

**RESIREA**  
**Minutes of the workshops**  
**Cambodia, Laos, Vietnam**  
**January – February 2009**

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Acronyme	RESIREA
Name:	Renewable Energy Sustainable Programs for Intelligent Rural Electrification and Poverty Alleviation
Project time	36 Months
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## 1 General information

<b>Workshop Dates and places</b>	23/01/2009 – PHNOM PENH - Cambodia 29/01/2009 - VIENTIANE – Laos 10/01/2009 – DAK NONG - Vietnam
<b>Team Work</b>	<p><b><u>European partners:</u></b>  <b>Catherine Bourg:</b> Fondation Energies pour le Monde (FONDEM),  <b>Nicolas Guichard:</b> Fondation Energies pour le Monde (FONDEM),  <b>Romain Crehay:</b> Centre for Agronomical Research (CRA-W).  <b>Brisa Ortiz:</b> Fraunhofer Institute for Solar Energy Systems (ISE)</p> <p><b><u>Local partners:</u></b>  <b>Mr. Sovanna Toch:</b> Ministry of Industry Mines and Energy (MIME) – Department of Energy Technique (Cambodia)  <b>Mr. Bouathep Malaykham:</b> Ministry of Energy and Mines, Department Of Electricity (Laos) – Electric Power Management Division  <b>Mme Le Hoang To:</b> Centre for Renewable Energy and Rural Development (RERD)</p>
<b>Objectives</b>	<p>Main objectives of the workshops:</p> <ul style="list-style-type: none"> <li>- present the results of the surveys to a wide panel of participants,</li> <li>- provide all clarifications and explanation about the methodology of RESIREA project and results,</li> <li>- start the last phase of RESIREA project with concentration and discussions to <b>design adapted and suitable</b> electrification projects in the targeted villages.</li> </ul>

## 2 Context of RESIREA project

Launched in 2007, with the financial support of the European Commission and the French agency for Environment ADEME, RESIREA is a planning project for **rural electrification projects through renewable energies** in three provinces of South East Asia: Oudomxay in Lao PDR, Kampong Thom in Cambodia and Dak Nong in Vietnam.

RESIREA project is implemented by a consortium of European partners composed of the **Fondation Energies pour le Monde, Fraunhofer Institute for Solar Energy Systems ISE,** and the **Center for Agronomical Research (CRA-W).**

To elaborate sustainable electrification projects, RESIREA has used and developed an innovative methodology, based on in-depth knowledge of the local and provincial contexts and of the renewable energy potential.

**Priority villages** have been identified in the three provinces **as the most promising and favorable sites to implement rural electrification projects.** This selection has been done using a GIS and multi-criteria analysis. This selection was validated by local authorities during provincial workshops held in March and April 2008.

Detailed studies have been then completed in the priority villages, to apprehend the local context and analyze the energy demand and solvability of the targeted population.

In 2009, the collected data will be used to design sustainable electrification projects in the targeted area. Project documents will be submitted end of 2009 to operators and financing agencies.

### 3 Objectives of the workshops

After 2 years of studies, the partners have finalized the collection of data in the provinces. At this stage of the project, it was important to gather all actors who could be interested in RESIREA next stages to:

- present the results of the surveys,
- provide all clarifications and explanation about the methodology of RESIREA project,
- start the last phase of RESIREA project with concertation and discussions to **design adapted and suitable** electrification projects in the targeted villages.

As a result, 3 workshops have been held in this purpose:

- Phnom Penh, on the 23<sup>rd</sup> of January,
- Vientiane, on the 29<sup>th</sup> of January,
- Dak Nong, on the 10<sup>th</sup> of February.

### 4 Phnom Penh Workshop - Cambodia

The minutes of the workshop held in Phnom Penh on the 23<sup>rd</sup> of January are presented below:

#### 4.1 Participants

The main participants represented the different categories of actors who could be interested in the implementation of the electrification projects that will be submitted at the end of RESIREA:

- Institutional bodies: MIME, EAC, provincial authorities (DIME, Department of Agriculture and Forestry Office)
- Financing actors: Acleda bank, AFD, REF, JICA,
- Actors involved in energy: Cheang Engineering Consultants (CEC), SME Cambodia, Clean Energy Group (CEG), Electricité du Cambodge (EDC), Kc-Solar,

The list of participants is attached in annex 3.

**45 persons** attended the workshop.

#### 4.2 Agenda

The official invitation to the workshop is attached in Annex 1 and 2. The Workshop was developed according the following agenda:

<b>TIME</b>	<b>Description</b>	<b>SPEAKERS</b>
<b>08:00</b>	Registration of attendees	
<b>08:30</b>	Opening speech	Opening speech by H.E. Dr. Sat Samy Secretary of State Mr. Nicolas Guichard, General Secretary of the Fondation Energies pour le Monde
<b>09:15</b>	Introduction of the <b>national context for Rural Electrification and renewable energies</b>	MIME – DET Mr. Touch Sovanna
<b>10:00</b>	Presentation of the <b>local development strategies</b> in the targeted province	DIME of Kampong Thom
<b>09:35</b>	General <b>presentation of RESIREA project</b>	Ms. Catherine Bourg - Fondation Energies pour le Monde
<b>10:10</b>	RESIREA: <b>overview of the preliminary results</b>	Ms. Catherine Bourg - Fondation Energies pour le Monde
<b>10:30</b>	Presentation of RESIREA strategy for the <b>elaboration of electrification projects in the targeted villages:</b>	
10:30	<b>1- Technical options</b>	Mr. Romain Crehay – CRA-W
10:45	<b>2- Organizational schemes and models</b>	Ms. Brisa ORTIZ – Fraunhofer ISE
11:15	<i>Presentation of a biomass gasification project in Anlong Tamei - SME Cambodia:</i>	<i>Erik MIDDELINK – SME Cambodia</i>
11:30	<b>3- Economical and financial analysis</b>	Ms. Catherine Bourg - Fondation Energies pour le Monde
11:45	<i>Presentation of Electricity Authority of Cambodia</i>	<i>Mr. Theng Marith - EAC</i>
<b>13:30</b>	Presentation of the objectives of the afternoon discussions	RESIREA European partners
<b>13:40</b>	<b>Discussions</b>	
<b>17:00</b>	End speech	Mr. Victor Jona – Deputy Director General General Department of Energy – MIME

## **4.3 Minutes of Phnom Penh workshop**

### **4.3.1 Opening speech**

The meeting was opened by H.E. Dr Sat Samy, Secretary of State and adviser to H.E. Mr. Hun Sen, Prime Minister, who presented an overview of the present situation of the energy sector in Cambodia. During the speech, different themes were addressed such as electricity needs in the rural areas, the technology options with renewable resources, the experience of the MIME with new technologies.

