CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1. Title of the small-scale programme of activities (PoA):

Installing PV LED lanterns throughout Uganda

Version 01
dd/mm/2010

A.2. Description of the small-scale programme of activities (PoA):

Purpose of this programme of activities (PoA)

The purpose of this PoA is to introduce photo voltaic light emitting diode lantern (PV LED lantern) systems in households throughout the Republic of Uganda. The PV LED lantern systems, manufactured by Sanyo Electric Co., Ltd. (SANYO), Japan, will be distributed through a network of local distributors coordinated by Balozi Inc. (Balozi), a distributor of PV products.

The goal of this PoA is to introduce PV LED lantern systems throughout Uganda and replace kerosene lanterns which are used for lighting in un-electrified rural households. The PV LED lantern systems will improve the quality of life for people living in such areas in Uganda by providing safe, clean, easy-to-use and high quality lighting. Using solar energy for lighting, the solar cells convert solar energy directly into electricity and hence, in contrast to the kerosene lanterns, the project will reduce the demand for fossil fuels and the greenhouse gases (GHGs) associated with the combustion of fossil fuels.

This project is a voluntary initiative coordinated by Balozi Inc., Uganda and Sanyo Electric Co., Ltd., Japan. Balozi was established in 2008 with the aim of promoting the distribution of solar products in Uganda. SANYO developed the PV LED lantern system for the purpose of lighting in un-electrified rural households in Uganda. Balozi, as a counterpart to SANYO, will cooperate with local distributors to introduce the SANYO PV LED lanterns for this project. Balozi will coordinate this PoA and all CPAs under this PoA.

SANYO and Balozi are aiming to introduce about three (3) million PV LED lantern systems under this PoA. The systems will be sold to the rural market through local distributors, who will cooperate with Balozi for this PoA, at a price which is affordable for poor households in Uganda. The required price level can only be achieved through additional revenues from the sale of CERs.

Background of this PoA

In Uganda the power supply is limited and the rate of electrification is only 10% nationally although 33% of the urban population has access to electricity compared to only and 3% of the rural population[1]. The government of Uganda aims to increase access to electricity. However, the population density in rural areas is quite low with approximately one household per acre and this increases the cost to supply electricity services by expanding the grid. Even in areas which have grid access many people cannot

[1] Indicative Rural Electrification Master Plan Report, Ministry of Energy and Mineral Development, January, 2009

connect due to the high connection fee, approximately 500USD, considering that GNI per capita is 340 USD (2007) and 38% of country's population live below the poverty line (1USD per day)[2]. Therefore, un-electrified households have no choice other than relying on cheap kerosene lanterns for lighting purposes. There are many concerns raised due to the use of these kerosene lanterns including the insufficient level of brightness, harmful smoke, the fire risk and the expensive price of kerosene. The government of Uganda is hoping to reduce the dependency on kerosene lanterns and reduce associated health issues, such as bronchitis, which especially tends to occur among children, by providing alternative lighting technologies. There are some PV lanterns available in the market of Uganda. However, the products currently on the market have not been widely used among households because of their poor quality and low reliability level. The Uganda National Bureau of Standards is currently developing quality standards to ensure the quality of PV lanterns sold in Uganda. The proposed PoA aims to introduce SANYO's high quality PV LED lanterns and reduce the dependency on kerosene lanterns to improve the quality of life of people in Uganda. .

Contribution to the sustainable development of the host country

This PoA will contribute to the sustainable development of Uganda in the following ways:

Economic dimension – The average price of kerosene is 2,400~3,000Ush (1.5~1.8USD)[3] per liter and kerosene payments, at 3~5USD per month[4] are a burden to households. The proposed PoA will reduce household consumption of kerosene for lighting and save households the ongoing cost of purchasing kerosene. The amount of money saved from the purchase of kerosene can be spent for education, food and other purposes. The PoA can also enhance income generating activities at households by providing stable and higher quality lighting with PV LED lantern systems.

Environmental dimension – The PoA reduces fossil fuel consumption and thereby reduces the amount of GHGs produced by fossil fuel combustion. The PoA can also reduce smoke and dust which cause serious indoor air pollution by replacing kerosene lanterns with PV LED lantern systems.

