



Capacity development and strengthening for energy policy formulation
and implementation of sustainable energy projects in Indonesia

Capacity development and strengthening for energy policy formulation and implementation of sustainable projects in Indonesia CASINDO

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Pro-poor Energy Strategy in Papua

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Preface

This report is deliverable No. 38 of the project ‘Capacity development and strengthening for energy policy formulation and implementation of Sustainable energy projects in INDOnesia (CASINDO)’. The CASINDO project aims to establish a self-sustaining and self-developing structure at both the national and regional level to build and strengthen human capacity to enable the provinces of North Sumatra, Yogyakarta, Central Java, West Nusa Tenggara and Papua to formulate sound energy policies and to develop and implement sustainable energy projects.

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- Indonesian Ministry of Energy and Mineral Resources, Jakarta.
- Muhammadiyah University of Yogyakarta, Yogyakarta.
- Diponegoro University, Semarang.
- University of Sumatra Utara, Medan.
- University of Mataram, Mataram.
- University of Cenderawasih, Jayapura.
- Institute of Technology of Bandung (ITB), Bandung.
- Technical Education Development Centre (TEDC), Bandung.
- Technical University Eindhoven, Eindhoven.
- ETC-Nederland, Leusden.
- Energy research Centre of the Netherlands ECN, Petten.

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Executive Summary

The need for energy is a very basic requirement for human life. All human activity relates directly or indirectly to the utilization of energy. Energy derived from fossil fuels (petroleum), will run out at a certain point. Because of this, the utilization of new and renewable energy becomes very important and will need to be improved and encouraged.

CASINDO, in collaboration with several universities in Indonesia, including the University of Cenderawasih in Jayapura, Papua, has helped facilitate the implementation of new and renewable energy utilization in a target location in Papua. After a lengthy process, it was decided that Enggros village would be the target location for activities in TWG V, in accordance with pre determined criteria. Enggros is a fishermen village located just outside the city of Jayapura, which falls in the category of poor villages and has very limited access to electricity.

Several energy laws and policies of central and local governments have been reviewed to assess their impact on the poor. Many of them claim they aim to accommodate the interests of the poor, but the application and implementation of those programs as they occur in the field, is very far from expectations. Most of the poor in the province of Papua, especially in mountainous and remote areas, still do not have access to any form of electricity. This calls for a more integrated oversight and planning for implementation of all the pro-poor energy policies and programs.

In addition, an energy needs assessment has been conducted in the target location to obtain a first-hand understanding of the energy situation of the poor in Papua province. The data collected showed that for Enggros, the most pressing energy need is energy for lighting and that the best solution to meet this need is with solar home systems.

With regard to pro-poor programs carried out by the Department of Mines and Energy of Papua province, on the whole, they can be considered good enough, but in our view, the post-implementation and evaluation activities could be improved. Furthermore, in some locations where electrical installations have been built, the local community just hopes that the maintenance of the installed electrical equipments, will be carried out by the government. So that ownership of the equipment is very poor. Equipment maintenance costs that were charged to the public, received less serious response from the community itself. This is evident in several areas or villages which have electricity, but people mostly do not pay their electricity bills (*results of surveys and interviews*). It is therefore important, that together with electrical equipment, communities are given training on its operation and maintenance.

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CHAPTER 1. Introduction

1.1 Background

During the period 1987-1997 Indonesia experienced high economic growth rates of on average almost 7 per cent per annum. However, the East Asian economic and financial crises that started at the end of 1997 severely affected Indonesia and resulted in a drop of the value of the rupiah by some 80 percent and a decrease of Indonesian's GDP by more than 13 per cent in 1998. The steeply rising prices for food triggered a mass popular uprising in Jakarta and other regions in Indonesia that eventually led to the resignation of President Suharto in mid 1998. Since then Indonesia has embarked on a process of social, political and economic reforms that are still on going and that are meant to bring about economic growth and a transition to democracy. During the early 2000s the Indonesian economy started to slowly recover from the recession : GDP grew by, on average, 4.8 per cent per annum during the period 2000-2006.

A key component of the political reforms is the decentralisation and regional autonomy that were implemented in 2001 based on the new Law no.22, which was amended in 2004: Law no.32. This law has devolved almost all powers and responsibilities from the central government to the local government (except for sectors such as defence, foreign policies, justice and monetary policy), including responsibilities for energy sector development. This means that regional governments are now responsible for formulating their energy policy and, consequently, must reform their institutional structure and strengthen their human capacity to be able to carry out this new responsibility.

The new energy-related responsibilities for the regional government are also clearly expressed in the new Energy Law (Law no. 30/2007) that came into effect in August 2007. The new law stipulates that the local government will formulate their regional energy master plan, based on the national energy master plan, and develop regional regulation for the implementation of the plan. The new Energy Law also stipulates the establishment of the National Energy Council, which will be responsible for the development of the national energy master plan, involving the participation of regional and local governments.

The decentralisation process, however, appears to be a difficult and time-consuming process. The regional political institutions are weak and poorly organised because they have been left out of the political decision-making process for the last three decades. Many regions also lack sufficient technical and analytical capacity to conduct energy policy analysis and develop energy supply projects. This is seriously hampering the regional energy sector development and is further compounded by the current energy crises in Indonesia caused by the high world crude oil prices, insufficient investments in expansion of supply capacity over the past 10 years and regulated energy prices. As a result, regions are now experiencing power interruptions and load shedding and find it increasingly difficult to meet the growing energy demand.

Regions are very well aware of the importance of a sufficient and reliable energy supply for regional economic development in general and the alleviation of poverty in particular. Therefore, regions have requested the central government for assistance in formulating and implementing their energy policies. *Capacity development and strengthening for energy policy formulation and implementation of Sustainable energy projects in INDOnesia (CASINDO)* programme aims to provide this assistance through developing institutional and human capacity that will enable the regions to develop sound energy policies and implement sustainable energy project.