Dr. Sat Samy also introduced the necessary follow-up when RESIREA project activities will be finished for the implementation of the electrification programme defined in Kampong Thom.

Then, Nicolas Guichard, general secretary of the Fondation Energies pour le Monde briefly recalled the objectives of RESIREA project, mentioning also that RESIREA would contribute to reach the ambitious targets of Cambodian Government in terms of electrification rate.

### **4.3.2 Morning presentations**

Mr. Sovanna presented the present situation of rural electrification in Cambodia and the national policy for renewable energies.

The DIME representative kindly recalled the present stage of rural electrification in Kampong Thom and mentioned the availability of biomass resources in the province for rural electrification, as an interesting and cheaper alternative to diesel generator sets.

Mrs. Catherine Bourg from Fondation Energies pour le Monde presented the last results of the RESIREA project. The NORIA methodology was explained, and the process to select the most promising villages for the off-grid renewable energy project was presented. The results obtained from the detailed surveys (energy demand patterns, ability to pay electricity) of the priority villages were presented.

Mrs Brisa Ortiz from Fraunhofer ISE presented the usual models for local operation schemes and addressed the need of adaptation and adoption of models to the local conditions.

Mr. Romain presented the different technology options based on renewable local resources. He insisted on the pros and cons of each technology and compared them to the traditional electrification means: grid extensions and diesel generators.

Mr. Erik Middelink, project manager from SME Cambodia presented the biomass gasification technology option, basing on his experience in Anlong Tamei village, Battambang province. Basing on his feed-back, he provided technical and economical data (yields, operation costs, etc.) and recommendations about the organizational model that has to be created for the exploitation of such a project.

Then, Mr. Theng Marith, Director of Regulations, from Electricity Authority of Cambodia (EAC) presented the legislations ruling rural electrification in Cambodia. He presented the roles and attribution of EAC (tariffs setting, and license attribution). The necessary validation stages and the conditions for license application and granting were explained.

### **4.3.3 Afternoon discussions and results**

The second section of the workshop aimed at discussing all technical, organizational and financial issues that need to be considered in the definition of the electrification programme in the 27 targeted villages.

Main objective of afternoon discussions:

- Let the participant react to the preliminary results and orientations that have been proposed in the morning.
- For the participants: ask all necessary questions and get all clarifications on the future programme.
- Highlight questions that need to be carefully taken into account for the design of an adapted electrification programme (technical, organizational and financial questions)

The discussions and recommendations noted during the afternoon session are sum-up by theme, hereafter.

### **A) Questions and comments about RESIREA project**

The presented results of the RESIREA project were welcomed.

Considering the quick evolution of the electrification context in Cambodia, a question has been asked on the up-date of the collected data before the implementation of the programme.

Some participants, especially Clean Energy Group were interested in having the results of the studies.

A precision was brought to the participants: the final electrification programme for the 27 villages will be presented to financing agencies during a final seminar in November 2009. Then, the European partners, especially the Fondation, together with MIME would work together in 2010 to meet investors and foreign financing agencies to find funds for the implementation of the project.

The present electrification rate in Cambodia was debated. Then Mr. Victor Jona, Deputy Director General of the General Department of Energy in MIME recalled the strategy to reach the objectives of the Master Plan.

EAC representative appreciated that RESIREA targeted areas will not compete with grid extensions. He noted that RESIREA outputs would complement the national plan in Cambodia and contribute to the national objective to raise the electrification rate.

### **B) Questions about technical options**

Regarding biomass, Mr. Crehay pointed out an important factor, which is the lifetime of the biomass gasification equipments. SME Cambodia was also interviewed about his experience in Anlong Tamei project on the necessity of a contractual relationship between farmers and the cooperative for the supply of wood or agricultural residues, to guaranty a continuous biomass supply.

SME Cambodia mentioned the necessity for the European partners of RESIREA to make a soil quality analysis in Kampong Thom in order to give recommendations for adapted species for energy crops.

Finally, a controversial issue for biomass gasification is the pollution of water. This should be carefully taken into account and the cost of pollution prevention should be internalized.

### **C) Questions about organizational schemes**

Mr. Marith from EAC pointed out the possible operation schemes, basing on local communities or on private operators. The two options are possible in the Cambodian legal framework, although the private scheme seems to be preferred by the population and the authorities.

Mr. Guichard discussed this issue with SME Cambodia, asking why the Community management scheme had been selected in Anlong Tamei. The reason was that this was a pilot project, which aimed at demonstrating the relevance of community-based operators for gasification projects. The return on experience few years after starting date shows that a hybrid model with private management and community ownership could be preferable.

CEG and Kc-Solar were also interviewed to apprehend their positioning for a possible operation of the electrification programme designed by RESIREA in Kampong Thom.

In Kampong Thom, there are already 13 existing REE's, but they are not located in the targeted villages. Apparently, these local private companies prefer to own the energy system, and might not be interested in managing electricity systems in the targeted villages, since there is lower density and therefore lower profitability.

#### **D) Questions about economical and financial scheme**

Basing on the experience of the participants, the discussions lead to the identification of weak points and barriers for the establishment of renewable technology options. The biggest difficulty faced by the audience is the financing of these new technologies: renewable options usually present a higher investment cost than diesel generators.

