

# Lao Institute for Renewable Energy



Biomass

Gasification

Technologies



## Field Visit to Khammouan and Borikhamxai, 3-6 June 2008

Report series # 2

**Sugandha P. Gurung**

Vientiane

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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 Laos. 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.

## Acknowledgments

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ສູນຄົ້ນຄ້ວາ - ທົດລອງວ້ານພະລັງງານທົດແທນ

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*Thai-Lao Road, km3,  
Wattnak village, Vientiane, Lao PDR  
P.O. Box 9077*

*Tel: +856 21 353 430. Fax: +856 21 314 045.*

*Email address: [contact@lao-ire.org](mailto:contact@lao-ire.org).*

*Web-site: [www.lao-ire.org](http://www.lao-ire.org)*

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## Abstract

Rice mills were approached in two provinces of the Lao PDR to determine the viability of using rice husk as a feedstock to an industrial sized biomass gasifier to provide for local electricity needs. The study revealed that only one large mill already connected to the national grid could provide enough rice husks to supply a 200kW gasifier, and off-grid mills are typically much smaller. Alternative feedstock should be considered in a subsequent study.

## 1. Introduction

A team of representatives consisting of Mr. Rene Magermans from ETC Energy ([www.etc-energy.org](http://www.etc-energy.org)), Mr. François Guégan (LIRE), Ms. Nana-Sounaly Somany (LIRE) and Ms. Sugandha Priyadarshani Gurung from ETC/LIRE visited districts in Khammouan and Borikhamxai provinces from the 3<sup>rd</sup> of June 2008 to the 6<sup>th</sup> of June 2008.

## 2. Objective

The objective of the field trip was to check on the practice of rice milling and to identify rice mills with available rice residue (rice husks) in sufficient proportions to power an industrial sized gasifier for the purpose of electrification (200 kW).

The criteria for interviews during field visit included capital and production capacity of the rice mills. The main objectives of the interviews were: (i) to understand the milling industry by having direct contact with entrepreneurs; (ii) to investigate the possibility of using the biomass left over after milling (rice husks) in order to implement a gasifier capable of supplying energy to the mill or any other adjacent industry in the vicinity.

## 3. Methodology

### 3.1. Groundwork

The main sources of information for this visit were set to be interviews and field observation. A questionnaire was hence prepared in both English and Lao in order to interview entrepreneurs. The necessary documents required by the Lao authorities to allow visit and data collection were then prepared for each district.

### 3.2. Field visit

The visited sites were Thakhek district of Khammouan province and Pakxanh district and Thaphabath district of Borikhamxai province. The respective district administration offices provided a list of rice mills against which sites were selected for the visit. Each mill's owner was interviewed in the presence of an officer from the district administration. The people interviewed during the field visit are listed in table 1.

**Table 1** List of people interviewed

SN	Interviewee	Occupation	District	Village
<i>Khammouan Province</i>				
1	Mr Boneta Boutsabang	Director, Provincial office of the Ministry of Energy and Mines	Thakhek	Thakhek
2	Mrs Watsana Photilak	Rice miller and trader	Thakhek	Thakhek
3	Mrs Wanh Saiyabom	Rice miller	Thakhek	Nongboua
4	Mr Ngor Xaiyavong	Rice miller and entrepreneur	Thakhek	Phonyhianoy
<i>Borikhamxai Province</i>				
5	Mr Boualy	Rice miller	Pakxanh	Hong Xay
6	Mr Saypasa Sil Sam Wanh	Rice miller	Pakxanh	Ban Na Som Moh
7	Mrs Sisamonh Lunsavaanh	Rice miller	Pakxanh	Phonsaath
8	Mr Ot Sarivisa and Mrs Leng	Rice miller and entrepreneur	Thapabhat	Ban Na Xay
9	Mr Thongdeng Pithak	Farmer and rice miller	Thapabhat	Ban Thouai

*The profiles of the people interviewed during the visit are included in the appendix.*

## 4. Technical Background

### 4.1. Technical potential for biomass gasification

The type of biomass, efficiency of technology, load pattern and the operating time determine the amount of biomass required for the gasification process. In the case of rice husks, the specifications of the biomass gasification model of Ankur Scientific shows that around 1.8 kg of air-dry rice husk per kWh<sup>-1</sup> is required (Smits and Rietzler, 2008). In neighbouring country Cambodia, SME Renewable Energy Ltd is successfully operating 200 kW dual-fuel biomass gasifiers using around 40-50 tons of rice husk per month (SME, 2008).