Social dimension – The use of kerosene lanterns in households is identified as a main cause of health concerns such as bronchitis and is a concern for people who have children. The poor quality of light from kerosene lanterns also hampers the ability of children to study. The introduction of PV LED lantern systems will provide a safe and steady supply of lighting and hence increase the quality of life for people in Uganda, with no emissions and a brighter luminescence allowing more productive household use of after dark hours for activities such as study and cooking.

A.3. Coordinating/managing entity and participants of SSC-POA:

The coordinating entity for this PoA is Balozi Inc., Kampala, Uganda

The project participants being registered in relation to the PoA are as follows:

[2] Worldbank, Uganda at a glance, http://devdata.worldbank.org/AAG/uga_aag.pdf

[3] JICA research report, Utilization and diffusion of renewable energy in un-electrified regions in Africa, Oct 2008

[4] JICA research report, Utilization and diffusion of renewable energy in un-electrified regions in Africa, Oct 2008

Name of Party involved ((host) indicates a host party)	Private and/or public entities Project participants	The Party involved wishes to be considered as project participant
Uganda (host)	Balozi Inc. (private entity)	No
Japan	Sanyo Electric Co., Ltd. (private entity)	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

Uganda

A.4.1.2. Physical/ Geographical boundary:

The geographical boundary of the project is the country border of Uganda.

Figure 1. Map of Uganda[5]

[5] Image courtesy of worldtravels.com

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

In a typical CPA, PV LED lanterns will be distributed throughout Uganda. The lanterns employ photo voltaic technology to provide a stable, high degree of luminosity. The PV LED lantern systems distributed under a CPA are manufactured by SANYO. The system consists of mainly two parts, an LED lantern with a rechargeable battery and a separate solar cell panel.

LED Lantern Technology

The lanterns contain two (2) 0.5W light emitting diodes (LEDs) and when fully charged can be operated for five (5) hours at high setting and twenty (20) hours at low setting. LEDs have advantages over fluorescent lamps including lower energy consumption, longer lifetime and high brightness. Further, LEDs do not contain mercury, unlike fluorescent lamps, and hence are an environmentally friendly technology. SANYO PV LED lanterns are equipped with rechargeable nickel metal-hydride (Ni-MH) batteries. The Ni-MH battery used for the SANYO PV LED lanterns employs SANYO's leading technology and can be recharged approximately 500 times[6]. Although excessive self-discharge was a concern of Ni-MH battery, SANYO's battery can control self-discharge and hence can be used for a long period of time. Ni-MH batteries do not contain lead, unlike conventional batteries and hence are safe for the environment. It takes approximately six (6) hours to recharge the Ni-MH (2.4V, 3200mAh) battery using the solar panel.

Solar Panel Technology

SANYO has more than 30 years of experience in solar technology and is a leading company in the field of photovoltaic power generation. The solar cell panel equipped to the system employs a mono-crystalline silicon solar cell with a 5W peak, DC12V output.

The lantern and solar panel are durable and have a ten-year life expectancy under normal operating conditions. Technical specifications of the LED lanterns and solar panels are described in Table 1.

All the lanterns distributed under a typical CPA do not consume energy sources other than solar energy. PV LED lantern distributors, who are officially registered in this programme, will instruct consumers on the optimum placement for the solar panels during charging. Charging will be carried out during the daylight hours and the lantern used in the evening.

Table 1. SANYO PV LED Lantern and Solar Panel Specifications

PV LED Lantern	Lighting Method	High: 1W (0.5W x 2) LED
	Illumination Mode	High / Low
	Operation Time	High: 5 hours; Low: 20 hours
	Battery	Ni-MH / 2.4V 3200mA
	Recharging Method	Solar Charger
	Input Voltage	DC7-24V

[6] A guide-line for battery life based on IEC61951-2 2003(7.4.1.1)

	Recharging Time	6 hours (DC12V/300mA)
	Temperature	Operation 0-47 ° C; Storage -20-50 ° C
	Dimension	120(D) x144 (W) x 153(H) mm
	Weight	590g
Solar Panel	Output Power	5W peak
	Output Voltage	DC12V
	Cable Length	10m standard

Figure 2. Sanyo PV LED lantern

Figure 3. Sanyo PV LED lantern solar cell panel

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

Criteria for inclusion of a typical CPA in the PoA include:

