



## RESIREA

# Renewable Energy Sustainable Programs for Intelligent Rural Electrification and Poverty Alleviation

## DETAILED STUDIES OF THE PRIORITY VILLAGES

Kampong Thom province

## SUMMARY REPORT

WP6

March 2009



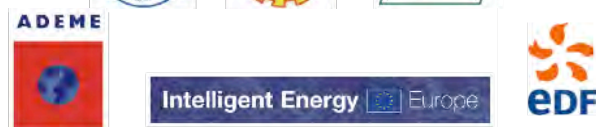
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# I- INTRODUCTION

## 1- *Context of the study*

After a provincial study carried out in Kampong Thom in 2007, 27 priority villages have been identified in 3 districts: Prasat Sambour, Prasat Balangk and Sandan.

These villages have been selected because they presented a favourable context for decentralised rural electrification projects, based on renewable energies.

The list of priority villages was presented during a workshop held in Kampong Thom in April 2008 and validated with local actors.

Further to this selection, RESIREA partners launched the next phase of the project, consisting in in-depth analysis of the selected villages.

## 2- *Methodology of the survey*

Detailed data have been collected in each priority villages by the consultant Cheang Engineering Consultants (CEC) and SME Cambodia, with the support of the provincial authorities.

A **village database** has been created, with data concerning:

- Accessibility;
- Geographical configuration and context;
- Living and housing conditions;
- Social context;
- Socio-economical context;
- Energy context.

An inventory of non-domestic users has been completed to identify social infrastructures (schools, health centres, offices, etc.) and economic activities (shops, crafts, etc.) existing in the priority villages.

Further to the completion of the village database, the priority villages have been scored basing on the following criteria:

- Economical dynamism: presence of activities generating income, of markets, etc.
- Social dynamism: presence of associations, development projects, etc.
- Accessibility,
- Good context: access to water, health care, education,

The villages have been shared into two categories, according to their more or less favourable context for a suitable development of a rural electrification project.

- **Category A:** village with economic dynamism, dense population, good social dynamism;
- **Category B:** suitable village, but presents some risks (lower economic dynamism, lower energy demand)

Category A	Category B
Dang Ta Aek Doung Kraya Cheung Sakream Cheung Prasat Balangk	Kraya Tboundg Sakream Tboundg Trach Thmei Prasat Balangk
Chheu Teal Kampong Ta Baen Samret Veal Pring Kroam Andoung Pring Roneam Sandan	Boeng Rolum Kai Rang Boeng Pra Sandan
Atsu Chhuk Stuong Or Kru Ke Sambour Ta Aok Tang Krasao Tuek Andoung Prasat Sambour	CHEY SAMPOV KAMPONG CHVEA TRAPEANG CHHRUK Prasat Sambour

Table 1: List of priority villages, per category A or B

Then, to get all the data necessary to the design of the electrification programme, surveys of the potential beneficiaries have been completed:

- survey of representative households;
- survey of social infrastructures and economic activities.

Methodology of the users' surveys:

Basing on the results of the village database, the surveys have been carried out in representative villages, in terms of population, economic dynamism, social context.

10 representative villages have been selected:

- Roneam, Chheu Teal, Samret and Boeng Pra in Sandan district,
- Sambour, Trapeang Chhruk and Chhuk Stuong in Prasat Sambour district,
- Dang Ta Aek, Kraya Tboundg and Trach in Prasat Balangk district.

Within these villages, a sampling has been done to survey group of users that is the most representative of the targeted population.

The sampling of households was done basing on professions and housing conditions with cooperation of local authorities. A panel of non-domestic actors has been also surveyed.

Thus, 170 households and 60 non-domestic actors have been surveyed in the three Priority Zones.

For each Priority Zone, these surveys assessed:

- The traditional energy expenses (recharge of batteries, kerosene lamps, diesel gen sets, etc.)
- The electricity needs,
- The ability and willingness to pay of the population.

The results of the household's surveys have been extrapolated to the priority villages selected **in each Priority Zone, to define adapted energy services.**

**They were presented during a workshop held in January 2009 in Phnom Penh.** The detailed results of the studies are presented in the next section.