In some provinces of the Lao PDR, as in Khammouan and Borikhamxai, farmers produce rice twice a year – wet season rice and dry season rice (irrigation). In Borikhamxai province, year 2000 statistical data on harvested rice in Laos show 25,000 ha of wet season rice and 4,310 ha of dry season rice. Figures in Khammouan are respectively 34,000 ha and 7,770 ha (Linquist and Sengxua, 2001).

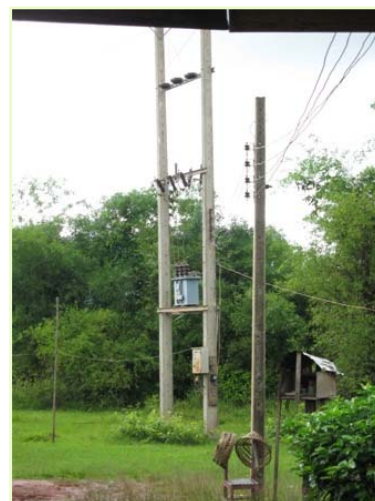
As for the side products generated by rice milling, the Lao National Statistics Centre established in 2004 that their total yearly production amounted to approximately 1,728,150 tons. 37% of this generated residue is rice husk; the rest is made of rice bran and rice straw. In Khammouan province, statistics show that 38,558 tons of rice husks were generated in 2004; 31,770 tons in Borikhamxai. The most rice productive province in Laos is Savannakhet, with 12 % of the total rice produced in the country. Khammouan and Borikhamxai account for respectively 5 and 6 % (Asia Pro Eco, 2006).

## 4.2. Rural electrification status

The flat lands in Thakhek district, Borikhamxai province, accessible from the main road and where most of the rice mills are located are already electrified through the national grid. Similarly, the whole of Pakxanh and Thapabath districts are already connected to the grid. As a consequence, all the rice mills that were surveyed during this visit operate with electricity provided by the national grid.

The Khammouan provincial office of the Ministry of Energy and Mines asserted that all districts in Khammouan province are either already electrified or are in the process of being connected to the grid through the World Bank funded Rural Electrification Project

(REP). Bualapha, Mahaxay and Xaybuathong districts are expected to be connected to the grid by 2012. Xebangfay district is mostly electrified in urban areas. According to the local authorities, the remaining districts in Khammouan province seem to hold more potential for micro-hydropower systems than for biomass gasification technologies.



**Figure 1. National grid infrastructure in the study area**

## 5. Key Findings

### 5.1. The rice milling business

All the rice mills within the study group have specific machinery settings. Some have only the most basic equipment and provide milling services only to neighbouring farmers. Others are of industrial size and are involved in buying rice, stocking it, milling it on demand and sometimes delaying sales to make as much profit as possible following speculation practices. Some operate within a very limited geographical area while others work on a regional scale, buying rice from neighbouring districts, sometimes provinces. Investment volumes vary accordingly, with some entrepreneur having spent as little as 78,000 baht; others as much as 1.2 million baht. All mills received technical support from the national electricity provider EDL (Electricité du Laos) in setting up their installation but all of them had to pay for their transformer (bringing three-phase current to the mill). Minor maintenance and repairs of the milling equipment are usually carried out by the millers themselves.

Most entrepreneurs do not keep books or any sort of accounting records. As a consequence, the financial data they were able to communicate is very approximate and cannot be used to draw a clear financial picture of their business. It is not clear whether this lack of precision is intentional.

Rice millers operate their business according to different rationales and following different practices. Some buy harvested rice, stock it for a while, mill it and sell it together with all the side products, owning everything from buying to selling time. Other millers do not buy the rice and only charge the farmers for their milling services. In such cases, farmers usually bring their own rice to the mill; it is then milled and the miller charges either money or rice (as a percentage of the end product). He also keeps all the side products, the farmers being left only with their milled rice.

In one particular case, the miller had a rice threshing business (where the rice grains are torn from their stalks) for which services farmers would pay a percentage of their harvested rice. After threshing, the miller would keep the rice and sell it to other millers, only milling his own rice (from his 5 rai – 1,600 square meters – plantation) and other villagers' – against a percentage of the milled rice.

## 5.2. Products from the rice milling business

Apart from plain rice grains (on average 59 kg produced with 100 kg of harvested rice), there are generally three other types of materials generated during the milling process, namely broken rice (2 kg), rice bran (the powder produced out of the outer layer of the grain – 15 kg) and rice husk (or rice chaff – 24 kg). In figure 2 the percentage production of each output is averaged for all of the mills in the study group.