- A CPA will distribute new PV LED lanterns in households with no grid electricity connection.
- A CPA is located in Uganda.
- The coordinating entity of a CPA will be Balozi.
- The manufacturer of the PV LED lantern distributed under a CPA will be SANYO.
- A CPA consists of a group of SANYO PV LED lanterns to be distributed within a certain year during the crediting period of the PoA.
- The SANYO PV LED lanterns under a CPA are to be purchased from pre-assigned distributors who are cooperating with Balozi under the contracts.
-A CPA will implement the baseline and monitoring methodology AMS-I.A. “Electricity generation by user”. The version of the baseline and monitoring methodology may change according to the most recent guidance provided by the CDM Executive Board.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

Uganda is experiencing economic growth at a rate of approximately 5.4% but has a high unemployment rate (33%) and approximately 38% of the population lives below the poverty line. Rural areas have

almost no access to electricity with the electrification rate 3% and the overall national rate only about 10%[7]. As such, most households have no access to grid electricity. Lighting is supplied by means of fossil fuel fired kerosene lanterns. According to recent socioeconomic studies[8] the percentage of households employing kerosene lanterns is in the range of 75-99%, depending on the area.

The proposed PoA is a voluntary coordinated action by SANYO and Balozi with the goal of reducing the reliance on kerosene lanterns in Uganda by distributing a large number of PV LED lantern systems. The proposed programme of activities will be not implemented in the course of regular business due to the following barriers:

Investment barrier

In Uganda, GNI per capita is 340USD (2007) and approximately 38% of the population lives below the poverty line (1USD per day)[9]. The target group of the PoA is also low-income households who cannot afford to access grid electricity. These people are not able to purchase PV LED lanterns or other lighting technologies. They have no choice other than using kerosene lanterns which are much cheaper than PV LED lanterns. The price of a kerosene lantern is approximately 0.25USD whereas SANYO PV LED lanterns cost approximately 40USD even with the subsidy from the government. It is difficult for people in the target group of the PoA to purchase SANYO PV LED lanterns.

There is an investment barrier for SANYO who will invest to start up this PoA as well as the end users. In order to sell the PV LED lanterns without lowering the quality at the price level which is affordable for poor households in Uganda, SANYO is required to sell the products almost at cost price without expecting any profit. Even applying a subsidy (5.5USD/W) for PV products from the Government of Uganda, there is still a price gap between the price of the SANYO PV LED lanterns and the price of the PV lanterns which are currently available in the market of Uganda (about 50USD[10]). The required price level can only be achieved through additional revenues from the sale of CERs.

Without CER revenue, it is difficult for SANYO to lower the price of the PV LED lanterns to an acceptable price range in Uganda and hence it is difficult for SANYO to invest to introduce the PV LED lanterns in Uganda. Furthermore, without CDM, it will be difficult for Balozi to distribute the PV LED lanterns at an acceptable price range in Uganda.

Technical barrier

Although there are some PV lanterns available in the market in Uganda, the poor quality and reliability of the products avoids their widespread use in Uganda. SANYO developed PV LED lanterns for the purpose of lighting in un-electrified rural households in Uganda. This technology transfer would not happen in the absence of the PoA.

[7] Indicative Rural Electrification Master Plan Report, Ministry of Energy and Mineral Development, January, 2009

[8] Development of an Indicative Rural Electrification Master Plan, Annex 1 Social Survey Summary Report, October 2005, Ministry of Energy and Mineral Development

[9] Worldbank, Uganda at a glance, http://devdata.worldbank.org/AAG/uga_aag.pdf

[10] JICA research report, Utilization and diffusion of renewable energy in un-electrified regions in Africa, Oct 2008

While small sized, mobile PV LED lanterns can be distributed easily, their use is not widespread and aside from distribution issues it is necessary to demonstrate the proper use of the LED lanterns with their rechargeable battery and solar panel. The solar panel recharging units rely on optimum placement in order to collect enough solar radiation to recharge the lantern battery. Care must be taken that there is no shade to block the sunlight and that the solar panel is positioned in the appropriate position and for the appropriate time to receive sufficient solar radiation. The proper use of the SANYO PV LED lanterns will be educated to end users by Balozi and its partner distributors.

Barriers due to prevailing practice

The barrier due to prevailing practice is a similar barrier to the investment barrier. The prevailing practice is to use kerosene lanterns for household lighting. People cannot afford to purchase SANYO PV LED lanterns unless the price range is lowered to meet the required price range using the revenue from the sale of CERs. It is also difficult to overcome this barrier without educating people about the benefit of PV LED lanterns, such as the economic benefits from the saving of kerosene consumption and the reduction of health risks associated with kerosene combustion. SANYO and Balozi will communicate the benefit of PV LED lanterns to enhance distribution of the products under the PoA.