## II- RESULTS OF THE VILLAGE STUDIES

### 1- Description of the targeted villages

#### 1.1 Demography

In Kampong Thom province, **5 000 direct beneficiaries** are targeted in RESIREA programme, which is to say **25 000 people**. Some of the targeted villages are also Communes towns, and the electrification of social infrastructures like health centers, schools, will benefit to the all population of the commune.

District	Village	Households (HH)	Pop villages	Commune	Pop communes	Nber of HH commune
Prasat Sambour	Chhuk Stueng	145	636	Chhuk	8953	1906
	Ta Aok	263	1260			
	Sambour	219	1078	Sambour	11220	2341
	Trapeang Chruk	127	596			
	Ou Kru Kae	132	690			
	At Su	164	470			
	Chey Sampov	175	1023			
	Tuek Andoung	206	1110	Tang Krasau	9850	1882
	Tang Krasau	305	1572	Koul	4411	963
Kampong Chvea	126	607				
Prasat Balangk	Doung	210	1106	Doung	6049	1109
	Dang Ta Aek	101	567			
	Kraya Cheung	256	1353	Kraya	6275	1149
	Kraya Tboung	304	1684			
	Sakream Khang Cheung	162	712	Sa Kream	7905	1542
	Sakream Khang Tboung	174	787			
	Thmei	178	1033	Sameakki	3717	735
	Trach	130	664			
Sandan	Chheu Teal	274	1439	Chheu Teal	6985	1335
	Boeng Rolum	111	546			
	Kampong Ta Baen	106	605			
	Samret	209	1047			
	Veal Pring Kraom	162	891			
	Kai Rang	190	895			
	Boeng Pra	134	617			
	Andoung Pring	139	885			
	Roneam	183	776	Mean Chey	5928	1281

Table 2: Number of households and inhabitants in the targeted villages and communes<sup>1</sup>

<sup>1</sup> Source: National census 2004

On average, in the targeted villages, each family counts **5 persons**.

**1.2 Accessibility**

All the villages are served by roads that are **passable all the year** but difficult during the rainy season. The average time to access the nearest town (Kampong Thom provincial town for Prasat Sambour and Sandan district, Stoung for Prasat Balangk district) is **less than 2 hours**.

The average distance to the district town is 19 km (43 km for Prasat Balangk villages, 9 km for Sandan district and 10 km for Prasat Sambour district).

The average distance to the provincial town is 65 km (86 km for Prasat Balangk villages, 80 km for Sandan villages and 39 km for Prasat Sambour villages).

Cell phones can be used in all villages.

**1.3 Configuration of the villages**

The houses in the villages are grouped together. Maps for each village have been drawn to show the geographical configuration of the houses in the village. An example is shown below.