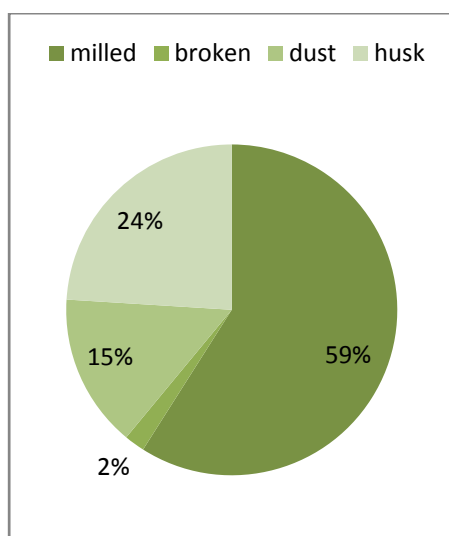
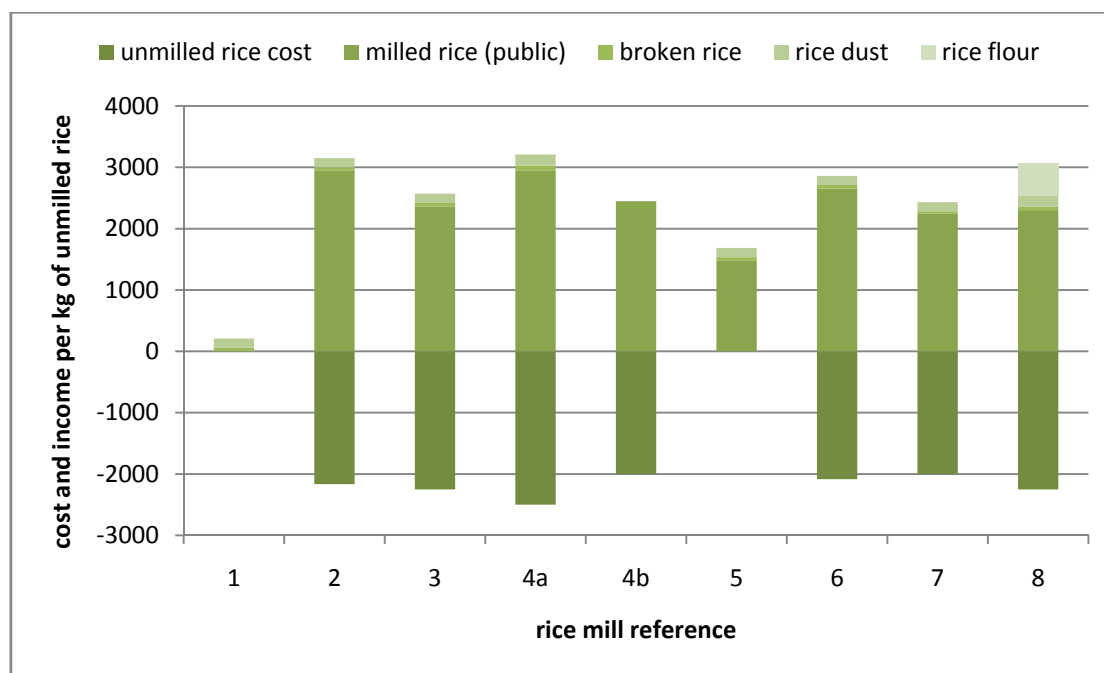


Figure 2 Output from rice milling



Figure 3 Rice husk waste stored beside a mill in the study group

What millers do with these by-products is basically the same in all cases. The broken rice is sold at a cheaper price than plain grains, for household consumption or restaurants (preparing rice soup). The rice bran is sold as feed for chicken and pig at prices depending on the quality. As for the husks, most millers give them away to farmers, mainly for soil fertilization – though a few sell them on the basis of cart loads. In figure xxx the economics of rice milling is summarised for each of the mills in the study group. The mill reference corresponds to the case reports given in the appendix. Reference 4a and 4b refer to two varieties of rice milled at mill 4. In the figure, the income generated from selling milling products is shown per kg of unmilled rice, obtained by applying the average percentages in figure 2 to the individual prices at each mill.



**Figure 4 Individual rice mill economics, including cost of unmilled rice and income from products per kg of unmilled rice. Horizontal axis labels correspond to the case reports given in the appendix**

While rice grains can be sold for as much as 4,500 kip<sup>1</sup> per kilo, broken rice is usually sold for about 3,000 kip and rice bran powder for 1,000 (though in one case, the mill could separate fibre-rich thin powder from bulk powder and prices rose to 2,000 kip per kilo). If not given away, rice husks can be sold to farmers for up to 8,000 kip per cart (approximately 1.5 cubic metres).