Therefore, due to the existing barriers highlighted above, the project activity would not be implemented in the absence of the PoA.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

The operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA, include:

(i) A record keeping system for each CPA under the PoA

The operational and management arrangements for the implementation of the PoA will be established by the coordinating/managing entity, Balozi. Balozi is the sole coordinating entity of this PoA and implementer of all CPAs under the PoA. Balozi will cooperate with partner PV LED lantern distributors to ensure the proper distribution and operation of PV LED lanterns, and the collection of monitoring data.

Balozi will appoint an internal CDM Manager (TBD) who will be responsible for keeping all the records for each CPA under the PoA. When the PV LED lanterns under each CPA of the PoA are sold to end users, distributors will record the name and address of the users, the lot number of the lanterns and the date the lanterns are sold to them. The distributors will give a receipt with a record of the lot number and the date of sale to end users to identify the lanterns. The distributors will be required to check if the number of PV LED lanterns sold corresponds with the number of receipts.

The database will be set up by Balozi for each CPA and for the PoA. The data collected by local distributors will be sent to the CDM Manager and recorded in a database by Data Managers (TBD) under the supervision of the CDM Manager. Information included in the database is described in Section E.7.

(ii) A system to avoid double accounting

A database will be set up by Balozi for the PoA as well as each CPA under the PoA. The PoA database will include the following information for each CPA under the PoA:

- Name and address of the SANYO PV LED lantern owner;
- Distribution date of the SANYO PV LED lantern;
- Details of the distributor of the SANYO PV LED lantern;
- Lot number of the SANYO PV LED lantern;
- Number of kerosene lanterns handed over in exchange for the SANYO PV LED lantern from its owner.
- Date of return if the distributed SANYO PV LED lantern has any problem.

All lanterns registered in one CPA will be uniquely defined and recorded, thus allowing each CPA to be uniquely identified. Balozi will ensure that any lanterns in a new CPA have neither already been registered as a CDM project activity nor as a CPA of another PoA.

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity

According to the "Guidelines on assessment of de-bundling for SSC project activities", Version 02, Section II, "Guidance for determining the occurrence of de-bundling under a programme of activities (PoA)", Paragraph 9, as each independent subsystems/measures included in a CPA of the PoA is no greater than 1% of the small scale threshold defined by the methodology applied, then the CPA is exempted from performing a de-bundling check and is not considered a de-bundled component of a large scale activity.

Each of the SANYO PV LED lantern systems included in the CPA of a PoA account for 1 W which is less than 1% of the 15 MW threshold of AMS-I.A., therefore a CPA of the PoA is exempt from performing a de-bundling check and is not considered a de-bundled component of a large scale activity.

(iv) Provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA

Balozi is the sole coordinating entity of this PoA and also implementer of all CPAs under the PoA, hence Balozi is aware that all CPAs are subscribed to the PoA.

A.4.4.2. Monitoring plan:

Balozi, as a coordinating/ managing entity, will verify each CPA individually. A database will be set up by Balozi for each CPA and the PoA. The database includes information of name and address of owners' lot number and the date of sale to users of each lantern included in a CPA in order to ensure no double accounting. The monitoring plan for each CPA under the PoA is discussed in Section E.7.

The database will record the start and end dates of each monitoring period and the emission reductions attributable for the monitoring period per each CPA. Balozi will produce a monitoring report for the verification corresponding to the monitoring period.

Balozi will keep a record of all monitoring data electronically for a period of at least two years after the crediting period of the PoA. The figure in Annex 4 shows the monitoring structure for a typical CPA.

A.4.5. Public funding of the programme of activities (PoA):

The proposed PoA will not receive any public funds resulting from official development assistance from Parties included in Annex I to the Convention.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

dd/mm/2010

B.2. Length of the programme of activities (PoA):

28 Years

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☑
2. Environmental Analysis is done at SSC-CPA level ☐

The PoA involves introduction of the PV LED lanterns. Ugandan law does not require an environmental impact assessment (EIA) to be completed for PV LED lantern distribution. Therefore, the environmental analysis is undertaken at the PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

There are not expected to be any environmental impacts due to the implementation of the project.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

Ugandan law does not require an environmental impact assessment to be conducted for a typical CPA included in the PoA as per Section C.1 above.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☑
2. Local stakeholder consultation is done at SSC-CPA level ☐