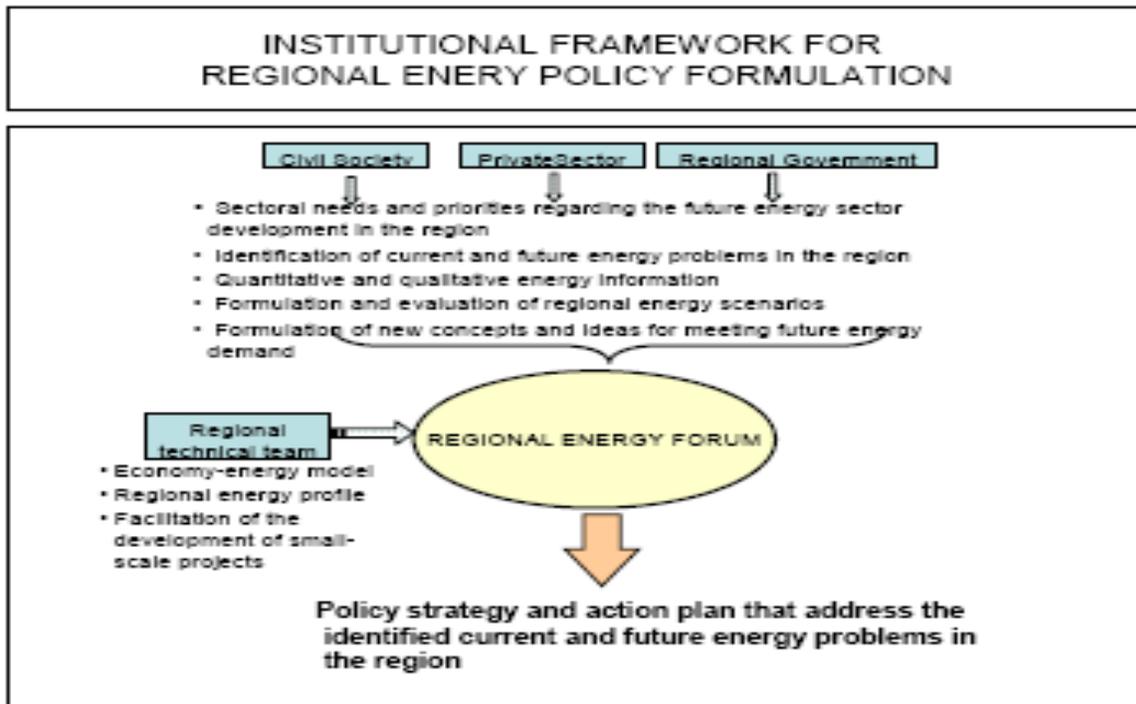


Figure 1.1 : Schematic overview institutional framework for regional energy policy formulation

1.2 Overall objective and expected impacts of the CASINDO programme

The overall objective of the CASINDO programme is to establish a self-sustaining and self-developing structure at both the national and regional level to build and strengthen human capacity to enable the provinces of North Sumatra, Yogyakarta, Central Java, West Nusa Tenggara and Papua to formulate sound policies for renewable energy and energy efficiency and to develop and implement sustainable energy projects. Sufficient technical and analytical human capacity is a precondition for the target provinces to be able to link energy provision to local economic development planning, to develop and implement energy policies and to establish energy businesses. Furthermore, it must be recognized that capacity building is an on-going requirement and that therefore strong institutional government structures are needed to ensure that a sufficient level of capacity and knowledge among local policy makers, entrepreneurs, universities and technical schools can be maintained also in the longer term.

Furthermore, the energy policies formulated and implemented by regional governments must be in line with the national energy policy framework. Therefore, the CASINDO programme will also focus on the development of human capacity at national government departments and

agencies, in particular at the Ministry of Energy and Mineral Resources, to ensure that good communication channels can be established between national and regional policy makers and to facilitate the dissemination of the CASINDO results to other provinces. Within the overall objective, special attention will be paid to the energy needs of poor people who currently have no access to modern forms of energy and still rely to a large extent on traditional biomass for meeting their energy needs.