### 5.3. Additional practices

Some millers interviewed during this survey also had other businesses besides rice milling. These include: planting rice, producing rice whiskey, raising livestock, running small retail shops or restaurants, producing charcoal or planting rubber.

## 6. Closing remarks

The results of this study indicate that the possibility of setting up a biomass gasification plant operating solely on rice husks in Borikhamxai or Khammouan provinces is minimal. The main argument for this conclusion is that most of the area covered by the two provinces is already connected to the national grid or is in the process of being so. The price of grid electricity being very low, entrepreneurs would have no interest in running their equipment on a power-generating gasifier. Any biomass gasification technology represents a large investment and is then highly demanding in terms of fuel supply and maintenance skills. It is hence hardly competitive compared to maintenance-free grid electricity in the Lao PDR.

<sup>1</sup> 1 USD ≈ 8,700 LAK, source: Banque Pour Le Commerce Extérieur Laos (BCEL), <http://bcellaos.com/>, accessed June 2008,

Subsequently, bringing forward the idea that a gasifier should only be implemented in areas not yet reached by the national grid, a second conclusion comes into view. Since among all the rice mills in this survey only the largest one in Thakhek is in a position to provide enough rice husks to power a 200 kW gasifier, it is certain that the mills situated in remote areas (necessarily smaller), producing less rice husks, are not capable of providing enough biomass to sustain the use of such a gasifier. However, smaller gasifiers (20-30 kW), with lower biomass demands, remain a possibility in areas where grid electricity is not constant or not yet present.

## 7. Recommendations

1. Operating a biomass gasifier on rice husks only seems to be very hazardous in the context of Khammouan and Borikhamxai provinces. In order to keep a constant flow of biomass input into a gasifier, the following alternatives should be considered in future studies:
  - A combo-gasifier using different sources of biomass (wood, corncobs, rice husks) – though the technology is expensive.
  - A dedicated plantation site with fast-growing wood species to be used as feedstock.
  - There is always the option of dual-fuel gasifier operating on biomass as well as diesel fuel.
2. Due to a lack of precise information currently available concerning the needs and abilities of rural communities to accommodate new technologies, it would be prudent to select a site near to Vientiane for any future demonstration plant.

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## Appendix: Case Reports

## CASE # 01

Respondent: **Mrs. Hji Xayavong**

Village: Phonyhianoy

District: Thakhek

Province: Khammouan

Interview Date: 4 June 2008



Mr. Hji Xayavong, his wife Mrs. Suy In and their two young daughters live next to the main road 15 km from Thakhek. Mr. Xayavong started his rice milling business three years ago. He received the mill from his uncle who was to retire and did not have any children interested in the milling business. In return he assists his uncle with some financial support.

Mr. Xayavong is a talented entrepreneur. Besides his milling business he runs a charcoal factory, distillates local whiskey, raises pigs, cows and turkeys. His wife has a small shop and she also sells beverages, sweets and noodle soup. They grow their own vegetables

on their property of 1.5 ha. The family has three employees to help them run everything. They make most money in the rice business (70 % of their earnings). For the transport and installation of the rice mill from his uncle's to his place and for the housing of the installation, Mr. Xayavong invested 300,000,000 kip. Of this investment, the three-phase connection to the grid cost 180,000 baht.



Over the last three years, the learning curve in the rice business has been steep. Whereas in the beginning Mr. Xayavong bought rice that was grown in the rainy and dry season, he now only buys rice from the rainy season. The quality of this rice is much better. It does not break as fast and is less vulnerable to mould. He refrains from buying the rice too quickly after the harvest, and thus saves 2 % in loss

of weight due to the drying of the rice. His rice buying period is limited to November-January. Afterwards he stocks his rice and waits until the price increases (to a level he is able to make profits) before milling. He has calculated that he needs at least 4,000 kip to break even and therefore waits until the price rises to 4,200 kip, which he says usually happens in September.



Rice product	Laos name	Reference weight	Price/kg (kip)
Unmilled rice	<i>Khao Puak</i>	168 kg	2,250 LAK (buying)
Milled rice	<i>Khao san</i>	100 kg	3,900 LAK
Flour	<i>Ham Peng</i>	8 kg	2,200 LAK
Rice dust	<i>Ham</i>	8 kg	1,200 LAK
Broken rice	<i>Khao Pai</i>	10 kg	2,800 LAK
Rice husk	<i>Kep</i>	42 kg	10,000 LAK per 1.5m3

Nowadays farmers call him from Thakhek whenever they want to sell their rice. They organise themselves and make sure that they have three tons of rice ready to be loaded – the size of the truck. Mr. Xayavong goes as far as 30 kilometres to load his truck. Transport only costs him about 100,000 kip per trip.