KC-Solar, supplier and installer of solar technologies regretted the lack of financing support and financing guaranties.

Mr. Sovanna talked about the need on developing adapted financing schemes, especially for solar, which is very expensive. Additional, he mentioned that for a better profitability, training is necessary for the promotion of economic use of energy.

Representative from AFD gave an overview of the portfolio investment in Cambodia and mentioned that energy is not yet included in the grants area of AFD. He mentioned an irrigation project currently in progress in Kampong Thom. He suggested that a collaboration with AFD and other donors active in Kampong Thom, like the European Commission could be very fruitful.

In terms of local financing possibilities, it was pointed out that the national subsidy framework is not quite efficient. The REF is re-elaborating all the rules and strategy for the attribution of grants.

Other financing agencies such as E+Co showed their interest on financing projects under "profitable" bases. As an example, it was mentioned that the amortization recovery period should no last more than five years. Other important decision factor for funding such project was the professionalism of the actors involved.

#### **4.3.4 Closing speech**

Mr. Victor Jona, Deputy Director General of the General Department of Energy in MIME concluded the workshop with an emphasis on development of renewable energies as part of Cambodian strategy for poverty alleviation. He also highlighted the need of a higher participation of public private partnerships.

## 5 Vientiane Workshop - Laos

The minutes of the workshop held in Vientiane on the 29<sup>th</sup> of January are presented below:

### 5.1 Participants

The main participants represented the different categories of actors who could be interested in the implementation of the electrification projects that will be submitted at the end of RESIREA:

- Government representatives (Ministry of Energy and Mines, Department Of Electricity, EDL, etc.)
- Oudomxay authorities: Provincial and District Departments of Energy and Mines, Planning division,
- Other: LIRE (Lao Institute for Renewable Energies), Technology and Research Institute
- Development actors: JICA, Rural Development Committee,
- Actors involved in energy: Sunlabob, VOPS, EDC, ECI, SME Cambodia

The list of participants is attached in annex 6.

**25 persons** attended the workshop.

### 5.2 Agenda

The official invitation to the workshop is attached in Annex 4 and 5. The Workshop was developed according the following agenda:

<b>08:00</b>	Registration of attendees	
<b>08:30</b>	Opening speech: Mr. Hatsady SISOULATH, Deputy Director General - Department Of Electricity (DOE) - Ministry of Energy and Mines Mr. Nicolas Guichard, General Secretary of Fondation Energies pour le Monde	
<b>08:45</b>	Introduction of the <b>national context for Rural Electrification and renewable energies</b>	Mr. Bouathep MALAYKHAM Head of Electric Power Management Division - DOE
<b>09:05</b>	General <b>presentation of RESIREA project</b>	Ms. Catherine BOURG, Fondation Energies pour le Monde
<b>09:15</b>	Presentation of the <b>local development strategies</b> in Oudomxay	Mr. Somvang, Deputy director of Planning and Investment– Oudomxay Province
<b>09:25</b>	RESIREA: <b>overview of the preliminary results</b>	Ms. Catherine BOURG, Fondation Energies pour le Monde
<b>09:35</b>	Questions and discussion about RESIREA results	
<b>10:15</b>	Presentation of RESIREA strategy for the <b>elaboration of electrification projects in the targeted villages:</b>	RESIREA European partners
10:15	<b>1- Technical options</b>	
	<i>Presentation of experiences in different technologies:</i>	
10:30	<i>Solar PV: Fraunhofer ISE</i> <i>Hydro: Sunlabob</i> <i>Biomass Gasification: SME Cambodia</i> <i>Biofuels: CRA-W</i>	
11:00	Questions and discussion about technical options	
13:00	<b>2- Presentation of possible organizational schemes and models for RESIREA</b>	Ms. Brisa ORTIZ - Fraunhofer ISE
13:30	Questions and discussion about organizational models	
14:30	<b>3- Economical and financial analysis</b>	RESIREA European partners
<b>14:45</b>	Questions and discussion about economical and financial schemes for RESIREA	
<b>15:45</b>	End speech	Mr. Bouathep Malaykham, Department of Electricity Head of Electric Power Management Division

## **5.3 Minutes of Vientiane workshop**

### **5.3.1 Opening speech**

The meeting was opened by Mr. Hatsady Sisoulath, head of the Department of Electricity (DOE) of the Ministry of Energy and Mines, who gave an overview on the present situation in the electricity sector in Laos. The national goals are the extension of the grid and export of energy to other countries like Thailand.

Mr. Sisoulath introduced the main objectives of the workshop and explained about the methodology for the selection of targeted villages, the experience of some renewable energy technologies for the rural electrification and the necessary promotion of renewable energy in the rural areas of Oudomxay province.

He talked about the government's objective to reach an electrification rate of 70 % of household by the year 2010 and 90% by the year 2020 and expressed the need to support of any appropriate technology. He also pointed out the need to supply electricity in the rural areas with local energy resources to contribute to the social and economic development.

Oudomxay province is one of the main important Northern province, but the electrification rate is still low. Only 46 % of households were electrified in 2007 but the province presents a high potential to use technologies as biomass, micro hydro and PV solar.

An important remark concerned the promotion of Renewable Energy in Lao PDR: now the government is setting up a new national committee to create the Policy and Strategy for the Renewable Energy.

### **5.3.2 Morning presentations**

Mr. Bouatheap MALAYKHAM Head of Electric Power Management Division – DOE introduced the national context for Rural Electrification and renewable energies in Laos. He insisted on the necessary access to electricity in rural areas for the stability of the society and the social and economic development of these remote villages: health, women positions, rural exodus, business creation, etc.

Then, Mr. Somvang, Deputy Director of Planning and Investment– Oudomxay Province presented the local development strategy of the province. He presented data about the socio-economic development of the province: demography, health and education, agriculture, trade, energy, mining, etc.

Mrs. Catherine Bourg from FONDEM presented the results of RESIREA project, especially the methodology to select the most favorable villages for the implementation of off-grid renewable energies.