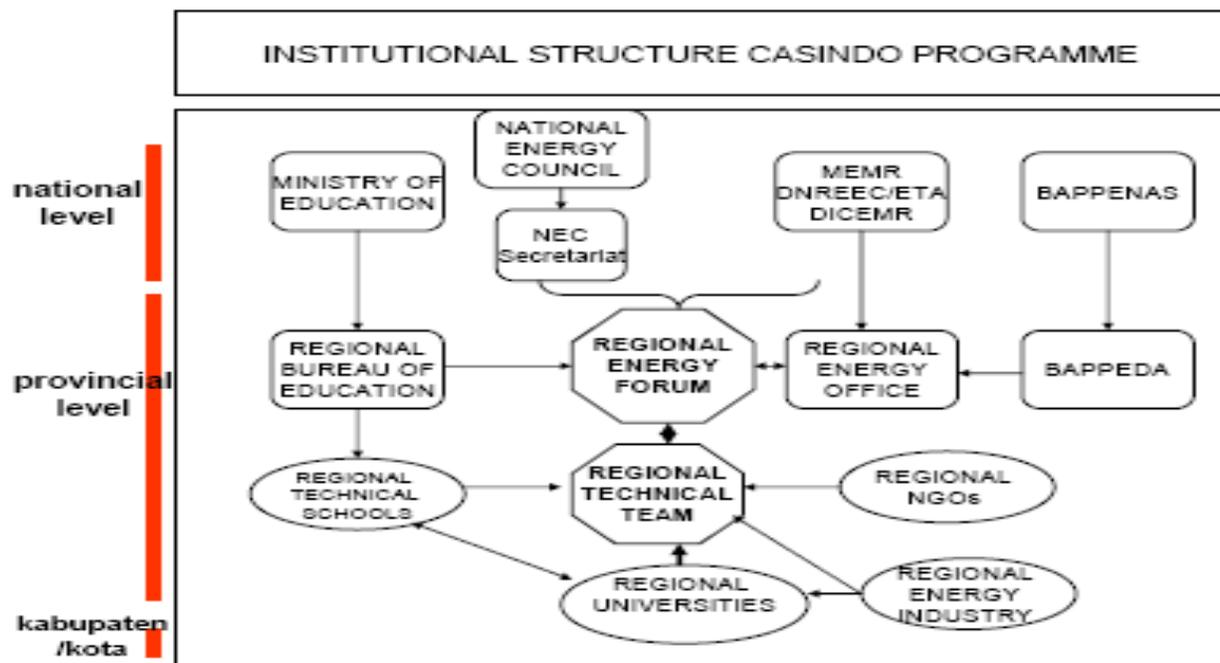


Figure 1.2: Schematic overview institutional structure CASINDO

Technical Working Groups

To structure the work 7 (seven) Technical Working Groups (TWG) have been established. The composition of each working group consists of representatives from the regional teams, MEMR, ITB, TEDC and the European partners. The 7 (seven) TWGs cover the following areas:

- I. Energy Policy Formulation
- II. Renewable energy action plan
- III. Energy efficiency masterplan

- IV. Renewable energy project development
- V. Pro-poor energy strategy
- VI. University education & research programme
- VII. SMK RE & EE training modules

This report focuses on TWG V, which has the following aims :

- To review current pro-poor policies in Indonesia.
- To select a suitable target community.
- To conduct an energy needs assessment in the target community.
- To identify options that address identified energy needs.
- To formulate a pro-poor energy strategy for the region.

The expected outcomes of TWG V are :

- Good picture of energy needs as defined by the communities.
- Good understanding on how existing energy needs are currently being met.
- Insight into wishes of community for change in energy provision.
- Insights into community's level of information on currently used and alternative energy provision.

CHAPTER 2. Overview & Evaluation of Existing Pro-poor Policies & Measures

2.1. National level

In this chapter, we describe and comment some of the laws relating to the planning, utilization, and management of energy in Indonesia, and describe some areas of pro-poor energy policies. We start with policies on the national level.

- a. The law of Republic of Indonesia, No. 30 / 2007, contains relevant information about ENERGY.**

CHAPTER II : PRINCIPLES AND OBJECTIVES

Article 2 states that :

The energy is managed under the principles of expediency, efficiency of justice, increased added value, sustainability, *social welfare, environment conservation*, national security, and integration with emphasis on national capabilities.

Comment :

Social welfare achieved through the implementation of this law has so far not yet been measured in detail. In the provincial sphere it can be seen there are some areas that still have no grid connection, most of which are using generators as their main power source.

In mountainous areas, the majority of communities still do not enjoy the facility of electricity. This is due to accessibility limitations and difficult natural conditions. For certain segments of society, it is very difficult to obtain adequate electricity, because their land has no electrical connection, and they have no ability to pay for it. So it is very difficult to measure the level of social welfare that has been achieved because of provision of energy under the above mentioned principles.

Article 3 states that :

In order to support sustainable national development and enhancing national energy security, goals of energy management are :

- The achievement of increased public access to energy for those that cannot afford and / or who live in remote areas to achieve welfare and prosperity of the people in a fair and equitable manner :
 1. Provide assistance to increase the availability of energy to communities which can not afford it ;
 2. Developing energy infrastructure to undeveloped areas so as to reduce disparities among regions ;

Comment :

So far there are no exact figures about the level of success the program implemented by the provincial government has achieved in order to improve welfare and prosperity of the people fairly and equitably, especially for the poor.

The existing monitoring and evaluation of government programs is very superficial.

CHAPTER III : MANAGEMENT OF ENERGY

Article 4 states that :

- (1) Fossil energy resources, geothermal, large scale hydro, and nuclear energy sources controlled by the state and used for the greatest prosperity of the people.
- (2) New energy resources and renewable energy resources regulated by the state and used for the greatest prosperity of the people.

Article 7 states that :

- (1) Energy prices should be determined based on fair economic value.
- (2) Government and Local Government provides subsidy funding for poor community groups.

Comment :

So far, the provision of subsidies by local governments to community groups who cannot afford to buy energy supplies (which is governed by the provisions of Regulatory invitation), are not given directly to the poor directly in the form of cash subsidies, but are directed to fuel producers to lower the price for consumers.

However, these subsidies for fuel producers are more effective in some areas compared to others (i.e. in some areas prices for consumers are lower than in others).

In some parts of the country the subsidies are lost in the production and distribution network and do not reach the consumers at all.

CHAPTER IV : NATIONAL ENERGY POLICY

Article 19 states that :

- (1) Everyone has the right to obtain energy
- (2) Society, either individually or in groups, can participate in
 - the preparation of the general national energy plan and general plan of regional energy
 - that energy development is in the public interest

Comment :

An active role by the public in regional energy planning and energy development in Papua province, has so far not been significant.

Most of the general regional energy planning and regional energy development are still prepared by the Department of Mines and Energy and BAPPEDA of Papua Province. However, there is now an "Energy Forum" formed by local community agencies, for monitoring and overseeing matters relating to regional energy planning and development. But their work to date has not been seen in practice.

Stakeholders are also trying to establish a Regional Energy Council, but until now it has not yet been endorsed by the Governor.

CHAPTER V : ENERGY MANAGEMENT

Article 20 says that :

- (2) The provision of energy by the government and / or local government in underdeveloped regions, remote and rural areas would preferably be focused on using local energy sources, particularly renewable energy sources.
- (3) Energy producing regions have priority to obtain energy from local energy sources.

Comment:

Although in some regions there is knowledge about potential of local renewable energy resources, the use of this potential is not sufficient.

b. The law of Republic of Indonesia, No. 30 / 2009, contains relevant information about ELECTRICITY.