After keeping the rice, he mills and sells it to traders at the Thakhek market. The mill has a maximum processing capacity of 150 tons a month. He only uses it for a maximum of 90 tons a month and operates it for about 20 to 25 days. He currently has a stock of about 60 tons, ready to mill and sell. When he has more money available, he will buy more to stock until September.

Mr. Xayavong is complaining about his electricity bill. It became higher after he received a new meter (“compteur”). In his shop and in the house, they have two fridges, TV, stereo and 5 fluorescent lamps. His bill usually revolves around 400 to 500,000 kip a month. This amount doubles during the milling season.

1 kWh in 2008: 616 LAK

Average use in Oct-July: 700 kWh

Average use in Aug/Sept: 1,400 kWh

## CASE # 02

Respondent: **Mrs. Watsana Photilak**

Village: Thakek

District: Thakhek

Province: Khammouan

Interview Date: 4 June 2008



Mrs. Watsana Photilak is running the biggest mill in Thakhek district called the “Sayfon mill”. There are two of big trucks (25 tons) parked in the hangar next to the mill. She is running the business with the help of her children since her husband passed away five months ago. He was a much respected man and his funeral was held in Vientiane with senior officials present.

Her husband had started the business of rice milling in 1992 after realizing that there was no one with the capacity to go to the producers in the villages and bring the rice to town. Thakhek was in need of such a capacity and the local administration suggested that he take up the business. He invested 1.2 million baht. At the time, the Lao Government had quotas according to which rice producers had to sell, at a certain price, part of their production, a rule he complied with for a year, when quotas were abolished.



Before her husband passed away, Mrs. Watsana says that her mill was producing an average of 1,000 tons a year, most of it being sold to the army in Vientiane and Borikhamxay. Now the family is trying to catch up with the running of such a business. Mrs. Watsana says that the mill produces up to one ton per hour, with working days of eight hours (eight tons a day). She does not open the mill for half a day or two hours of milling. Some weeks, she just works a few days, only full days.

She buys the unmilled rice in Savannakhet province as well as in Xebangfay district in Khammouan province. Sometimes her trucks go as far as 70 kilometres to load rice. The people she buys her rice from live in about 70 different villages. She has contracts with them (usually ten households are grouped in one contract) and arranges transport. She also buys rice from people who come directly to the mill. She buys unmilled rice at two different prices according to grain size and quality and she also buys rice already milled, only of superior quality, at a higher price. She buys unmilled rice in bags of 30 to 35 kilos for 73,000 kip. The reference weight is 12 kg, at 25,000 kip. Watsana was not able to say how much, in percentage, of unprocessed rice can produce white rice.

Rice product	Price/kg (kip)
Unmilled rice (bought)	25,000 per 12 kg
Milled rice	3,800-4,500
Broken rice	2,800
Rice dust	1,000
Rice husk	7,000 per cart

Her monthly electricity bills reach eight million kip when production is high and fall as low as three million kip in low activity periods. Her mill features two engines to run the belts, totalling 45 kW (30 +15).

## CASE # 03

Respondent: **Mrs. Wanh Saiyabom**

Village: Nong Boua

District: Thakhek

Province: Khammouan

Interview Date: 4 June 2008



Mr. and Mrs Saiyabom operate a rice mill on the side of the road, 12 kilometres from Thakhek. They have a little shop selling a few things. She used to sell clothes at the market; her husband sometimes helped her. They have three daughters and three sons. One daughter is living and studying in Vientiane, the other two are helping the parents. One of them has married, but her husband is never here; they all look after the 2 year-old granddaughter. One son is driving the truck transporting the rice, one is working at the market to sell the rice; the last one is working at the provincial department of Energy.

They started operating the mill in 2003 following the idea of their son working in the administration. They buy their rice in Savannakhet province, as far as 70 kilometres, because the rice in Khammouan is “does not look good”. One son travels once a week to the producers and loads his Hyundai truck with four tons of rice. Last May he went twice, in June once. He usually goes three times a month for two months after the harvesting season – a total of twelve trips a year or 48 tons of unmilled rice.



Rice product	Reference weight	Price/kg (kip)
Unmilled rice	190 kg	Bought 1,700-2,400
Milled rice	100 kg	3,500-3,800
Broken rice	5 kg	2,000
Rice dust	20 kg	1,000
Rice husk	65 kg	8,000 per cart

The rice is piled up in 125 bags of 30 to 35 kilos each. The reference for weighting is 12 kilos – bought for 21,000 to 24,000 kip. Farmers who bring rice on their own can sell it at a higher price, since there are no transport costs, at about 1,900 kip

per kilo (when transport costs are included, rice is bought from 1,700 to 1,800 kip). Rice from the rainy season is bought at a higher price (28,000 kip for 12 kilos, or 2,400 per kilo). They mill upon order, when the market calls them.