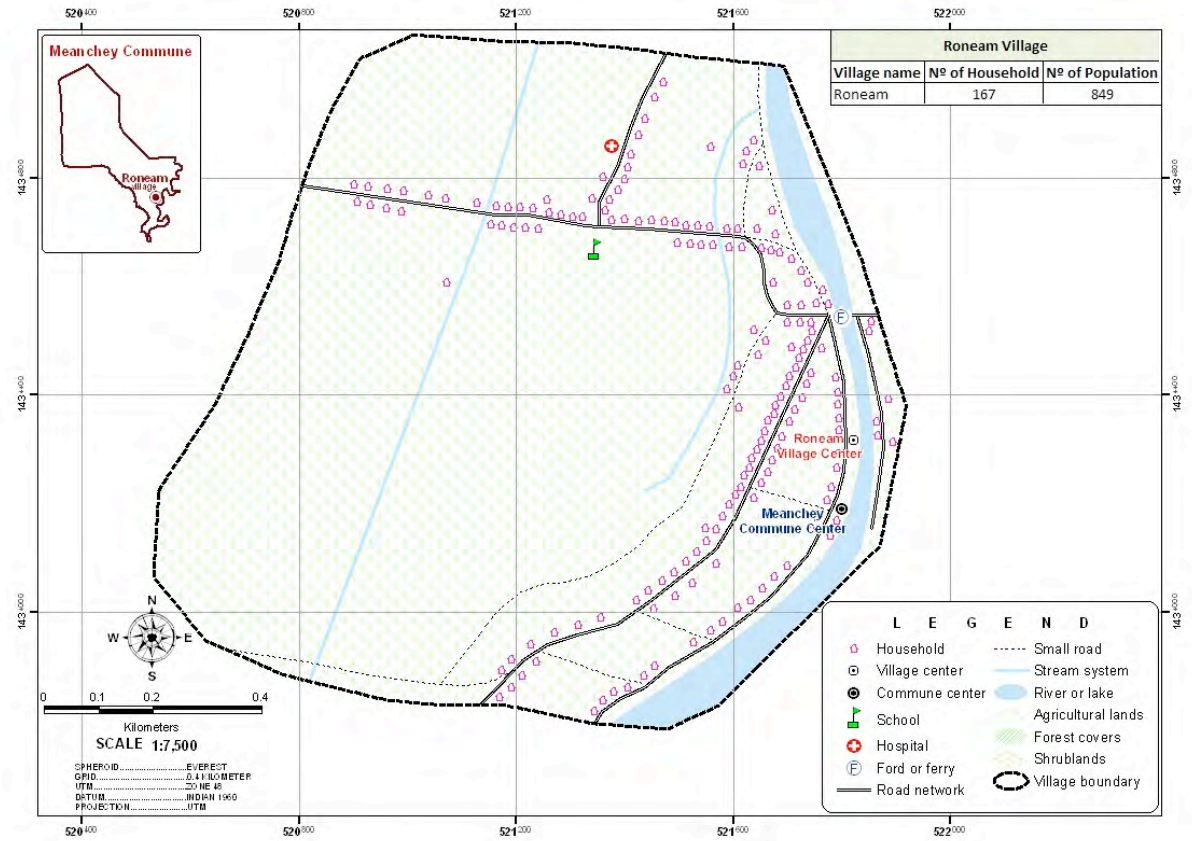


Figure 1: Map of Roneam village, Sandan district

**1.4 Natural risks**

The main risks are related to climatic events (flood and drought), insect disasters and diseases that have impact on harvests and livestock.

## 2- Socio-economical analysis

### 2.1 Economic activities

The main economic activity in the targeted villages is **agriculture** (rice, corn, cashew nut, etc.), **stockbreeding and fishing**. There are some **tourism** activities in Prasat Sambour district, where are located pre-angkorian temples.

In Sandan district, two villages (Chheu Teal and Roneam) have a local market, which supplies shops in the area.

The following activities can be found in the targeted villages:

- Shops and groceries,
- Restaurants,
- Rice mills and agricultural products transformations units,
- Micro-credit organizations,
- Battery charging stations,
- Repairing shops and handicrafts.

