief and signed by both husband and wife in order to avoid future conflict between spouses. Approval takes about four working days
- Constraints for private investment: clients borrow money from various places causing late back payment or non-performing loan. The current portfolio at risk is 10%
- Solutions to problem: screening out non-performing loan/clients
- Market intervention to promote participation and performance of financial sector: promote awareness and the importance of BRE in order to create demand for renewable energy first. This can be done through marketing by advertising through local mass media such as newspaper, magazine and television.

**3. Interview with Mr. Kerrod Thomas, Managing Director of ANZ VCB, (Thursday July 22, 11:00am)**

- There is no formal BRE policy but is interested in financing occasional projects. No figures or projects names were given but he mentioned that ANZ group (in Singapare) has previously been supporting two large scale hydro-power projects whose names are not revealed.
- Amount of loan limited: there is no maximum
- Key criteria of loans screening: Background of the project, commitment/management team, feasibility studies, cashflow/liquidity, 5 Cs
- Kinds of investment: Interested in large scale investment not really in micro or small entrepreneurs. Prefers to work with larger, well established companies which he believes are better prepared and constitute a less risky investment. Also, he underlined a lack of promotion of existing BRE projects in Lao PDR. Not aware of the full possibilities in the sector or the policies on renewable energy. ANZ has rejected loan requests from micro/small entrepreneurs asking for full finance of a project, with no personal funds and inconsistent proposals.

- Money is available for BRE financing but there is a serious lack of technical expertise and environmental experts from the BRE sector. “They're often perceived more as speculators rather than developers”. Borrowers must be able to bring in some initial capital and personal funds on the table and cannot expect the bank to fully finance a project from scratch.

- Solutions: Closer guidance for foreign experts, increase the offer of business consultancy services to assist green entrepreneurs who lack of financial literacy to speak and do business, more governmental regulation.

**4. Interview with Mr. Sisaleow Phongsavath, General Director of the Agricultural Promotion Bank, (Thursday 22 July, 1:30pm)**

- APB has no formal BRE financing policy for now but has already supported several biogas projects through financing pig farms in Vientiane Capital and other provinces such as Vientiane and Khammuane. It also finances Thai invested who carries out palm tree and jatropha in Champasak province. APB’s overall policies include the support to both the production and processing industries on such projects. APB is willing to expand its activities beyond biogas financing to support solar and pico-hydro projects. There is no real limit in terms of scale of investment available. Assessment for funding is centrally based on the reality and feasibility of the project.

- Mr. Phongsavath_does not identify any real problem or hindrance to access information. Data are accessible through the BoL’s information center, based on the project proposal and information from other government departments concerned upon the requests. .

- Kinds of investment: APB has financed small to big projects. Its total loan tops up to 1,300 billion kip. In general, maximum loan per company cannot exceed over 25% of the capital registered by the business license. Micro credit per individual borrower is limited to 10 million kip. Short term loans last for one year with an interest rate of about 10-14% vs. medium and long term loans for less than 3 years, at 12-15%. APB has a long practice of group collateral (which consists of 10 members) for the past 17 years, which seems to have been working quite well.

- Criteria for approval of loans: By order of importance: 1) Government policy (absolutely crucial as APB is a state-owned bank), 2) Social and environmental impact, 3) Financial return on investment and the 5 Cs.

- Legal procedure to request financial support: All requests need to be certified by the chief villager and signed by both spouses. The project feasibility study will also need to be certified by the relevant Ministry. Borrowers must be Lao nationals and have a proper business license registered. In case of financing a company, a company shall have Lao share holder.

- Constraints for private investment: Most often, borrowers do not use their loans for the purpose/project agreed upon. Late paybacks of loans are quite frequent due to improper business operations or in case of natural disaster. The current portfolio at risk is 3% (cautious with figures given out! That's impossible!)

- Solutions to problem: Promote/disseminate APB's policy more, impose a penalty system for late payments

- Key recommendation: Increase dialogue between stakeholders and formulate a project that will involve various stakeholders such as farmers, government authorities, NGOs, banks, practitioners, etc to define a clear role for each party, strategic goals to achieve and a plan of action to implement.

**5. Interview with Mr. Narin Phon, CEO, ACLEDA Bank, (Thursday July 22, 8:30am)**

- General Background: originate from Cambodia with five stakeholders, including from FMO (Dutch). The Bank was established two years ago which now there are four provinces which ACLEDA have branches and 10 service units. The total number of staffs is 349.

- There is no formal policy to support BRE sector

- It is opened to all types of business to borrow money from the bank, particularly SMEs. Its loan sizes are $300,000 on average. Loan of $100,000 is provided for retailing business. Interest rates are varied: 19%, 13-14%, and 13% per year for

small, medium and large, respectively. At present, the bank has not yet made any profit.