The building itself cost 200,000 baht to construct. Mr. and Mrs Saiyabom say they bought a 100-kVA transformer for about 250,000 baht, plus 20,000 baht for connections. The mill cost 152,000 baht. Their electricity bill was 870,000 kip in May 2008. The bill reads 1,316 kWh at 616 kip a unit. They do not keep books, but still say it’s a good business.



## CASE # 04

Respondent: **Mr. Boualy**

Village: Hongxay

District: Pakxanh

Province: Borikhamxai

Interview Date: 3 June 2008

Mr. Boualy (50) lives with his two daughters in Hongxay village of Pakxanh district in Borikhamxai province. He invested approximately 600,000 baht (400,000 in a transformer, 100,000 in a rice mill and 100,000 in other items such as housing and wiring). He uses 3-phase electricity. Mr. Boualy is proud on his milling equipment because it is good quality from Thailand whereas most millers in remote areas have generators and milling equipment from China. He was a civil servant and worked as an accountant before he started his milling factory two years ago. He does not keep his books.



Mr. Boualy's clients are farmers of his village, of 640 households. Before he started his mill the villagers went to another mill in his neighborhood. The farmers in his village have two rice crops a year, once in November and once in April. They dry and store the rice in their own house and bring it little by little to the mill. On average he gets 10 clients a week with 2 bags of 35 kg each.

When asked about the source of his income, Mr. Boualy answers that for each 32-35 kg bag of rice he mills he charges 1,000 kip to the farmers. The latter keep the rice and Mr. Boualy the side products. The rice husk is piled up at the back of his house and sometimes used as fertilizer. He indicates to have an income of about 50,000 kip per day from his business. Mr. Boualy is really committed to his job and only takes a day off twice a lunar month. Next to the rice Mr. Boualy keeps some chicken, turkeys, and geese and next to his house he keeps a fish pond with catfish, all for his own consumption.

Rice product	Reference quantity	Price (kip)
Unmilled rice	Bag	1,000 for milling
Milled rice	20 kg	-
Broken rice	0.5 kg	Sold 3,000 per kg
Rice bran	7 kg	Sold 1,000 per kg
Rice husk	4-8 kg	No charge

The average electricity bill is about 350,000 kip per month for both his house and business. However he showed an example of a bill stating 500,000 kip. Further to the 18,5 KV engine to power the mill, he uses a small water pump to irrigate his garden, he has a color TV, karaoke, radio, refrigerator, mobile phone, around 6 fluorescent lamps and his daughter had a laptop. Mr. Boualy's wife is living in the USA and his son is in the army.

## CASE # 05

Respondent: **Mr. Saypasa Sil Sam Wanh**

Village: Ban Na Some Moh

District: Pakxanh

Province: Borikhamxai

Interview Date: 5 June 2008

The mill owned by Mr. Khamphou (74) is in Ban Na Some Moh village, 8 km away from the Pakxanh. Mr. Khamphou started his business in 1999. Before that he used to sell rice at the local market. The investment for the rice mill was about 330,000 baht for the 35kW engine mill, 150,000 baht for the transformer (100 kVA) and 40 million kip for the building. The mill is now run by his daughter Mrs. Noy (27) and son-in-law Mr. Saypasa (30). Mr. Saypasa also works at the Provincial Department of Energy and Mines.



They buy rice to farmers within the district, at a maximum distance of 30-40 kilometres. They have no contract with the villagers. The only contract they have is to the army, at 30 tons a year. 90 % of the rice they buy is rainy season rice (harvested in December) and 10 % is dry season rice (harvested

in May). From December to March, they go to the farmers to buy rice with their Hyundai truck very often, even everyday in December and January, up to two tons a day. Until March, this decreases gradually, at about 2 tons a week. As farmers keep their rainy season rice in stock, they still go to buy rice later on, but only occasionally, depending on orders.