The geographical boundary of the PoA is the border of Uganda. Each CPA consists of a group of PV LED lanterns distributed in a year throughout Uganda. It was determined that there would be no significant difference in the comments toward this project depending on the year of installation.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

A stakeholder's meeting for the introduction of PV LED lanterns in Uganda was conducted on 13 September 2009 at Busabara village in Entebbe, Uganda. The meeting was held to gather responses on the benefits of distributing the PV LED lanterns to local communities and was conducted in a village with a population of approximately 1,000 people. Invitations were sent to the Village Leader and village members to attend the meeting. There were seventeen (17) participants from the local community including teachers, farmers and local business representatives. Representatives of SANYO and Balozi also attended the meeting. The attendance list for the meeting is attached in Annex 5.

Figure 4. The meeting at the village in Entebbe

D.3. Summary of the comments received:

Respondents were satisfied with the replacement of kerosene lanterns with PV LED lanterns. Comments were received indicating the safety and convenience of the PV LED lanterns, especially in a household setting. Comments were also received concerning the cost saving of the renewable solar panel recharging units as compared to the ongoing price of kerosene and matches.

D.4. Report on how due account was taken of any comments received:

No negative comments were received, thus no further action was deemed necessary.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

All CPAs in this PoA use baseline and monitoring methodology AMS-I.A., "Electricity generation by the user", Version 13. Versions of the baseline and monitoring methodology may change according to the most recent guidance provided by the CDM Executive Board.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

The CPAs included in this PoA comprise renewable energy generation units that supply individual households or users or groups of households or users with electricity. The applicability is limited to households and users that do not have a grid connection. The technology (PV LED lanterns) produces electricity all of which is used on-site by the user and replaces existing fossil-fuel fired generation (kerosene lanterns). The capacity of the renewable energy generating units (PV LED lanterns) does not exceed 15 MW. The capacity of one PV LED lantern system is 1 W so up to fifteen million units can be distributed in one CPA.

The methodology, AMS-I.A., indicates specific clauses for Projects under a programme of activities (paragraphs 21 and 22). The CPAs included in this PoA do not apply the PoA specific clause in paragraph 21 because the CPAs are not biomass project activities.

The CPAs included in this PoA will involve the replacement of equipment. The equipment will be scrapped and as such the leakage from the use of the replaced equipment in another activity is neglected. However, following the second clause of paragraph 22, independent monitoring of the scrapping of replaced equipment will be implemented. A check will be performed to determine that the number of PV LED lanterns distributed by the project corresponds to the number of scrapped kerosene lanterns. The kerosene lanterns will be stored until such correspondence has been checked. The kerosene lanterns will then be scrapped and the scrapping will be documented and independently verified.

E.3. Description of the sources and gases included in the SSC-CPA boundary

The project boundary is the physical, geographic location of each PV LED lantern installed under a CPA. The gas reduced through this CPA is carbon dioxide. The CPA will reduce fossil-fuel consumption by providing renewable energy via installation of the PV LED lanterns. The reduced fossil fuel demand thereby reduces the amount of CO_2 produced by fossil fuel combustion in Uganda.

	Source	Gas	Included?	Justification/Explanation
Baseline	Fossil fuel consumption	CO_2	Included	Baseline lighting consumes kerosene as the fuel source.
		CH_4	Excluded	There is no CH_4 emission.
		N_2O	Excluded	There is no N_2O emission.
Project	PV lighting	CO_2	Excluded	There is no CO_2 emission.
		CH_4	Excluded	There is no CH_4 emission.

		N_2O	Excluded	There is no N_2O emission.