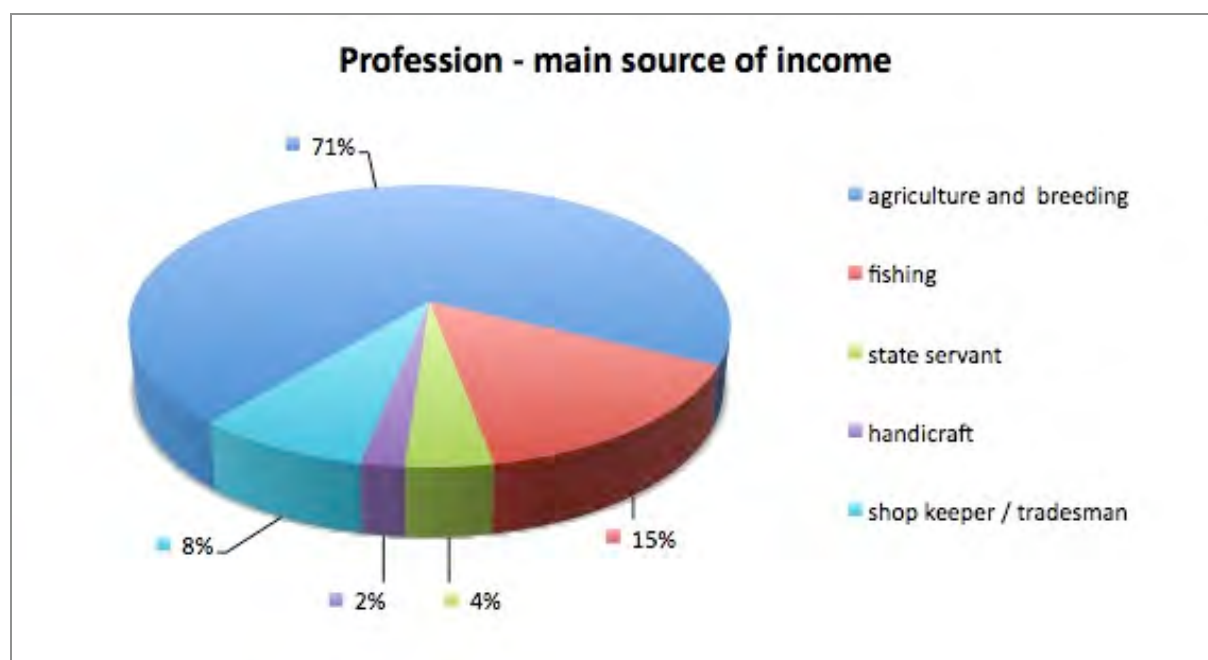


Figure 2: Profession of the targeted population

### 2.2 Housing conditions

The type of houses can be described by three categories:

Details	Type of Roof	Type of walls	Nber of rooms	% of HH
<b>Good houses</b>	Tile	Wood or cement	3-4	43%
<b>Average houses</b>	Tile or zinc	Wood	2	35%
<b>Poor houses</b>	Thatch or zinc	Thatch	1	22%

Table 3: Housing conditions

Each house is composed of two rooms on average.

### 2.3 Expenses of the families

The distribution of the families' expenses is shown with the diagram below:

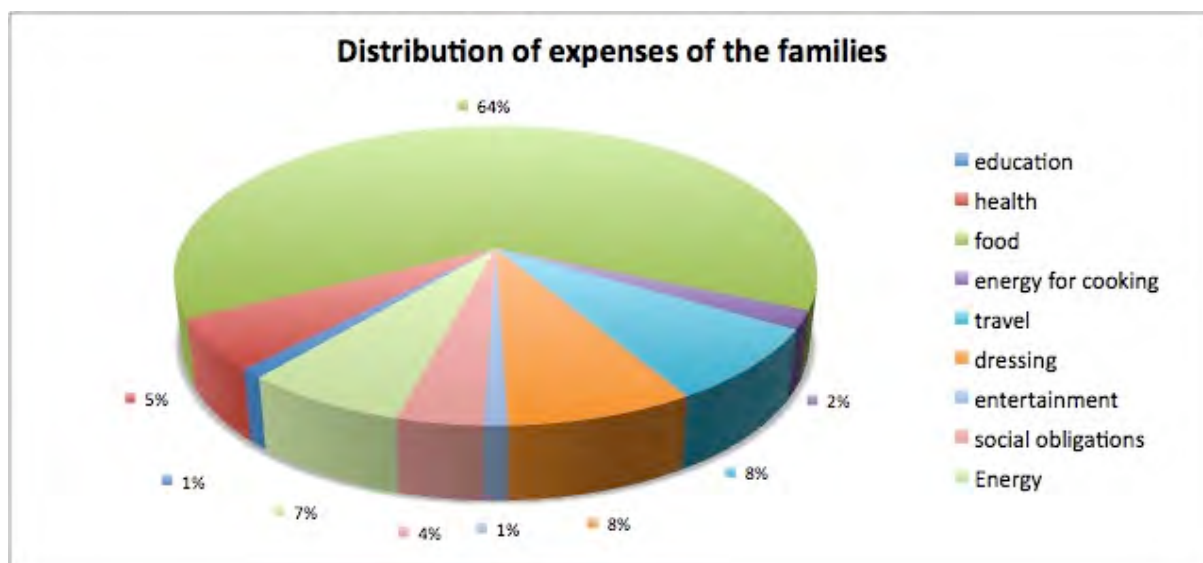


Figure 3: Distribution of the families' expenses

On average, each family spends **428,000 Riels** per month, that is to say **107 USD**. The highest expense for the family budget is for buying food: it accounts for 64% of the total expenses.