Article 2 : Principles and Objectives states that :

(1) Development of electricity adheres to the principles of:

- a. Benefits;
- b. Efficiency in justice;
- c. Sustainability;
- d. Economic optimization in the utilization of energy resources;
- e. Relying on own abilities;
- f. Sound business principles;
- g. Security and safety;
- h. Preservation of environmental functions; and
- i. Regional autonomy.

Comment :

Point (a)

The term "benefit principle" is that the results of electricity development should be used as much as possible for the welfare and prosperity of the people.

Point (b)

What is meant by "the principle of efficiency of justice" is that electricity development must be implemented at minimum cost, but with results that can be enjoyed equally by all people.

Electricity Development aims to ensure the availability of electricity in sufficient quantity, quality, and reasonable price in order to improve the welfare and prosperity of the people fairly and equitably and to realize sustainable development.

However, similarly to principle and objectives of law **No. 30 / 2007**, also for the case of electricity there is no good system for monitoring, whether the objectives have been achieved.

Article 3 on Mastery states that

(1) Electricity supply controlled by the state is carried out by the Government and local governments based on the principle of local autonomy.

Comment :

Given that electric power is important and has a strategic role in national life, the electricity supply business is controlled by the state in implementation is aimed for the maximum benefit and welfare of the people.

At present, the government and the state owned electricity company do not meet demand for electricity, especially of the poor. The government who controls electricity supply should encourage independent power producers (private companies) to provide electricity in remote areas.

Article 4 on Concession states that:

- (1) The electricity supply business is conducted by state owned and local-owned enterprises.
- (2) A private business, cooperatives, and governmental organizations can participate in the electricity supply business.
- (3) For the supply of electric power referred to in Article 3 paragraph (1), Government and local governments provide funding for:
 - a. Groups of people who cannot afford electricity (poor people);
 - b. Construction of electricity supply in underdeveloped regions;
 - c. Development of electric power in remote and border areas; and
 - d. Development of rural electrification.

Comment:

An undisclosed amount is available to the provincial government for supply of electric power for the above mentioned situations and groups of people but no public information on implementation is available.

2.2. Regional/Provincial level

Provincial / regional or local level government in Papua, does not issue own policies related to energy but only implements the energy programs or policies issued by the National Government (Ministry of Mines and Energy).

For now, the Department of Mines and Energy of Papua Province has made an annual program that refers to central government policies, and includes the development of solar power, micro hydro, diesel in a number of locations, as well as extending the existing power network. Such programs have already been developed, and are currently in the process of physical implementation. Most of the activities are carried out in remote rural areas.

2.3. Evaluation of selected energy programs

An evaluation of the government's existing energy programs is summarized in the following table :

Table 2.1. : Evaluation of selected energy programs

Policies/Programs	Policy objectives		Implementation		Policy objective likely to be achieved	Impact on poor
	Main obj.	Secondary obj.	To-date	Future	Yes / No	
NATIONAL LEVEL :						
<i>Subsidy for Household electricity use up to 900 kWh/month (30% cheaper)</i>	To lower the cost of electricity for the poor people	To keep household energy use low (below 900 kWh/month)	Fully implemented	Need to be continued	Yes	<ul style="list-style-type: none"> - Poor communities with access to electricity have low costs for electricity - Because of cheap electricity new houses are cheap - Poor communities without access to electricity do not benefit from this policy
<i>Subsidy for LPG</i>	To convert kerosene use to use of LPG	There is more supply of gas and it is a more efficient fuel	In Papua subsidized LPG is not yet available	Maybe not because of bad safety track record	No	No impact because the policy is not yet implemented in Papua.
<i>Removal of subsidy for Fuel Oil (BBM)</i>	For subsidy funds to be used for other social purposes, e.g : for education, health and poverty alleviation	It leads to savings of fuel utilization	Not yet implemented in Papua	Unlikely	Unlikely	<p>Policy impact directly felt by the rich people, because they consume the most fuel. The impact on the poor would be indirect.</p> <p><i>Example :</i> Because transportation cost of energy supply to remote areas would increase, the price of</p>

						energy supply (LPG, kerosene) would also increase.
PROVINCIAL LEVEL	Main obj.	Secondary obj.	To-date	Future	Yes / No	Impact on poor
Kampung mandiri terang (“the shine of the villages”) Part of RE program of Papua province. Survey Investigation in villages across the province (program of Dinas Energy since 2005) to identify the energy potential in the village. The Dinas Energy choose the villages with high solar potential and distributes (for free) solar panels to households.	To identify best energy solution for native people (in 100 villages/year)	To improve the quality of life of rural communities	Probably not fully achieved	Not likely because of conflict of interest, low population density, no strict supervision of implementation	Maybe over a long period of time ?	<ul style="list-style-type: none"> - Limited success in improving the energy situation of some villages - It provides some villages electricity for lighting

CHAPTER 3. Selected target location

3.1. Introduction

To conduct an energy needs assessment we needed to selected a target location. This has been done based on the following criteria :

- The location falls into the category of poor villages.
- There is no electricity facilities.
- High population density.
- Public facilities are still lacking.
- Preferred sites adjacent to the provincial capital city.

The Selection Process

Visits were conducted to 10 (ten) villages close to the provincial capital city

The ten villages include :

- Enggros
- Koya Koso
- Tobati
- Kayu Pulo
- Yoka
- Kalkhote
- Harapan
- Skouw
- Puay
- Nafri

Based on impressions from the visits, and also a variety of considerations in accordance with the required criteria, we decided to choose **Enggros village** as the target location for the energy needs assessment.

Some of the reasons for which **Enggros village** was selected as the target project site are :

- The village is included in the category of poor villages.
- There is no electricity connection in the village.
- There are several houses of worship facilities and population is dense and growing.
- There are no educational facilities and public facilities.
- Previously, there had been electric generator facilities available in the village, but they did not last long, due to operational problems and required maintenance of generators.
- People's income is erratic, because it depends only on the sea (most of the people are fishermen).