Rice product	Unit	Price/kg (kip)
Unmilled rice	1 kg	Bought 2,166
Milled rice	1 kg	Sold 5,000 (local market)
Broken rice	1 kg	Sold 2,500
Rice bran	1 kg	Sold 1,000
Rice husk	Cart	Given away

They mill approximately 250 tons per year, usually once a week, at a rate of 4 tons a day (5-6 hours of work). The market usually orders 7 tons at once, which can be milled in roughly 2 days. They buy rice at 2,166 kip a kilo and sell it at different prices: to the army, 3,800 kip; to the market, depending on prices, up to 5,000 kip. They do not sell the rice husk; farmers come to pick it up

themselves to use it as fertilizer on their field. In the house, they have three fans, a TV, a karaoke-VCD player, a fridge, a motorbike, a tuk-tuk and a small truck (Hyundai). Their electricity bills range from 300,000 to 700,000 kip depending on milling activities. Mr. Saypasa mentions that the price of electricity is going down every year. In May 2008, their electricity bill for business alone was 616,000 kip.

## CASE # 06

Respondent: **Mrs. Sisamonh Lunsavanh**

Village: Phonsaath

District: Pakxanh

Province: Borikhamxai

Interview Date: 5 June 2008

Mrs. Sisamonh Lunsavanh lives with her husband, son, daughter-in-law and grandchild at Phonsaath village in Pakxanh. She runs a rice mill along with raising some chicken and goats. She started her first milling business in 1990 as the first milling business in Pakxanh. She gave her first rice mill to her younger brother and she is now operating a second rice mill at Phonsaath village. Her investments in the present mill include: 220,000 Baht for the transformer (including poles and wires), 250,000 Baht for the mill, 150,000 Baht for the building/infrastructure and 4,600 US dollars for the small Hyundai truck that she bought in year 2002. There was an additional expense of 80,000 Baht for the poles and wiring, as the one installed in the beginning broke down.



She says that the milling business is now expanding and there are at least 2 to 4 rice mills per village in Pakxanh district. She also informs that there are few small rice mills in off-grid areas that are operating on diesel generators. Apart from working herself in the mill and with her daughter-in-law helping her, she also employs 4-5 workers 200,000 kip per month.

Mrs. Lunsavanh buys rainy season rice only. She used to have people send the harvest to her, but now she drives a small Hyundai truck with a maximum load of 3 tons. She only travels up to 15 kilometres to the farmers. She buys rice all year round and usually has a stock of 20 to 30 tons. Altogether, she buys approximately 500 tons of rice to mill each year. From December to February, people usually come to the mill themselves to sell her their production. She sells milled rice the Lao army, to Vietnam and the local market. The rice husk is given away to farmers who use it as fertilizer.



Rice product	Reference quantity	Price/kg (kip)
Unmilled rice	100 kg	Bought 2,000-2,500
Milled rice	60 kg	Sold 4,000 (Vietnam and local market) Sold 3,850 (Army)
Broken rice	2 kg	Sold 3,000
Rice bran	38 kg	Sold 1,000

Every year she sells 100 tons of milled rice to Vietnamese traders (just before Tet, the Vietnamese New Year). The traders come themselves to collect the rice at the mill. She sells 50 tons to the Lao Army and the rest to the local market. The bags she uses to pack the milled rice are bought for 2,000 kip.

Mrs. Lunsavanh complains a little bit about her electricity bills. She only uses a 30 HP engine and paid 1.7 million kip last December and February. The rest of the year, bills revolve around 700,000 kip. Even though competition has increased in the rice milling business over the last few years and the fact that she does not keep her books, she believes that giving good price for the rice she buys, together with being respectful and fun to deal with, makes her customers coming back to her.

## CASE # 07

Respondent: **Mr. Sarivisa and Mrs. Leng**

Village: Ban Na Xay

District: Thaphabath

Province: Borikhamxai

Interview Date: 6 June 2008



Mr. Sarivisa's rice mill is located in Ban Na Xay village, 10 kilometres away from the district office. Mr. Sarivisa started his business in 2007, until which date he worked with his father at a mill just 500 metres off the main road. His father has been in the business for over 20 years, starting with a 20 HP diesel generator from India – since 1997 his father has been using electricity from the grid. Mr. Sarivisa decided to start a new mill on the road because to make it more accessible. His new mill on now just 15 metres off the main road and is more easily noticeable and reachable.

Mr. Sarivisa buys his rice from farmers in Ban Pak Ngum (about 6 km away towards Vientiane) and from the military unit 202 that is stationed 3 kilometres from the mill. Mr. Sarivisa has two trucks: a Toyota (1 ton load capacity) and a Hyundai (up to 3 tons). Trips to buy rice are organized twice a month. Each time he takes only one truck, either of his, depending on how much he is expecting to buy. He tries to fill the truck as much as possible to maximize fuel consumption. He buys rice all year round because farmers stock their rice all year round, waiting for prices to go up.