There is no monthly expense for renting the house or buying water: people own their house and the use of wells is usually free of charge.

School is free of charge, which explains the low amount dedicated to education.

**64% of the interviewed households can make savings** each month. This amount is saved mainly to renovate the house, buy land, extend a business, for the studies of the children or in case of unexpected difficulty.

### 2.4 Period of economic difficulties

The main period of ceremonies are Khmer New Year in April, Prachum Ben's celebration (Ancestors' Day) in September and Water Festival in November. Nevertheless, there is no de-capitalization of the households for these events: they don't go into debts at these periods.

Less than 30% of the families meet economic difficulties during the period before the harvests. This period lasts on average **2,5 months**.

### 2.5 Access to financial mechanisms

There is an ACLEDA bank office in Kraya Cheung village (Prasat Balangk district) and an office of World Vision association in Roneam village (Sandan district). These two organizations provide micro-loans to the population of the surrounding villages. CODEC organization is also present in Prasat Balangk district. In Prasat Sambour, World vision is providing micro-credits, but has no office in the targeted villages. There are also some cooperatives at the villages scale to provide micro-fund for breeding or agriculture.

Approximately **5% of the families are customers to a Micro-Finance** organization.

### **3- Access to social infrastructures**

Within the 27 priority villages, there are 18 primary schools and 10 secondary schools. School enrolment rate of children in the province is **97%**.

**6 villages have a health center** and there are pharmacies in 9 villages.

There are also 12 pagodas and 8 commune offices.

Access to water is not difficult in the targeted villages, with well and rivers, excepted in April during the dry season.

### **4- Socio-economical context**

#### **4.1 Local authorities**

In each village, there are two types of local authorities: the commune chief represents the Government, and is in charge of the management and development of the commune. The village chief has to implement the decisions of the Commune Chief at the village scale.

The whole population is Cambodian and practice Buddhism. Some people (approximately 5% of the population) can speak English.

Generally, no conflict occurs in the villages excepted rare territory conflicts.

#### **4.2 Community organizations**

There are relatively few local associations in the targeted villages. This is due to the recent history of Cambodia during the Khmer Rouge regime and the reluctance of Cambodian people to gather in groups.

Nevertheless, there are some associations for pumping irrigation, forestry and agricultural cooperatives in the three areas that are successful and demonstrate the possibility of the population to work collectively and manage a project.

#### **4.3 Development projects**

Some development programmes, carried out by national and international organizations, are in progress in the targeted villages:

- Development of infrastructures: roads rehabilitations, water drainage, collection of rainwater, pure water access and toilets constructions with World Vision, ADB, GTZ, Department of Rural Development;
- Agriculture and stockbreeding: trainings and supply of new species, improvement of rice cultivation (World Vision and GTZ), micro-loans and agricultural banks (CODEC, cooperatives);
- Health improvement: medicines supplies, health education programmes, with GTZ and World Vision;
- Human rights and psychotherapy following family violence with JSAC.

These operations are welcomed by the population, who takes an active part in their fulfillment.

#### **4.4 Craft industries**

The most widely spread craft activities in the targeted areas are the making of wooden furniture, tailors, weaving of mats, making of jars and work on iron (making of knives and axes). These activities hire on average two persons.

## 5- Energy context

### 5.1 Overview of the energy situation

2% of the interviewed households use a **diesel generator** for their electricity supply, while **72% use rechargeable batteries**, which is in accordance with the national average.

50% of the non-domestic users use a diesel generator for running their business, which shows the important need of electricity for the development of activities generating incomes. However the increase of oil prices has a huge impact on the revenues of these economic actors: they spend on average **262 000 riels per month for diesel**, which is to say **65 USD**.

Health centers usually use gas for the refrigeration of the vaccines and the sterilization, and rechargeable batteries for lighting.

Primary schools have no access to electricity and only some secondary schools use rechargeable batteries for lighting and tape recorder.

There are shops in all villages with available low consumption lamps, radio, television and rechargeable batteries.