- Criteria for screening and approving loan to private investment: 5 Cs + 3 Rs (right person, right amount (reflecting business nature) and right time
- Access to information: not quite easy. Mostly based on staff commitment and assessment on a project, based on communication with local people/authority. So far, he does not know much about BRE
- Legal procedure to request financing:
    - Customers approach marketing division of the bank
    - Assessment at home/business
    - Work together with clients on business planning
    - Use 5 cs and 3 rs to assess
    - Follow up with customers
    - Bank manager approve less than US$ 30,000 where higher credit should be considered among Credit Committee
    - Approval period 2-4 days
- Constraints for private investment:
    - Human resource: new graduate with no experience
    - Information flow on law and regulation is slow. Officials do not keep update with new law and regulations
    - Law practice is not limited and slow. There is a law but not much of reinforcement
    - Social norms: clients offer commission of credit officers in the bank
    - Difficult to get access to loan
    - Payment lag: low production of rice due to natural and climate factors in which farmers asks the bank to postpone the pay-back for a year which then causes problem for banks
    - Lack of market information (financing) from other banks. Only two banks have financial reports: ACLEDA and BCEL

- Free market knowledge is very limited

- Solutions:
  - HR: select the right person for right position, i.e. good qualification
  - Follow up activities more especially on paying back
  - Raise awareness of project
  - There is a need for demonstration to allow people to understand the importance of renewable energy

- Market invention to promote participation and performance of financing sector
  - Cooperation from local authority
  - Promote door-to-door campaign
  - Advertisement
  - Support from other donor banks in term of guarantee to investing banks

**6. Interview with Mrs. Bounta Dalavy, Managing director of the Lao Development Bank, (Thursday July 22, 3:00pm)**

- LDB is the public Enterprise which provides the credit/banking services to SME customers who want to borrow or save money. Fund from this bank is from the saving account.

- LDB does not have the specific policies for BRE projects, but it provides the fund for small and medium projects that operate in Lao PDR.

- Recently, LDB is financing Namlong Hydropower project whose investment capital requirement of US$ 9 million. Indeed, LDB provides one million dollars where the rest of financing derives from the loan of BCEL banks and the project owner's fund.

- The general criteria for screening investment project
  - Feasibility report of project.
  - Effectiveness of project.
  - Capability of paying back.
  - The need of investment.

- Collateral

- The decision making on large amount of loan i.e. larger than 20 billion kips has to be done by board of directors while the amount of loan less than that can be considered and approved by Credit Approval Committee.
- Access to information: LDB can have access to information center at the BoL in order to find out the information of investor's profile if they are good or bad borrowers.
- Legal procedure for requesting for financial support:
    - Customer interviews on their investment project
    - Filling in application forms which then certified by village chief and spouses
    - Feasibility studies are certified by line government departments
    - Collateral (land title which must be the name of borrower or certified transfer of right)
    - Contribution fund of borrower
    - In general, 25-30% of registered capital is approval.
- Constraint for private investment:
    - Non-Compliance to credit agreement
    - Late re-payment due to unforeseen circumstances such as natural disaster.
    - Mis-use of loan
- Solution: Warning/Awareness and Compromise as much as possible. Final measure is to take over collateral
- Market invention to promote participation and performance:
    - Facilitate on infrastructure
    - Improve/ease approval procedure
    - IPP

**7. Interview with Mr. Sisaliao, Director of Lao Farmer Production Cooperatives, (Thursday July 22, 4:30pm)**

- The Lao framer Production Cooperatives is the company that produces the products from the agriculture products from the rural areas of the Lao PDR. Their products are jams, candy, tea, coffee to be exported to various countries. This segment is funded by a donor from England. Now they have the Funds cooperative (FC) 12 branches in 11 provinces throughout Lao PDR. However, he is not really supportive on using land for agricultural plantation which is not for food.

- The Cooperative does not have the specific BRE policy. The Microfinance is main business. The funds partly come from the ACLEDA bank. The portfolio is about 5 billion kip. High interest rate about 36% per year.

- This is the network for building up the capacity of rural people to be self efficient and self-sustained. (Trainings on various subjects on agricultural production and processing as well as marketing to people to have work and better job).

- The criteria for approving the loan: Assessment of the need of investment at stake based on project proposal, borrower must have a saving account, and can borrow up to 80% of their savings. Must have at least 1 share ( 1 share = 10,000 kip).

- The legal procedures:

  - The feasibility report of business
  - Application for loan must be certified by village chief and signed by wife and husband

- Problem of loan: Investor does not make profit. Often, people just borrow the money because they see other member borrow (mimetism). Borrowers do not use the loan according to what is agreed upon and there are many cases of late repayments due to natural disaster.

- Solution: Be More careful assessment (no longer provide loan for rice cultivation) with the loan conceded. Promote retailing and marketing.

**8. Interview with Mr. Somchit, Director of Naxaythong Development Rural Cooperative, (Friday July 23, 10:00am)**

- General background: the Cooperative was established in 2001 with participation of 4 villages. The total fund in the year was 50 million kip only. Fund is growing due to an increase in number of members. At the end of 2009, the fund was accumulated up to 4.8 billion kip (where 3.2 billion is for lending) with the participation of 52 villages within Naxaythong district. There is a rapid growth due to promotion of the work of NDRC.
- Provide loan to three main sectors such as: agriculture, industry, and service.
- Criteria for loaning: Must be a member of cooperative holding share of at least one share (10,000 Kip) and saving account, 5 Cs, Interest rate for borrowing is 28-30% per annum, Short term interest period is up to six months.
- Access to information by physical visit for assessing the assets and business as well as other members.
- Legal procedure for requesting financial support: Two days for approval, Filling in application form certified by village chief and signed by both spouses.
- Problems: Late re-payment, Non-compliance to the purpose of proposal.
- Mitigation: Staff to follow up more closely (follow up 7 days after the loan release).
- Intervention: There should be a strategy to cooperate with various stakeholders to formulate a project. Government funding is also essential for promoting renewable energy sector.

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