Regarding the technical presentations:

Mrs. Brisa Ortiz presented the different options based on photovoltaic systems: Solar Home Systems and Solar generator with mini-grid.

Basing on Sunlabob experience in Nam Kha project (Xieng Khuan province), Mr. Andy Schröeter from Sunlabob presented the hydro power mini-grid option and the operation and management scheme implemented by his company.

Mr. Erik Middelink from SME Cambodia introduced his experience of implanting gasifiers in Cambodia and provided feedback on organizational scheme and operational costs.

Finally, Mr. Romain Crehay presented the liquid biofuel options: biodiesel and vegetal oil, explaining the technical, operational and economical pros and cons of these two options for rural electrification.

Additional was presented by Mrs. Brisa Ortiz a general overview of possible operational schemes and Mrs. Catherine Bourg gave a preliminary overview of the economical issues and possible financing schemes.

### **5.3.3 Afternoon discussions and results**

The objectives of the discussions are the same than for Phnom Penh workshop. See section 4.3.3

During the workshop different topics were discussed. They are summarized in the following parts.

#### **A) Questions and comments on RESIREA project**

A representative from the Lao government asked some clarifications about the process to select Priority Zones and the concordance of RESIREA priority zones with the national “Priority Areas”, that are the least developed or poorest districts.

Some explanations were also provided about the selection of 21 villages.

#### **B) Questions on technical options**

Considering hydro power stations, the participants pointed out the seasonality of the flows. Sunlabob suggested that to supply electricity 24 hours per day all year long, hybrid solutions should be investigated.

Oudomxay authorities expressed their interest for big biomass capacity plants, using corn residues to be connected to grid. Nevertheless, it was also recalled that the main corn production is exported entirely to Thailand: the availability of corn residues is not that high. It was also recalled that RESIREA project was targeting remote villages and promoting off-grid systems.

JICA representative expressed his interest regarding biomass gasification and asked SME Cambodia feedback on the efficiency of leucaena, rice husks and corncobs.

It was pointed out that a more detailed and field investigations have to be done to give precise results on biomass potential: CRA-W investigations in February meet this objective.

#### **C) Questions on operational scheme**

Organizational and management model are a great issue to be studied and developed.

In Laos, an organizational model, set up by national authorities is already defined: it includes the PDEM (Provincial Department of Energy and Mines), Village Energy Committees (VEC) and Village Technicians (VT) and Managers.

This organizational model is well regulated by Lao government and according to the participants and operators presents, quite successful.

#### **D) Questions on financing scheme**

Despite good renewable energy potential and an adapted management scheme, the participants mentioned the difficulties met by the actors for managing sustainable and rentable projects.

Village Off-grid Promotion and Support (VOPS) shared his experience on his hire-purchase project. VOPS meets difficulties for recovering the monthly payments because the targeted customers live in remote areas and are poor.

The high investment costs of renewable energies, the low load consumption and the few users are the main barriers for the implementation of off-grid renewable energy systems, and explain the lack of attractiveness for private sector for electrifying remote villages. Moreover, in Laos there is no possibility for private investment or loans.

This highlight one of the major point to be considered in RESIREA project: **high level of subsidies will be required**. Private Public Partnerships will be necessary to ensure the financial sustainability of the projects.

Especially, great attention will have to be paid to the **definition of the tariffs rate**. Indeed, the main reference in terms of rural electrification in Laos is EDL grid extensions, with highly subsidized tariffs. The participants agreed and insisted on the fact that RESIREA project should propose affordable tariffs, to reach the rural and poor population. For example the price of the kWh in Anlong Tamei (Cambodia), which is 0,5 \$/kWh is far too expensive for Laos market.

As a result, an important issue to work out for the next phase within the RESIREA project will be to develop cost-effective options to offer low / affordable electricity tariffs. However, the European partners insisted on the fact that off-grid renewable energies will never be able to compete with EDL, but considering the remoteness of the targeted villages, they are the sole possibility for these populations to access modern sources of energy and develop their economy.

Finally, the representative from the National Committee for Rural Development and Poverty Eradication explained that in the frame of the national policy to support renewable energies in rural areas, the Government plans to reduce import taxes for renewable energies equipments.

## 6 Dak Nong Workshop - Vietnam

In the frame of the agreement of Dak Nong Province People Committee and according to the schedule of RESIREA project, the Department of Science and Technology of Dak Nong province in the cooperation with FONDEM and RERD organized a workshop on the 10<sup>th</sup> of February 2009 in Gia Nghia City, Dak Nong Province.

### 6.1 Participants

- Dak Nong province:
  - o Representatives of Dak Nong province People Committee,
  - o DOST,
  - o Department of Industry and Trade,
  - o Department of Agriculture and Rural Development,
  - o Department of Irrigation,
  - o Center for Information and Technical Application,
  - o Center for Promotion of Commercial Investment,
  - o Representatives of 11 following Communes: Truong xuan, Dak N'drung, Nam N'jang (District Dak Song), Nhan dao, Sak wer, Quang tin (District Dak R'Lap), Hak Ha, Quang son, Dak P'lao, Dak R'mang, (District Dak G'long), Tan thanh (District KrongNo).
- Department of Energy, Ministry of Industry and Trade **from Hanoi**
- Fondation Energies pour le Monde (Fondem)
- Centre for Renewable Energy and Rural Development (RERD)
- Center for Energy Research and Development (Enerteam)
- DAQ SOLTECH VN company

**The total number of participants was 28. The list of participants is attached in annex ...**

The Workshop was presided by Mr. Nhu – People's Committee of Dak Nong province, Mr. Hung – Vice Director of DOST, Dr. To – RERD, Mrs. Catherine Bourg- FONDEM.

### 6.2 Objectives and agenda

The objective of the workshop in Dak Nong was the following:

- Presentation of the results obtained so far in RESIREA project;
- Discussion about the technical, organizational and financial design of the electrification project to be defined by RESIREA;
- Discussion about the possibility to implement in a short term part or total of the electrification project defined by RESIREA in Dak Nong province.