The peak period is always practically the same, as farmers sell a lot of their rice just after the rainy season rice (Na Pi) harvest. Mr. Sarivisa says he mostly buys Na Pi rice (75 %) and a little bit of Na Seng (dry season) rice (25 %). He does not know how many tons of rice he mills in a week or month or year. Yesterday, he milled about 10 bags (each 35 kilos). He says the maximum capacity of his mill is 50 bags a day. Mr. Sarivisa does not go anywhere to sell his rice; he sells them directly from his mill.



Rice product	Reference quantity (Rainy season rice)	Price/kg (kip)	Reference quantity (Dry season rice)	Price/kg (kip)
Unmilled rice	150 kg	Bought 2,500	120 kg	Bought 2,000
Milled rice	98 kg	Sold 5,000	66 kg	Sold 4,150
Broken rice	1 kg	Sold 4,000	3 kg	Sold 4,000
Rice bran	30 kg	Sold 1,200	24 kg	Sold 1,200
Rice husk	20 kg	No charge	27 kg	No charge

Mr. Sarivisa sells all his stock in October in order to get ready for the new harvesting season. At the time of visiting, there was about 20 tons in stock in his mill: 12 tons of Na Pi, 8 tons of Na Seng. Mr. Sarivisa keeps books, but has not looked at them yet, or made any analysis based on his transactions.

Mr. Sarivisa built everything he could in his mill on his own, investing a total of approximately 100,000 baht. He says otherwise it would have cost him double the price. The transformer he uses, three-phase current, belongs to the village. He paid only for the "compteur", about 2 million kip.

His mill is powered by a 22 kW engine. His electricity bill, which he did not show us, revolve around 1,000,000 kip a month in busy periods (January and February) and 700,000 kip in quiet months. In addition to this, he pays about 200,000 kip for electricity in his house. Mr. Sarivisa lives with six members of his family, including his wife and two children, his father-in-law and two aunts.

He has a few other businesses after rice milling, though he reckons rice is still is number-one business. In second position comes his shop, selling clothes and minimart-like items, then his rubber plantation, which he expects to be very profitable (he planted 5 rai in 2007 and plans another 7 years before slashing the bark). Mr. Sarivisa and his family also sell noodle soup and coffee; raise 14 pigs and other chickens, plant rice on about 7 rai (a little more than 1 hectare).

## CASE # 08

Respondent: **Mr. Thongdeng Pithak**

Village: Ban Thouai

District: Thapabath

Province: Borikhamxai

Interview Date: 6 June 2008

Mr. Thongdeng (45) lives with his wife Ms Wuon (43), his father in law and five children in Ban Thouai, about 4 km from the main road from Thapabhat to Vientiane. The old truck in front of the house witnesses his activities as a timber transporter in the past. It is only in 2005 that he invested in a rice mill (15 kW). The initial investment includes 300,000 baht for the mill, 6 million kip for the housing, and 15 million kip for the “compteur” and wiring. The transformer he uses belongs to the village.



Mr. Thongdeng explains that he also owns a trashing machine. In December and June he goes to the farmers and their fields up to 3 km from his house and helps them trash their rice. He has about 70 customers. There is only one other person in his village with a trashing machine like his, whereas there are about 7 small thrashers in Ban Thouai. Mr. Thongdeng gets paid in kind for his services. Out of every 15 bags that he processes, he receives one for himself. Altogether, Mr. Thongdeng and his helper earn about 200 bags (35kg each) of good quality Na Pi rice after the rainy season and about 150 bags of Na Seng rice after the dry season.



His trashing clients do not always mill their rice at his place. When they need money, they sell it to traders. Altogether, about 15 to 20 farmers come to have their rice milled at his place. Every day there are about 10 bags of rice to mill. He mills about 24 days a month. When they mill at his place, he does not charge any money but he keeps the broken rice, rice barn and husk.

Rice product	Weight	Price/kg (kip)
Unmilled rice	350 kg	
Milled rice	200 kg	No charge
Broken rice	3 kg	3,000
Rice dust	50 kg	1,000
Rice husk	97 kg	Use in own fields



Aside the services he offers, Mr. Thongdeng owns a 5-rai piece of land that can produce 1.5 tons of rice each year. He sometimes sells this rice for money when he needs it. However, he tries to stock as much as possible so he can sell in September when prices are high. Mr. Thongdeng uses fertilizer, without which he says he would only harvest 1 ton a year. He normally uses two 50kg-bags of NPK (900 baht) along with the rice husks (without rice husks he would need up to 6 bags of NPK). Mr. Thongdeng earns 60,000 kip a day (approximately 8 US dollars). His electricity bills vary between 400,000 and 500,000 kip a month.