3.2. General Description of Target Location

Enggros village is located in District Abepura, approximately 6 (six) km from Jayapura City, the capital of Papua Province. The village is located in the bay and coastal area. The terrain itself is quite separate from the big island (the village is built on stilts off the main island coast). So the only transportation option to the village is by boat and there is no road access. According to data obtained from the Central Bureau of Statistic in 2009, Enggros village has a population of 368 inhabitants, of which 176 are male and 192 are female.

Some natives of Enggros have settled in the city of Jayapura, especially those working in government agencies as civil servants, but those are very few. Almost 90% of the population is making a living as fishermen. The number households in Enggros village is 115. The size and structure of families in the village is basically the same as in other areas of Papua. What is unique in Enggros village is that one house can be occupied by more than one family. Even within a single dwelling there can be 2 (two) or 3 (three) families. So even though Enggros village consists of 115 households, the number of existing homes in the area is approximately 80-90 residential units.

There are no educational facilities in the village, so school children from Enggros must use a boat to cross the bay to get to the Yotefa area in Jayapura city.

Economic activity in Enggros village is slow. The lives of people who mostly work as fishermen are very much depending on weather conditions. Moreover, the system of fishing they use is still very traditional and is performed independently. The fish that they catch is partly used to fulfill their daily needs, while the rest is sold at the market, which is located approximately 2 (two)

kilometers from the village. To go to the traditional market, they also have to use motorized boats, with a travel time of approximately 15 minutes.

The main problem they face is if the fish they catch is not entirely sold, because they do not have refrigerators to store the unsold fish, so they are sometimes forced to throw the fish back into the sea due to decay. With an average income per month of 750,000 IDR, it is very difficult for Enggros village residents to meet daily living needs.

Because the area is surrounded by sea, then the only means of transport to Enggros village is the boat. For a single crossing to the main land (Jayapura city area), the inhabitants of Enggros are charged 5,000 IDR, or 10,000 for a round-trip. This does not include land transportation to the city.

CHAPTER 4. Energy Needs Assessment

4.1. Introduction

An energy needs assessment is necessary to get a good picture about the real energy conditions in the Enggros village, especially about:

- Energy needs as defined by the community.
- Understanding on how existing energy needs are currently being met.
- Insight into wishes of community for change in energy provision.
- Insights into community's level of information on currently used and alternative energy provision.

Approach used to assess energy-related needs and priorities

- ✓ The location was visited several times, both formally and informally, where the Casindo team:
 - Met with the head of village and village elders, explained the purpose of Casindo, etc
 - Conducted several meetings with tribal leaders, community leaders and religious figures.
 - Conducted interviews with several residents who live in the village.
- ✓ Gather information about the village, both primary and secondary data, especially concerning population and welfare level.
- ✓ Prepare energy needs assessment questionnaire (*see annex. 1*)
The questionnaire was prepared in advance. 3 (three) staff from UNCEN acted as moderator and facilitated the answers from the participant of the survey. 25 (twenty five) persons responded to the survey.
- ✓ Energy Needs Assessment Workshop in the village.
 - Was conducted in Enggros village in October 2010 (the workshop agenda is presented in *annex.2*)
 - The workshop was attended by the head of *village* and 3 (three) UNCEN staff and 25 (twenty five) villagers of which 4-5 women. (see *annex. 3* for attendance list).
 - During the workshop the following topics were discussed:
 - Energy for cooking
 - Energy for lightning
 - Energy for sailing

- Energy expenditures
- Transportation
- ✓ Collecting the questionnaires.
- ✓ Analyze outcome of energy needs assessment.

4.2. Identified general energy problems

▶ *Supply-related*

The geographic location of the village in the middle of the sea, although close to the city, means the only possible means of transportation to and from the village is by boat. This causes the supply of fuel to be difficult and expensive.

▶ *Socio-Economic level*

The community in Engross is still classified as very poor and has no fixed income, because it only depends of the fish caught at sea (fishermen). The level of education of the villagers is also relatively low, and there are no educational facilities in the village. With these conditions, it is difficult to get a decent job for the villagers, which means also simply buying the fuel they need everyday becomes very difficult as well.

▶ *Awareness*

The level of public awareness about the importance of saving energy, is still lacking. In addition to the low level of education, the population is not willing or cannot afford to pay for the maintenance of generators that were once in use, unless the generator is their own, in which case maybe they'll take care of it, because they have a sense of ownership.

▶ *Operation and Maintenance of Energy Devices*

The villagers are not able to take care of facilities, for example the generator machines, so when they get damaged or there is a problem with them, they do not fix it.

4.3. Result of Energy Needs Assessment Workshop and Survey in Enggros village

Some highlights from the survey :

- ▶ The average monthly income of the local people in Enggros village is 750,000 IDR.
- ▶ Most people felt they were no longer able to use a generator or battery for everyday activities, because their operation and maintenance are very costly.
- ▶ Average consumption of gasoline and kerosene is 2 – 3 liters per day per household.
- ▶ Gasoline and kerosene price is 7,000 IDR per liter (this is the subsidized price).
- ▶ According to the villagers, the total money they spend to buy household fuel is 1,000,000 IDR (approx.). / month. This is not in line with their income which is only 750,000 IDR / month. Our estimate is that their energy expenditure is maximum 500,000 IDR/month.
- ▶ All the community agrees that solar home systems are suitable to their conditions and circumstances (to solve the energy problem).

Next, we provide a summary of the questionnaire results :

Energy for cooking

Most households mainly use fire-wood for cooking. They get fire wood for free from the nearby forest. To start the fire they also use a small amount of kerosene. The reported price of kerosene is the subsidized price including transportation cost to the village.

This figure in this section refers to energy use of household (which maybe more than 1 family).