**The following presentations have been done in the Workshop:**

- Opening speech of Dak Nong Province People Committee (Mr. Nhu);
- Presentation on the objectives of RESIREA WORKSHOP (Dr. To);
- Presentation on the Government Policy on DRE and the potential in Vietnam (Ms. Giang – Ministry of Industry and Trade);
- Recall of RESIREA project's objectives (Fondem);
- Presentation of the methodology and the results obtained so far in RESIREA project (FONDEM, RERD, Enerteam) and discussion;

- Presentation on the experience of Micro-Credit model for rural electrification in Burkina Faso (Fondem);
- Presentation on the rural electrification situation of Dak Nong province (Department of Industry and Trade);
- Proposition for the implementation of the electrification project defined by RESIREA in Dak Nong province (DOST Dak nong);
- Discussion about the results, the modalities proposed by RESIREA for the electrification of the targeted households, and the possibilities to implement part or total of the project defined by RESIREA.

### 6.3 Workshop's results

After the discussions, the participants drawn the following conclusions:

1/ The completion of RESIREA project (planning project for rural electrification by renewable energy) comes perfectly within the objectives and policy of Dak Nong authorities for economic and social development in the province. The workshop participants assessed the obtained results of RESIREA project and appreciated the good cooperation between the partners in the implementation of the project in Dak Nong province. However, the obtained information on the ability to pay and energy demand might need to be up-dated because it is changing very quickly.

2/ Recommendations from the participants:

- Necessity to check or to use with care the statistics issued from the households surveys;
- The commune People's Committee should be involved in the follow-up and training of the target population, and could possibly participate to the initial investment;
- Necessity to find financial support from the Ministry of Industry and trade and international donors, to support households to purchase their solar home system;
- Necessity to propose different financial schemes and level of subsidies for rich and poor households;
- If a micro-credit scheme is set-up for the financing of the project, the reimbursement period should be shorter than 3 years;
- The users should be trained to use and maintain their system. A good cooperation with the suppliers is essential;
- Necessity to phase the implementation of the project, starting first with only a part of the target population;
- Willingness to start the implementation of the electrification project in the targeted households as soon as possible.

3/ In order to implement as soon as possible the rural electrification project by renewable energy defined by RESIREA to supply electricity for the remote, rural and mountainous villages, the workshop participants requested kindly Dak Nong Province People Committee to **decide soon the policy and strategy for the setting-up and completion of the project**. This project should be elaborated by the Department of Industry and Trade and implemented and managed by an independent organization.

4/ In order to assist the province in the completion of this DRE project, financial support should be asked from the Ministry of Industry and Trade of Vietnam and the international donors and organizations as Fondation Energies pour le Monde (Fondem).

## **7 Annexes**

## 7.1 Annex 1: Invitation to the Workshop in Phnom Penh



### RESIREA FOREWORD SUSTAINABLE ACCESS TO ELECTRICITY IN RURAL AREAS WITH RENEWABLE ENERGIES

Launched in 2007, with the financial support of the European Commission and the French agency for environment ADEME, RESIREA is a planning project for rural electrification projects through renewable energies in three provinces of South East Asia: Oudomxay in Lao PDR, Kampong Thom in Cambodia and Dak Nong in Vietnam.

RESIREA project is implemented by a consortium of European partners composed of the **Fondation Energies pour le Monde (FONDEM)**, the **Fraunhofer Institute for Solar Energy Systems**, and the **Center for Agronomical Research (CRA-W)**.

In Cambodia, RESIREA is carried out in partnership with the Ministry of Industry, Mines and Energy, more specifically the **Department of Energy Technique**.

To elaborate sustainable electrification projects, RESIREA has used and developed an innovative methodology, based on in-depth knowledge of the local and provincial contexts and of the renewable energy potential.

**27 priority villages** have been identified in Kampong Thom province as the **most promising and favorable sites to implement rural electrification projects**. This selection has been done using a GIS and multi-criteria analysis. This selection has been validated by local authorities during a provincial workshop held in April 2008.

Detailed studies have been then completed in the 27 villages, to apprehend the local context and analyze the energy demand and solvability of the targeted population.



Kampong Thom province - 27 priority villages

Next step of the project consists in **elaborating adapted and sustainable electrification projects in these 27 villages** with:

- the selection of the appropriate **technical options**: biomass and photovoltaic systems will be promoted to meet the electricity needs in these areas.
- the elaboration of **operation and management schemes** adapted to local context,
- the **economical analysis** and the elaboration of a financing scheme ensuring sustainability.



Kampong Thom workshop - April 08

**RESIREA workshop, on the 23<sup>rd</sup> of January in Vientiane**, will launch this phase of elaboration of projects in the targeted villages. First part of the workshop will be dedicated to presentations of RESIREA results and orientations for the elaboration of the electrification projects. Group discussions will be then organized in the afternoon to discuss in detail of the different options in Cambodian institutional framework.

Outcomes of this workshop will enable RESIREA partners to **design sustainable and appropriate electrification projects in the 27 villages**, which will then be submitted to financing agencies, investors and private operators during a **final seminar, scheduled in November 2009**.

## 7.2 Annex 2: Official invitation letter, Phnom Penh



Paris, on the 15 /12/08

### Invitation to RESIREA workshop: sustainable access to electricity in rural areas with renewable energy in Kampong Thom province

23<sup>rd</sup> January 2009 – From 8 AM to 5 PM - Phnom Penh – Hotel Cambodiana

Dear Madam, Sir,

The Ministry of Industry, Mines and Energy, on behalf of the European consortium Fondation Energies pour le Monde (FONDEM), Fraunhofer Institute for Solar Energy systems and Center of Agronomical Research (CRA-W), is pleased to invite you to RESIREA Workshop, to be held in Phnom Penh on the 23<sup>rd</sup> of January 2009. You will receive an official invitation from the Ministry early January.

RESIREA is a planning project for defining sustainable **rural electrification programmes in Kampong Thom province, based on renewable energy**. Through an innovative methodology and in-depth studies, RESIREA will contribute to reach the ambitious target of Cambodian Government to increase the national electrification rate to the current 20% up to 70% by 2030, partly through renewable energy promotion.