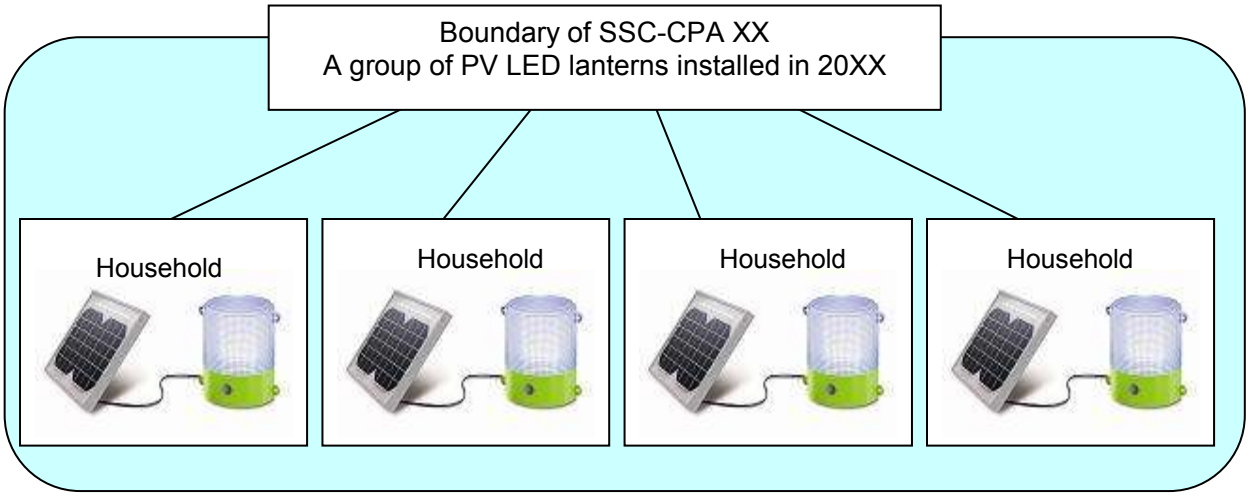

Figure 5. The CPA boundary

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario is the lighting technologies in the absence of the PoA. Possible alternative scenarios include:

1. Utilization of SANYO PV LED lanterns without implementation of PoA, the Project without CDM
2. Utilization of kerosene lanterns, the continuation of the current situation
3. Utilization of PV LED lanterns which are currently available in Uganda
4. Utilization of electric lighting

The use of SANYO PV LED lanterns, the project without CDM (Scenario 1), is hampered by an investment barrier, a technical barrier and barriers due to prevailing practice as described in Section A.4.3.

The utilization of other lighting technologies such as other PV LED lanterns (Scenario 3) is not feasible due to the upfront cost of lanterns for the same reasons as above. Additionally, many of the PV LED lanterns which are currently available in the market in Uganda have issues of low quality leading to a loss of reliability in the products. This technical barrier avoids the widespread use of PV LED lanterns which are currently available in Uganda.

Scenario 4, the use of electric lighting, is also not possible due to the low rate of electrification in Uganda. Although the Government of Uganda is aiming to increase the electrification rate, the dispersed population distribution, especially in rural areas, increases the cost of expanding the grid system, and thus makes it difficult to implement rural electrification. In addition, even if areas have grid access, many households cannot access the grid due to expensive connection fees as outlined previously in Section A.2.

Therefore, in the baseline, the current practice of using kerosene lanterns for lighting would continue in the absence of the project activity to generate the equivalent level of lighting service.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA):

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

According to the "Draft guidelines for the demonstration of additionality for CDM Programme of Activities" submitted to EB51, Paragraph 10, if each of the independent subsystems/measures included in the CPA of a PoA is no greater than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of the PoA is exempted from performing additionality demonstration. Additionality demonstration is therefore not a part of the eligibility criteria for CPA inclusion in a specific PoA.

Each of the SWH systems included in the CPA of a PoA account for approximately 1 W which is less than 1% of the 15MW threshold of AMS-I.A., Version 13 therefore a CPA of the PoA is exempt from performing an additionality demonstration.

(The draft guidelines are still under consideration by EB. This section will be modified depending on the decision on the guidelines.)

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

Following Section E.5.1, a CPA of the PoA is exempt from providing key criteria and data for assessing additionality as the CPA is exempt from performing an additionality demonstration.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

A typical CPA is eligible as a small scale project under category AMS-I.A., "Electricity generation by the user", Version 13. The baseline and monitoring methodology of AMS-I.A., Version 13, are applied for a typical SSC-CPA. Versions of the baseline and monitoring methodology may change according to the most recent guidance provided by the CDM Executive Board.

According to AMS-I.A, the energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quantity of energy.

In accordance with paragraphs 7 (c) in AMS-I.A, option 3: the baseline can be a trend-adjusted projection of historical fuel consumption in situations where an existing technology is replaced.