The presence of battery charging stations, engine repairing shops and large rice mills in the village, is an indicator of the presence of technical competencies to operate electricity systems.

### 5.2 Traditional energy uses

Almost all households use petrol oil for lighting at night-time. **75% of them use dry batteries** to supply an electric torch or a radio.

The majority of the population use rechargeable batteries that they bring to the **charging station 6 times per month** on average. The batteries are used to supply DC appliances: mainly lamps, televisions (black and white).

The durations for lighting are approximately **3 hours per day**, early morning (between 4h and 6h) and between 19h and 22h at night-time.

	Petrol lamp	Dry batteries	Rechargeable batteries	Diesel generator
% of Households using	91%	75%	72%	2%
Consumption per week per family	0,45 l	0,9 battery	1,1 recharge	0,13 l
Unit cost	5364 riels/l 1,34 \$/liter	660 riel / battery 0,17 \$/unit	2400 riel / charge 0,6 \$/charge	5000 riel/liter 1,26 \$/l

Table 4: Traditional energy uses

### 5.3 Traditional expenses for energy

The average amount spent by the families for energy is **28, 700 Riels/month**, which is to say **7.2 \$/month**. This amount represents 7% of the total monthly expenses of the families.

In each priority zones:

	Prasat Sambour	Prasat Balangk	Sandan
Traditional energy expenses in riel/month	20,200 Riel	26,100 Riel	37,400 Riel
Traditional energy expenses in USD/month	<b>5,05 USD</b>	<b>6,5 USD</b>	<b>9,35 USD</b>

Table 5: Traditional energy expenses in the three priority zones

However, the following graph shows that the majority of the population (64 %) spend between 2,5 and 9\$ per month for energy expenses.

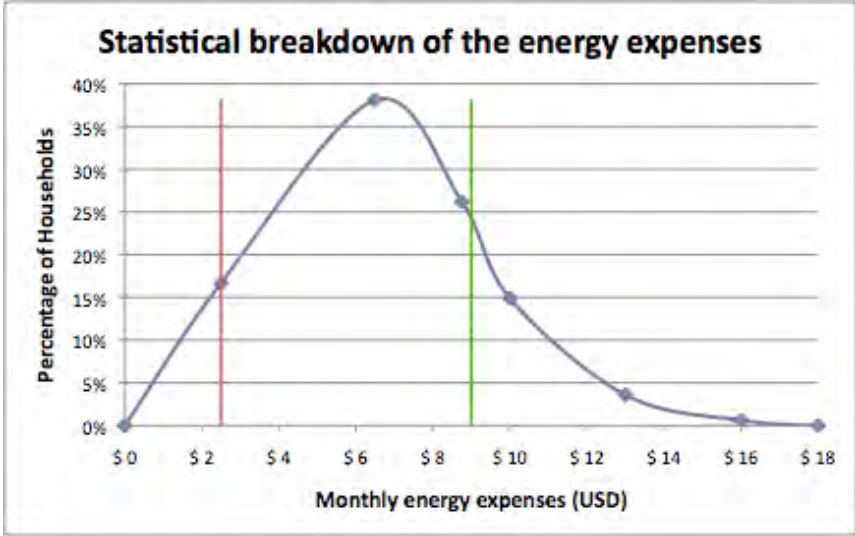


Figure 4: Statistical breakdown of the energy expenses of the households

This shows that energy is an important issue for the interviewed households and that they have a **relatively high capacity to pay an electricity service**, which would substitute the use of rechargeable batteries, petrol lamps and diesel generators.

5.4 Energy demand

During the surveys, the energy demand of the households and typical non-domestic users has been analyzed.

The type of appliances and their number has been reported, together with the duration of use per day of each appliance. For households, electricity would supply in priority lamps, radio and color TV. Considering lighting, the average number of lamps demanded is 1,8 and the average duration of use is 2,9 hours per day.