Two years after the starting date of RESIREA, this workshop aims at presenting the results obtained so far and the preliminary orientations for the elaboration of electrification projects in **27 priority villages** of Kampong Thom province.

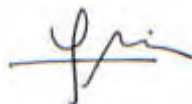
This workshop is intended for all actors who could be involved in the future implementation of these electrification projects in Kampong Thom province: rural electrification actors and energy institutions, rural development organizations, financing and aid agencies and electricity operators.

We would be delighted to welcome you at the workshop and are looking forward to your confirmation. **Please confirm by 5th January 2009 by sending an email to [catherine.bourg@energies-renouvelables.org](mailto:catherine.bourg@energies-renouvelables.org) and [tochsovann@yahoo.com](mailto:tochsovann@yahoo.com)**

For detailed information on the draft agenda of the workshop and its objectives, please see the enclosures. Do not hesitate to visit RESIREA website: [www.energies-renouvelables.org/resirea](http://www.energies-renouvelables.org/resirea)  
If you have further questions, please feel free to contact us at any time.

Kind Regards,

**Yves Maigne,**  
Director of **Fondation Energies pour le Monde,**  
Coordinator of RESIREA project  
And on behalf of **Fraunhofer ISE and CRA-W**



Enclosures:  
RESIREA foreword  
Draft Workshop Agenda  
RESIREA Brochure

### 7.3 Annex 3: List of participants for Phnom Penh workshop



**LIST OF PARTICIPANTS**  
**RESIREA WORKSHOP**  
**Cambodiana Hotel – 23rd JANUARY 2009**

NO.	Name	Position	Title & Organization	Telephone/E-mail address	Signature
<b>I. ព្រះរាជាណាចក្រកម្ពុជា - វិទ្យាស្ថានឧស្សាហកម្ម និងថាមពល - MINISTRY OF INDUSTRY, MINES AND ENERGY</b>					
1	HENG JOUNLEANG	Director	Energy Development Department, MINME	012 82 9338 <sup>Personal</sup> heng.jounleang@skk.com	
2	CHHAN PHETRA	Chief Division	EDC	016 9398844	
3	Kim Rithy	Technical Officer	RERD	08942612	
4	Heng Chan Pradum	Deputy Director	MOE	016 577899	
5	SAV VITPA	ED	USP	01 854809	
6	HEANG ADA	Deputy Dir.†	MINME (DET)	012 8884086	
7	Much Chhun Horn	Director	MINME HED	012 944 539	
8	SO Veasna	Deputy Director	MINME	012 888 442	
9	VICTOR JONK	DDG	MINME		
10	LIENGVUTHAY	Deputy Director	MINME	092 51 29 83	

LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL



11	Ms. CHEN SOANHA Head. office	MINE (DET)	011 870 333	<i>PS</i>
12	M. KHEUNG AMRABARITH. Deputy office	MIME	amrabarith@yahoo.com.	<i>AK</i>
13	Em. Kunsakda	MIME		<i>E. Souda</i>
14	THEUNG MARITH Dir. of Regup.	TAC	012 850171	<i>ellink</i>
15	H. E. Sef Samy Secretary of	MIME	012. 299 399	
16	Toeh Savanna Director	MIME	011. 9596 99	<i>PMZ</i>
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RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL

LIST OF PARTICIPANTS



**LIST OF PARTICIPANTS  
RESIREA WORKSHOP  
Cambodiana Hotel – 23<sup>rd</sup> JANUARY 2009**

ល.រ NO.	ឈ្មោះ Name	មុខងារ Position	ស្ថាប័ន Title & Organization	អាសយដ្ឋានទូរស័ព្ទ/អ៊ីមែល Telephone/E-mail address	ហត្ថលេខា Signature
<b>II. ខេត្តកំពង់ចាម – KOMPONG THOM PROVINCE</b>					
1	Heng Sam Ann	Governor of Thom	KOMPONG THOM PROVINCE	017 600048	
2	Mr. Nya Hun	District Gov.	Preah Sam Bœu District	012 582 980	
3	Mr. Nheh Kun Kea	Deputy Director	DPM of Preah Vihear District	012 93 7422	
4	Chhoun Vea	District Gov.	Banteay Meanchey District	092 2073 20	
5	Seng Vanna	Deputy Dist. Gov	San Donk District	012 960 018	
6	Eung Sokeat	Head office	DIE	012 848622	
7	Fritz Walthay	Director	CLEAN ENERGY GROUP	012 802 130	
8					

LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL



**LIST OF PARTICIPANTS**  
**RESIREA WORKSHOP**  
**Cambodiana Hotel – 23<sup>rd</sup> JANUARY 2009**

NO.	Name	Position	Title & Organization	Telephone/E-mail address	Signature
<b>III. អង្គការឯករាជ្យ - NGO</b>					
1	PERRETTE		Frenckh ENBASSY		
2	HENG salpseth	Program officer Infrastructure renovation	JICA Cambodia office	012 659 827 hengsalpseth.cw@jica.go.jp	
3	GUICHARD	General Secretary	Federation Energy you & World	0033 144 18 00 80 vincent.guidard@energy-renovables.org	
4	HEANG Suo Saravon	Commercial Attache	French Embassy	012 203334	
5	Steve Gosselin	Project Manager	Clean Energy Group	s.gosselin@ceg.com.kh	
6	Clea Eligon	Translator	CEPPL UNSD	016 851844 clea_eligon@yahoo.com	
7	Vann Kiet	Officer	KfW KfW-co-fac 842.10	012 92 3754 vann.kiet@kfwdc.de	
8	Teoh Sarama	Director	MA	011 95 96 99	
9	Erik Middeldink	Proj. Manager	SME Cambodia	erik@sme-revables.com 012-304334	
10	Khiam Phaul	Director	Budonxy Province	+ 856 - 71 - 21 9 286	

LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL



11	Nida Duk	Sr. Program Officer	AD5	093 915 805	<i>[Signature]</i>
12	Max Samneng	Re. Coordn	GT2	012 900 221	<i>[Signature]</i>
13	<del>Monica-charyvann</del>	<del>ADDE</del>	MDME		
14	Chhavy Samsay	officer	PHHE	085 95 65 70	<i>[Signature]</i>
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LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL



**LIST OF PARTICIPANTS**  
**RESIREA WORKSHOP**  
**Cambodiana Hotel – 23<sup>rd</sup> JANUARY 2009**

<b>NO.</b>	<b>Name</b>	<b>Position</b>	<b>Title &amp; Organization</b>	<b>Telephone/E-mail address</b>	<b>Signature</b>
<b>IV. ឥណទានឯកជន - PRIVATSECTOR</b>					
1	Prave Boreth	Director	ePPED	012 515 885	
2	Soketh Thom Issara	Officer	R&D - RDB	012 556355	
3	Hun Sornthy	CPD	RDB	012 773216	
4	CREHAY Romair		CRA-W	+32 81 627 453	
5	Ortiz, Brisa		Fraunhofer ISE	+49 761 45885283	
6	Olivier BÉTEGUES	Project Manager	Clean Energy Group	011244393/obrecourt@ceg.com.kh	
7	May Kanso	AVP/Manager	ACLEDA	015 700468	
8	SUDY BERLIM		CEC	016 876 396	
9	Dr. Pascal Seng	Manager Dir.	CEC	012 8815 24	
10	Hao Sangat	Staff	Rhmar Solar	011 911 922	

LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL



11	Dang Meng	Chief of Paul	Comasia Bank PLC.	012 649 234	<i>[Signature]</i>
12	Beeathee Malayahan	President	Director Leos	+856-413012	<i>[Signature]</i>
13	KEB Group Ltd	President	Phanth Chomrith	016 389 098	<i>[Signature]</i>
14	Joost Sitter	Investment Officer	E+Co	+662 650 3147	<i>[Signature]</i>
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LIST OF PARTICIPANTS

RESIREA WORKSHOP, 23 JAN 2009, CAMBODIANA HOTEL

## 7.4 Annex 4: Invitation to the Workshop in Vientiane



### RESIREA FOREWORD SUSTAINABLE ACCESS TO ELECTRICITY IN RURAL AREAS WITH RENEWABLE ENERGIES in Oudomxay province

Launched in 2007, with the financial support of the European Commission and the French agency for environment ADEME, RESIREA is a planning project for rural electrification projects through renewable energies in three provinces of South East Asia: Oudomxay in Lao PDR, Kampong Thom in Cambodia and Dak Nong in Vietnam.

RESIREA project is implemented by a consortium of European partners composed of the **Fondation Energies pour le Monde (FONDEM)**, the **Fraunhofer Institute for Solar Energy Systems**, and the **Center for Agronomical Research (CRA-W)**.

In Lao PDR, RESIREA is carried out in partnership with the Ministry of Energy and Mines of Lao PDR, more specifically the **Department Of Electricity**.

To elaborate sustainable electrification projects, RESIREA has used and developed an innovative methodology, based on in-depth knowledge of the local and provincial contexts and of the renewable energy potential.

**21 priority villages** have been identified in Oudomxay province as the **most promising and favorable sites to implement rural electrification projects**. This selection has been done using a GIS and multi-criteria analysis. This selection has been validated by local authorities during a provincial workshop held in March 2008.

Detailed studies have been then completed in the 21 villages, to apprehend the local context and analyze the energy demand and solvability of the targeted population.



Oudomxay province - 21 priority villages

Next step of the project consists in **elaborating adapted and sustainable electrification projects in these 21 villages** with:

- the selection of the appropriate **technical options**: hydropower, biomass and photovoltaic systems will be promoted to meet the electricity needs in these areas.
- the elaboration of **operation and management schemes** adapted to local context,
- the **economical analysis** and the elaboration of a financing scheme ensuring sustainability.



Oudomxay workshop - March 08

**RESIREA workshop, on the 29<sup>th</sup> of January in Vientiane**, will launch this phase of elaboration of projects in the targeted villages.

First part of the workshop will be dedicated to presentations of RESIREA results and orientations for the elaboration of the electrification projects. Group discussions will be then organized in the afternoon to discuss in detail of the different options in Lao institutional framework.

Outcomes of this workshop will enable RESIREA partners to **design sustainable and appropriate electrification projects in the 21 villages**, which will then be submitted to financing agencies, investors and private operators during a **final seminar, scheduled in November 2009**.

## 7.5 Annex 5: Official invitation letter, Vientiane



Paris, on the 10/01/09

### Invitation to RESIREA workshop: sustainable access to electricity in rural areas with renewable energy in Oudomxay province

29<sup>th</sup> January 2009 – From 8 AM to 5 PM - Vientiane – Lanexang Hotel

Dear Sir,

The Ministry of Energy and Mines, on behalf of the European consortium Fondation Energies pour le Monde (FONDEM), Fraunhofer Institute for Solar Energy systems and Center of Agronomical Research (CRA-W), is pleased to invite you to RESIREA Workshop, to be held in Vientiane on the 29<sup>th</sup> of January 2009.

RESIREA is a planning project for defining sustainable **rural electrification programmes in Oudomxay province, based on renewable energy**. Through an innovative methodology and in-depth studies, RESIREA will contribute to reach the ambitious target of Lao Government to increase the national electrification rate to the current 50% up to 90% by 2020, 20% of which should be by renewable energy.

Two years after the starting date of RESIREA, this workshop aims at presenting the results obtained so far and the preliminary orientations for the elaboration of electrification projects in **21 priority villages** of Oudomxay province.

This workshop is intended for all actors who could be involved in the future implementation of these electrification projects in Oudomxay province: rural electrification actors and energy institutions, rural development organizations, financing and aid agencies and electricity operators.