Equations for determining emission reductions are described in section E.6.2 below.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

Baseline Emissions

The baseline scenario for a CPA is the continued use of kerosene lanterns by households. Methodology AMS-I.A "Electricity generation by the user", Version 13 states "the energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity to generate the equivalent quality of energy. Renewable energy lighting applications shall consider the equivalent level of lighting service instead of energy". In accordance with the instructions provided in paragraphs 7 (c) and 9 of Methodology AMS-I.A, using Option 3: a trend-adjusted projection of historical fuel consumption in situations where an existing technology is replaced, times the CO_2 emission factor for the fuel displaced. The baseline is calculated according to the following equation given by the methodology:

$$BE_y = \sum_{i=1}^{N_{PV}} BE_{i,y} = \sum_{i=1}^{N_{PV}} \sum_j FC_{i,j,y} \times d_j \times NCV_j \times EF_{CO2,j} \quad (1)$$

Where:

Parameter	Value	Unit	Description
BE_y		(tCO_2 / yr)	Emissions in the baseline in year *y*
$BE_{i,y}$	0.077	(tCO_2/yr)	Emissions in the baseline per system *i* in year *y*
$FC_{i,j,y}$	30.0	(Litre/ yr)	Amount of fuel consumption of fuel type *j* (kerosene) per system *i* in year *y*
d_j	0.81715	(kg/Litre)	Density of kerosene
NCV_j	0.0438	(GJ / kg)	Net calorific value of kerosene
$EF_{CO2,,j}$	0.0719	(tCO_2/ GJ)	CO_2 emission factor for kerosene
N_{PV}		(units)	Number of PV LED lanterns in operation during the year
j	-	-	Fuel type used for combustion (kerosene)

According to the results of the survey which was conducted by the Ministry of Energy and Mineral Development in 2005[11], the monthly kerosene consumption for lighting purposes at households is 2.5 litres. Therefore, the annual consumption of 30.0 litres of kerosene is applied to calculate baseline emissions.

Considering the annual growth of GDP[12] at a rate of 5.1% in 2006 and 6.5% in 2007, it is assumed that the consumption of kerosene has increased in line with economic growth. Applying the value of 30.0 litres of kerosene consumption in 2005 for the baseline emission calculation provides a conservative estimation.

Baseline emissions are calculated as:

$$BE_y = \sum_{i=1}^{N_{PV}} BE_{i,y} = \sum_{i=1}^{N_{PV}} \sum_j FC_{i,j,y} \times d_j \times NCV_j \times EF_{CO2,j}$$

[11] Development of an Indicative Rural Electrification Master Plan, Social Survey Summary Report, October 2005, Ministry of Energy and Mineral Development

[12] Uganda at a glance, Worldbank, http://devdata.worldbank.org/AAG/uga_aag.pdf

$$= N_{PV} \times 30 \times 0.81715 \times 0.0438 \times 0.0719$$
$$= N_{PV} \times 0.077$$

The energy from the combustion of 30.0 litres of kerosene provides a lighting service at 30 lumen which is calculated as follows:

$$l = \frac{FC_{i,j,y} \times d_j \times NCV_j \times \frac{1}{3.6 \times 10^{-6}} \times LE_j}{365 \times h}$$
$$= \frac{30 \times 0.81715 \times 0.0438 \times \frac{1}{3.6 \times 10^{-6}} \times 0.13}{365 \times 3.5}$$
$$= 30.35$$

Where:

Parameter	Value	Unit	Description
l		(Lumen)	Lighting service
LE_j	0.13	(Lumen/W)	The specific luminous efficiency of kerosene when burnt in a kerosene lantern[13]
h	3.5	(hour/day)	Average hours of light use per day. The value is from the Methodology AMS-I.A.

The lighting service provided by the SANYO PV LED lantern is 116 lumen and this is far beyond the level of service provided by the consumption of 30 litres of kerosene. This also proves the conservativeness of baseline emissions based on 30 litres of kerosene consumption.

Project emissions

Inherently, as the energy is sourced from a renewable resource, there are no project emissions from a CPA. There are no emissions derived from fossil fuel consumption or electricity consumption by the project activity.

Leakage

The CPAs included in this PoA involve the replacement of equipment. The equipment will be scrapped and as such the leakage from the use of the replaced equipment in another activity is neglected.

Following the second clause of paragraph 22, independent monitoring of the scrapping of replaced equipment will be implemented. A check will be performed to determine that the number of PV LED lanterns distributed by the project corresponds to the number of scrapped kerosene lanterns. The

[13] The source of data 0.13 Lumen/W: Louineau et al., *Rural Lighting, A Guidance for Development Workers,* Intermediate Technology Publications in association with The Stockholm Environment Institute 1994, page 31

kerosene lanterns will be stored until such correspondence has been checked. The kerosene lanterns will then be scrapped and the scrapping will be documented and independently verified.