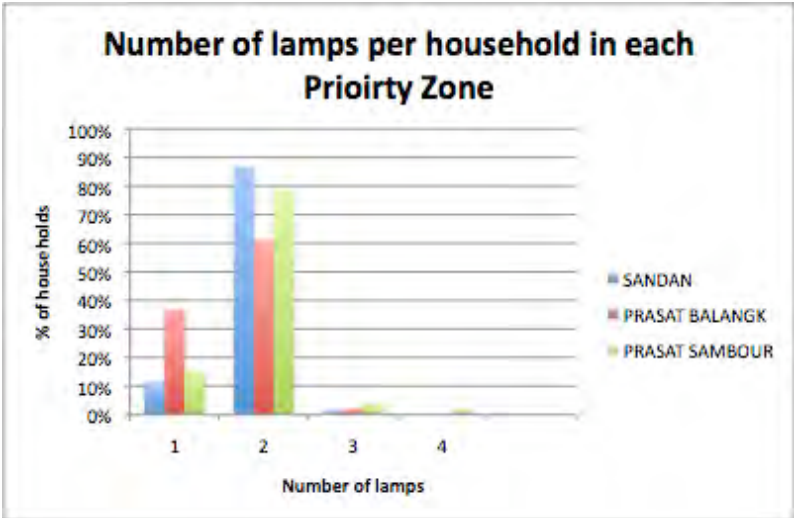


Figure 5: Number of lamps per household

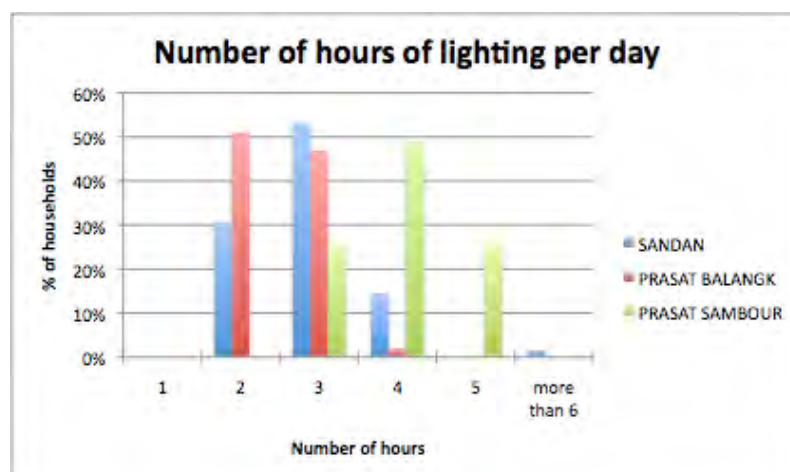


Figure 6: Number of hours of lighting per day per household

The analysis of the current energy uses for lighting (petrol lamps, rechargeable batteries), crossed with the survey results shows that the usual period of use are mainly at night time, between 18h and 22h, and in the early morning, between 5h and 6h.

Considering the other appliances asked by the interviewed households, the following table summarizes the average data obtained:

	Average number per household	Average duration of use per day	Period of use
Radio	0,13	1,45	Early morning Midday Evening
Tape player	0,1	0,6	Midday Evening
Color TV	0,8	3,1	Midday Evening
VCD or DVD	0,6	1,3	Evening
Fan	0,03	0,07	Midday Evening

Table 6: Analysis of the energy demand

### 5.5 Willingness to pay electricity

The surveys on the willingness to pay connection fees and monthly fees gave the following results:

	Prasat Sambour	Prasat Balangk	Sandan
Average connection fees that households are ready to pay in one or two times to get electricity	124,000 riels 31 USD	96,000 riels 24 USD	102,000 riels 25.5 USD
Average monthly amount that households are ready to spend for electricity	17,800 riels 4.45 USD	26,000 riels 6.5 USD	30,000 riels 7.5 USD

Table 7: Willingness to pay connection fees and monthly fees

These figures are lower than the traditional energy expenses, because the interviewed households had usually no precise idea of the amount spent for energy each month.

This also indicates that the first expectation of the interviewed households with access to electricity is to reduce their energy bills each month.

## **6- *Support of local authorities for electrification projects***

Village, commune and district authorities consider electrification as a key factor for the socio-economic development of their locality. The access to electricity for households, health centres and schools is the authorities' priority. Electricity for irrigation is also important, especially in Sandan district.