Table 4.1. : Fuel used for cooking at home

Fuel Type	Amount/day	Cost/unit	Amount/month	Cost/month
Kerosene	1 ltr	7,000 IDR	30 ltr	210,000 IDR
LPG	-	-	-	-
Fire Wood	6 stalks	-	180 stalks	-
Others	-	-	-	-

Energy for sailing

Most people in Enggros village work as fisherman. The boats they use for fishing use gasoline and kerosene. When fishing at night, they also use kerosene for lighting. The expenditure incurred by Enggros villagers for the purpose of going to sea can be seen in the following table :

Table 4.2. Fuel used for the purpose of going to the sea

Fuel Type	Amount/day	Cost/unit	Amount/month	Cost/month
Kerosene	1 ltr	7,000 IDR	30 ltr	210,000 IDR
Gasoline	10 ltr	7,000 IDR	150 ltr	1,050,000 IDR
Others	-	-	-	-

Energy for lighting

In addition to lighting in homes, a lamp light is also used at sea for fishing at night. For lighting their homes, most people use gasoline-fueled generators. Only a small portion of Enggros villagers use candles and kerosene lamps.

The expenditure incurred by villagers to meet their needs for lighting can be seen in the following table:

Table 4.3. Fuel used for lighting purposes at home

Fuel Type	Amount/day	Cost/unit	Amount/month	Cost/month
Kerosene	0.5 ltr	7,000 IDR	15 ltr	105,000 IDR
Candle	3 sticks	2,500 IDR	90 sticks	225,000 IDR
Gasoline	2 ltr	7,000 IDR	60 ltr	420,000 IDR
Battery / Accu	-	-	10 pcs	50,000 IDR
Others	-	-	-	-

It is important to note, that lighting sources are complementary. This means, that villagers either use a kerosene lamp or candles or gasoline-fueled generators, but not all of them at the same time. Nevertheless, based on the above, it can be concluded that the biggest energy need of the villagers is *energy for lighting*.

Lighting is needed for the purposes of home lighting at night, street lighting and for the purpose of school children's learning. As for cooking purposes, villagers are more inclined to use firewood, which is easily obtainable in the vicinity of their villages. Similarly, the fuel needs for boat, villagers can still find fish with fish traps, or they go to the sea not by motorboat but by using a paddle.

Communal energy use

Public facilities	Types of energy sources used	Number of units	Costs / month	Who pays for it
Public Health Centers (Small building)	a) Generator	1 Unit	500,000 IDR	Local Government
	b) Battery/ Accu	1 Unit	200,000 IDR	Local Government
Church	a) Generator	1 Unit	500,000 IDR	Self-help society
	b) Battery/ Accu	- Unit	-	Self-help society
Meeting Hall	a) Generator	1 Unit	500,000 IDR	Self-help society
	b) Battery/ Accu	- Unit	-	Self-help society

The Public Health Center is only a small health center, just for emergency conditions, such as maternity, minor accidents, etc. Medical workers are also still very limited, in such places there is no permanent doctor, only physician assistant.

Energy needs for small businesses

Business Type	Types of energy sources used	Number of units	Costs / month	Who pays for it
Fuel for the boat (boat)	Motor engine Battery/ Accu	Unit 1 Unit	1000,000 IDR 200,000 IDR	Self-help society Self-help society
Fridge to fish	Generator Battery/ Accu	- Unit - Unit	- -	Self-help society Self-help society
Electricity to stall	Generator Battery/ Accu	3 Unit - Unit	500,000 IDR -	Self-help society Self-help society

4.4. Energy Access Index for Village Level

Introduction

Based on the information collected during the energy needs assessment in Enggros village, we can construct an energy access index for the village level. The energy access index indicates the progress on the supply side towards the energy service standards. The index measures the three main supply dimensions of energy access – household fuels, electricity and mechanical power – by assigning a numerical value to the qualitative dimensions of people’s experience of accessing energy supplies, with 1 being the lowest and 4 the highest level of access ¹.

Household fuels :

1. Collecting wood or dung and using a three-stone open fire.
2. Most of the time using wood but sometimes also kerosene or LPG.
3. Most of the time using kerosene or LPG but sometimes use wood.
4. Using a modern stove with LPG.

¹ The scale used here is adapted from the *Poor people energy outlook, Practical Action, 2010*.

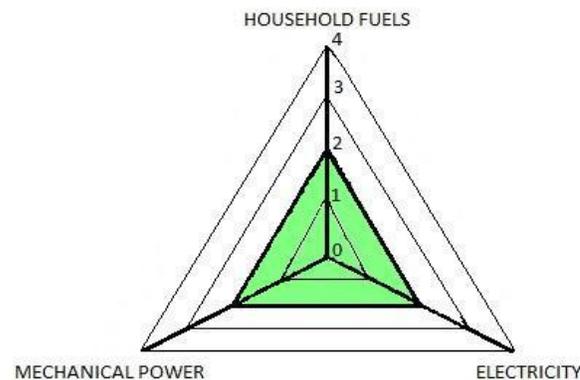
Electricity :

1. No access to electricity.
2. Limited access with generator (with high fuel costs).
3. Limited access with solar panel.
4. Unlimited access through grid connection.

Mechanical Power :

1. No access to mechanical power at all.
2. Mechanical advantage devices available to magnify human effort.
3. Mechanical power available for some tasks.
4. Mechanical power available for all tasks.

In accordance with the above criteria, the Enggros village energy access index looks as follows :



Household Fuels - 2 For cooking purposes, most people collect firewood from the forest, but sometimes they also use the kerosene to start the fire and sometimes they use a kerosene stove.

Mechanical Power - 2 Low education levels result in the absence of mechanical power. However, some people in the village have a motor boat (although most people still using paddles for sailing).

Electricity

-2

The village is not electrified. The only solar panel in the village belong to the head of village. Some villagers sometimes use a generator.