We would be delighted to welcome you at the workshop and are looking forward to your confirmation. **Please confirm by 20th January 2009 by sending an email to [catherine.bourg@energies-renouvelables.org](mailto:catherine.bourg@energies-renouvelables.org) and [bouathepmlk@yahoo.com](mailto:bouathepmlk@yahoo.com)**

For detailed information on the draft agenda of the workshop and its objectives, please see the enclosures. Do not hesitate to visit RESIREA website: [www.energies-renouvelables.org/resirea](http://www.energies-renouvelables.org/resirea)  
If you have further questions, please feel free to contact us at any time.

Kind Regards,

**Yves Maigne,**  
Director of *Fondation Energies pour le Monde*,  
Coordinator of RESIREA project  
And on behalf of **Fraunhofer ISE and CRA-W**

A handwritten signature in black ink, appearing to be 'Yves Maigne', written over a horizontal line.

Enclosures:  
RESIREA foreword  
Draft Workshop Agenda  
RESIREA Brochure

## 7.6 Annex 6: List of participants in Vientiane workshop

No	Name and surame	Organization	Position
1	Mr. Anousack Chaysavang	EDC	Consultant
2	Mr. Sengsavanh	EDC	Marketing
3	Ms.Sengdeuane Vong inh	DOE	Deputy Head of Division
4	Ms. Awelie PeueTreau	LIE	Pro gram Coondinator
5	Mr. kong wong	VOPS	Technical
6	Mr. Si som phone	VOPS	Technical Engineer
7	Mr. Vilaysone	EPD Director of	
8	Mr. Hatsady SISOULA TH	DOE	Deputy director
9	Mr. Erik Middelink	DSM Cambodia	Technical Advisor
10	Mr. Phonepaseuth	EDL	Engineer
11	Mr. Thongphet Phetsouphaphone	PDEM ( Oudomxay )	Chief of sector
12	Mr. Hongthong Inthavong	DDEM ( Oudomxay )	Chief of office
13	Mr. Vanhdy Boupha chick	DDEM (Houn )	Chief of office
14	Mr. Kham phone Pannha thoa	Department of Agriculture and forestry (Oudomxay )	Chief of planting sector
15	Mr. Somevang Soulinhaphone	Planning division (Oudomxay)	Deputy Director of Dipertment
16	Mr. Listhanoulook Lathsapho	DOE	Engineering

<b>No</b>	<b>Name and surame</b>	<b>Organization</b>	<b>Position</b>
17	Mr. Vanh la Vongmany	PDEM ( Oudomxay )	Deputy director of Dipartment
18	Mr. Phu tha nu thong Xaysomebath	Technology and Research Institute	Deputy Director of Institute
19	Mr. Viengsay Chantha	DOE	Chief of LEPTS Regelatory Unit
20	Mr. Dr. Xayphone Bounsou	DOE	Engineer
21	Mr. Bouathep Malaykham	DOE	Director of Division
22	Mr. Boua lan Saysanavong	DOE	Engineering
23	Mr. Bouasavanh Thepphavong	ECI	Technical office
24	Mr. ChanThaSone Akha vong	EPS	Engineer
25	Mr. Andy Schroeter	SunLabob	Director
26	Mr. Phouxay Viengvixay	DOE	Engineer
27	Mr. Kham Sing Boun nhong	DOE	Engineer
28	Mr. Humphanh Vongphachan	DOE	Deputy Director of Derector
29	Mr. Chith thavixay	Rural Development Committee	Deputy Chief of office
30	Mr. kayasith	JICA	
31	Mr. Romain Crehay	CRA.W	Biomass expert
32	Mr. Nicolas Guichard	FONDEM	General secretary
33	Ms. Catherine Bourg	FONDEM	Project Manager
34	Ms. Brisa ORTIZ	Fraunhofer ISE	Solar expert

## 7.7 Annex 7: List of participants in Dak Nong workshop

<b>Organization</b>	<b>Name of participant</b>	<b>Number</b>
Fondation Energies pour le Monde (FONDEM)	Mrs. Catherine BOURG	1
Center for Renewable Energy and Rural Development (RERD ) ENERTEAM	Dr. Lê Hoàng To, Director Mr. Phan Van Truong Dr. Nguyen Quoc Bao, Vice Director	2 1
Department of Energy , Ministry of Industry and Trade Translator	Mrs. Pham Huong Giang Mr.Thai Hoang Van	1 1
ÑAQ SOLTECH –VN Company	Mr. Nguyen Duc Tho, Vice Director	1
People Comittee of Dak nong province	Mr. Do The NHu , Vice President	1
Department of Agriculture and Rural Development	Mr. Nguyen Van Thang	1
Department of Sciences and Technology	GÑ Laâm, PGÑ Huøng , Ñãeng , Tuaân...	5
Department of Industry and Trade	Mr. Ngo The Tung , Vice Director	1
Center for Information and Technical Application	Mr. Ho Gam , Director	1
Department of Irrigation	Mr. le Viet Thuan	1
Center for promotion of trade investment	Mr. Le van Mot	1
Representative. of Commune Quang son/ Dak G'long	Mr. Pham Hong Thai, President	1
Repr. Of Commune Dak Plao/ Dak G'long	Mr. K'lo , Ptesident	1
Repr. Of CommuneNam N'jand/ Dak Song	Mr. Dieu Phuyet	1
Repr. Of CommuneNam Truong Xuan/Dak Song	Mr. Pham Quoc Thuy . President	1
Repr. Of CommuneNam Nhan Dao / Dak R'lap	Mr.Le Minh Hong	1
Repr. Of CommuneNam Dak Wer/ Dak R'lap	Mr.Le Ngoc Loc, Vice President	1
Repr. Of CommuneNam Tan Thanh / Krong no	Mr.Bui Gia Tuan , Presidentt	1
Repr. Of Commune Dak Ha/ Dak G'long	Mr. K'sim , Vice President	1
Repr. Of Commune Quang Tin/Dak R'lap	Madame Thi H'reu, President	1
Repr. Of Commune Quang tin/ Dak R'lap	Mr. Dang Ngoc Linh	1
<b>TOTAL</b>		<b>28</b>