CHAPTER 5. Provincial pro-poor energy strategy

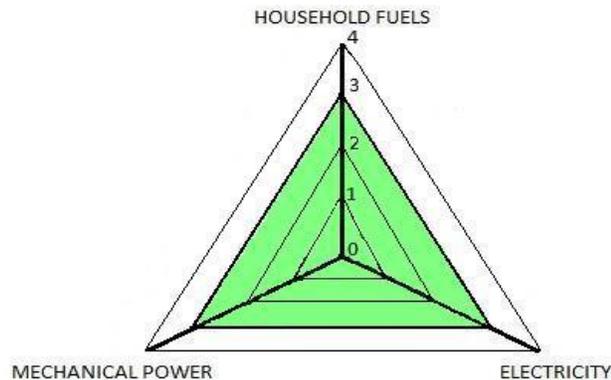
5.1. Suggestions for improving existing policies and programs

- Improve the monitoring and evaluation of government programs:
 - Develop clear success indicators to measure achievement of objectives. For example: impact of subsidies to fuel producers and distributors (if the subsidy really results in lowering the price for the consumers).
- Decision making bodies on provincial level (energy forum and regional energy council) need to be more active and their suggestion and decisions should be implemented:
 - The national government needs to endorse the energy council in Papua which would coordinate the various programs related to energy under different government institutions.
 - A clearer division of responsibility with regard to provision of energy to the poor needs to be established.
- Increase the use of local renewable energy with the help of modern technology.
- Independent power producers should be encouraged to provide electricity supply, especially in remote areas and through small scale installations.
- Increase the transparency of publicly funded programs (including rural electrification programs).

5.2. Developing a local pro poor energy strategy

Under the current situation, the energy provision in Enggros village is still minimal. For this situation to change, an energy strategy and management must be developed, programmed and planned. This could be successfully implemented if there is cooperation and concern of local government, the stakeholders and the public.

The medium-term target (next 5 years) for the Enggros village could be as follows:



Household Fuels - 3 Using a regular stove (kerosene or LPG) most of the time and sometimes still use wood

Mechanical Power - 3 Most people still have paddle boats but it would be better if more people would be using motorboat. Because Enggros is mainly a community of fisherman it would be useful to have at least some community owned refrigerators in the village.

Electricity - 3 For medium term it is not likely the village will be connected to the electricity grid, so providing the households with solar panels will give the people access to electricity at least for lightning and entertainment (small radio and tape recorder).

In order to move from the current situation to the desired outcome mentioned above, we need a plan and strategy, which would include the following:

➤ **For household fuels**

Government participation :

- Better implementation of the government program on the conversion of fuel oil (use of LPG as a substitute for kerosene).

- Working closely to provide research assistance to institutions (vocational high schools and colleges) which can make a simple stove, using local materials that are easily available and would increase fuel efficiency. The stove can then be mass produced, making it easy to get.

Public participation :

Support programs that are run by the government, as well as ensure direct oversight of all activities / programs that are currently run and will continue being run in the future.

➤ **For mechanical power**

Government participation:

- Develop a program that is associated with increased human resources in terms of the operation and maintenance of electrical equipment.
- Working closely with the institution (vocational high schools and colleges) to provide training and short courses related for the operation and maintenance of electrical equipment.

Public participation:

- Support programs that are run by the government, as well as ensure direct oversight of all activities / programs that are currently and will be run.
- Participate directly in programs/activities for training and short courses organized by governments and educational institutions (vocational schools and colleges).

➤ **For electricity**

Government participation:

- The government should facilitate access to SHS either through direct subsidies or a credit scheme. At the very least the villagers should be required to pay for maintenance of the solar equipment they receive, to ensure some sense of ownership.
- Working closely with the institutions (vocational high schools and colleges) to promote using energy-saving lamps instead of ordinary lamps.
- Provide the opportunity to some villagers to be trained in maintenance and repair of solar equipment.

Public participation:

- Support programs that are run by the government, as well as ensure direct oversight of all activities/programs that are currently and will run.
- Helping other people in terms of conversion of the use of incandescent bulbs to energy-saving lamps.

The proposed timeframe for implementation is:

For the installation process 4 (four) months / year

For dissemination benefit of energy saving lamp 3 (three) months

Training of villagers for maintenance and repair of equipment depending on the program length.

Estimate of cost, incl. the installation, maintenance and training (for villagers) to improve access to electricity in Engross village :

Based on data obtained for the analysis conducted in TWG IV, the estimated costs of achieving the outlined improvement of the energy situation in Engross are as follows :

- ✓ Installation costs of 55 units of SHS per year are 346,425,000 IDR, including cost of transportation and installation. (On average, per unit cost of a SHS is approximately 6,298,636 IDR).
- ✓ The yearly cost of maintenance is approximately 5% of the SHS price.
- ✓ The cost of training per year, is approximately 10% of the price per SHS unit .

So assuming there are 100 homes that need to have SHS installed (the figure of 100 is provided just for the purpose of this example, the exact number of dwellings in Engross has not been checked, but is probably between 80-90 units), then the total cost for Enggros village is $6.298.636 \times 100 + 31,493,180 + 62,986,360 = 724,343,140.00$ IDR

To ensure the SHS in Engross is successful, it is important to define a success indicator, which could be as follows:

- One year after the purchase of the solar home systems, all are installed and running well
- Finally, it is crucial to assign **the responsibility for monitoring the success of the program**, for example: The winner of the public tender (solar panel dealer), the vocational school and the local university together prepare the monitoring report for the Dinas office.

5.3. Generalization of energy strategy to province levels

- Currently, the Papua province consists of 29 regencies and cities. Assuming an average district consists of 70 villages, of which 30 have similar energy conditions as Enggros, then the number of villages to be electrified in the entire province of Papua is about 870.
- The estimated costs for the development of solar energy facilities in all the 870 villages in Papua Province is approximately:

$$724,343,140.00 \text{ IDR} \times 870 \text{ villages} = 630,178,531,800.00 \text{ IDR}$$

5.4. Conclusion

With regard to pro-poor programs carried out by the Department of Mines and Energy of Papua province, on the whole, they can be considered good enough, but in our view, the post-implementation and evaluation activities could be improved. Furthermore, in some locations where electrical installations have been built, the local community just hopes that the maintenance of the installed electrical equipments, will be carried out by the government. So that ownership of the equipment is very poor. Equipment maintenance costs that were charged to the public, received less serious response from the community itself. This is evident in several areas or villages which have electricity, but people mostly do not pay their electricity bills (*results of surveys and interviews*). It is also important, that together with electrical equipment, communities are given training on its operation and maintenance.

ANNEX 1



Capacity development and strengthening for energy policy formulation
and implementation of sustainable energy projects in Indonesia

QUESTIONNAIRE CURRENT ENERGY USES

1. Personal Data

Name :
Address :
Gender :
Occupation :
Age :
Education :

Domestic energy is used directly

2. Fuel used for cooking at home needs

Fuel Type	Amount / Day	Cost/Unit	Amount / Month	Cost/ Month
Kerosene				
LPG				
Firewood				
Others :				
Others :				

3. Fuel used for fishing needs

Fuel Type	Amount / Day	Cost/Unit	Amount / Month	Cost/ Month
Kerosene				
Gasoline				
Others :				
Others :				

4. Home lighting needs, always use :

Fuel Type	Amount / Day	Cost/Unit	Amount / Month	Cost/ Month
Kerosene				
Candle				
Tube Lamp with a source of power from generators				
Tube Lamp with a source of power from battery				
Others :				

5. Total expenses for the maintenance of electrical equipment in a month

- A. < 100.000 IDR
- B. > 100.000 IDR
- C. Other

6. The amount of the purchase cost of the battery in a month

- A. < 100.000 IDR
- B. > 100.000 IDR
- C. Other....

Energy use for people's needs

What energy is used by the people directly ?

Public facilities	What forms of public facilities energy use?	How much ?	What does it cost ?	Who pays for it?
Health facilities	a) Generator b) Battery c) Other :			
Church	a) Generator b) Battery c) Other :			
Meeting room	a) Generator b) Battery c) Other :			
Chief village Office	a) Generator b) Battery c) Other :			
Others :				

Energy requirements for small businesses

What type of energy used today (for local small businesses) ?

Type of equipment	What type of equipment used form of energy ?	How much ?	What does it cost ?	Who pays for it ?
Fuel for the boat (boat)				
Freezer for fish				
Electricity to stall				
Others :				

Identify the problem solving that might be achieved;

1. What is the right solution to solve the energy problem at your place ?
2. In your opinion, what is the solution of choice of the material presented. ?

Priority ENERGY NEEDS

Energy Requirement	1- Very urgently	2- Urgent	3- Not Important	Note
<i>Household</i>				
Cooking				
Lighting				
Radio/tape				
TV				
Others :				
Others :				
<i>Public</i>				
Lighting for health facilities				
Lighting for church				
Lighting for street				
Lighting for the village hall and village head's office				
Others :				
Others :				
<i>Business</i>				
Recharge mobile phones				
Freezer for fish				
Electricity to stall				
Others :				

ANNEX 2



Capacity development and strengthening for energy policy formulation and implementation of sustainable energy projects in Indonesia

Needs Assessment Workshop

Schedule of event

Place :

Date :

Time	Programme	Activities
8.30-8.45	Registration	<ul style="list-style-type: none">- Participants completing the registration form.- Moderator fill out the list of participants.
8.45-9.00	Opening ceremony	<ul style="list-style-type: none">- Message from the project team.- A brief description Casindo.- A description of the purpose of the workshop.- Opening of the village chief's speech.
9.00-10.00	Identifying the current energy situation	<ul style="list-style-type: none">- Separate the participants into several groups (no more than 10 people per group)- Explanation on each group of questionnaires- Answer the questionnaire
10.00-10.15	<i>Coffe break</i>	
10.15-11.00	Prioritize energy needs	<ul style="list-style-type: none">- Make a list of priority energy needs for households, communities and businesses.
11.00-11.30	Explain that renewable energy solutions are still possible	<ul style="list-style-type: none">- Ask the participants about what might be the solution to meet their energy needs.- Team members Casindo indicate possible solutions for renewable energy.- Ask the participants, about their responses to a given percentage.
11.30-12.00	Discussion of possible solutions	<ul style="list-style-type: none">- Participants give feedback on material presented, about renewable energy options.

Purpose Workshop :

- To understand the current energy situation and needs.
- To give local people the opportunity to express their energy needs and its problems.
- To determine a suitable solution for their area.

ANNEX 3

WORKSHOP ATTENDANCE LIST

No.	Name	Gender	Occupation	Sign.
1	Anton merauje	M	Fisherman	
2	Marthen merauje	M	Fisherman	
3	Marthina hamadi	F	Housewife	
4	Lisa hamadi	F	Housewife	
5	Pius sani	M	Fisherman	
6	Albert itaar	M	Fisherman	
7	Isack ondi	M	Fisherman	
8	Albertina hamadi	F	Housewife	
9	Ria hanesbey	F	Housewife	
10	Silvi hanesbey	F	Housewife	
11	Rudolf sani	M	Fisherman	
12	Yance sani	M	Fisherman	
13	Yanius hanesbey	M	Fisherman	
14	Richard merauje	M	Fisherman	
15	Mathias hamadi	M	Fisherman	
16	David merauje	M	Fisherman	
17	Erwin merauje	M	Fisherman	
18	Tony hanesbey	M	Fisherman	
19	Lukas ondi	M	Fisherman	
20	Anthonius sani	M	Fisherman	
21	Tinus hamadi	M	Fisherman	
22	Markus hanesbey	M	Fisherman	
23	Jhon hanesbey	M	Fisherman	
24	Paulus merauje	M	Fisherman	
25	Nathaniel sani	M	Fisherman	
26	Frumen	M	UNCEN	
27	Apolo Safanpo	M	UNCEN	
28	Duha A.K	M	UNCEN	
29				
30				

Jayapura, October 15th, 2010