Emission Reductions

Emission reductions are calculated as the difference between the energy baseline and the sum of the project emissions (PE_y) and leakage (LE_y).

$$ER_y = BE_y - (PE_y + LE_y) \quad (2)$$

Where:

Parameter	Value	Unit	Description
ER_y		(tCO_2/yr)	Emissions reductions in year *y*
PE_y	0	(tCO_2/yr)	Project emissions in year *y*
LE_y	0	(tCO_2/yr)	Leakage in year *y*

The emission reductions are calculated as follows by applying the calculation results of baseline emissions.

$$\begin{aligned} ER_y &= BE_y - (PE_y + LE_y) \\ &= \sum_{i=1}^{N_{PV}} BE_{i,y} - (0+0) \\ &= N_{PV} \times 0.077 \end{aligned}$$

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	$EF_{CO2,,i}$
Data unit:	tCO_2 / GJ
Description:	CO_2 emission factor for kerosene
Source of data used:	2006 IPCC guidelines for National Greenhouse Gas Inventories
Value applied:	0.0719
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	---

Data / Parameter:	NCV_j
Data unit:	GJ / kg
Description:	Net calorific value of kerosene
Source of data used:	2006 IPCC guidelines for National Greenhouse Gas Inventories
Value applied:	0.0438

Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	---

Data / Parameter:	$FC_{i,y}$
Data unit:	Litre / yr
Description:	Amount of fuel consumption of kerosene
Source of data used:	Ministry of Energy and Mineral Development
Value applied:	30.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is the kerosene consumption for one kerosene lantern for one year based on the density of kerosene and historical data for the consumption of kerosene (by volume).
Any comment:	---

Data / Parameter:	d_i
Data unit:	kg / Litre
Description:	Density of kerosene
Source of data used:	SImetric.co.uk
Value applied:	0.81715
Justification of the choice of data or description of measurement methods and procedures actually applied :	Density of kerosene at 60F. http://www.simetric.co.uk/si_liquids.htm
Any comment:	---

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	N_{PV}
Data unit:	[units]
Description:	Number of PV LED lanterns in operation during the year *y*
Source of data to be used:	Database developed by Balozi Inc.
Value of data applied for the purpose of calculating expected	-

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Directly determined in the course of distributing the PV LED lanterns included in a CPA. Registered distributors will collect and record the number of lanterns distributed under a CPA.
QA/QC procedures to be applied:	Balozi will cross-check against its internal records of the number of PV LED lanterns purchased from SANYO under the program and the number of kerosene lanterns replaced.
Any comment:	---

Data / Parameter:	N_{KL}
Data unit:	[units]
Description:	Number of kerosene lanterns collected and scrapped during the year *y*
Source of data used:	Database developed by Balozi Inc.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Directly determined in the course of distributing the PV LED lanterns included in a CPA. Registered distributors will collect and record the number of kerosene lanterns collected in exchange for PV LED lanterns installed under a CPA.
QA/QC procedures to be applied:	Balozi will cross-check against its internal records of the number of PV LED lanterns purchased from SANYO under the program and the number of kerosene lanterns collected.
Any comment:	The scrapping of collected kerosene lanterns should be documented and independently verified.

E.7.2. Description of the monitoring plan for a SSC-CPA:

According to the monitoring methodology, AMS-I.A., "Electricity generation by the user", Version 13, monitoring shall consist of:

(a) An annual check of all systems or a sample thereof to ensure that they are still operating (other evidence of continuing operation, such as on-going rental/lease payments could be a substitute) or

(b) Metering the electricity generated by all systems in a sample thereof.

Because a large number of PV LED lanterns to be installed under a CPA, an annual check of all systems is not feasible and therefore samples will be monitored to ensure that they are still operating.

Also, the monitoring of scrapping of kerosene lanterns needs to be implemented according to paragraph 22 of AMS-I.A in order to neglect the leakage from the use of the replaced equipment in another activity. The monitoring procedure for a CPA is explained below:

1) Develop a database for a CPA

Balozi will establish a database for each CPA. The database include following information:

- Title of a CPA defined by the year of a PV LED installed

- For each PV LED lantern:
  - Name and address of the SANYO PV LED lantern owner.
  - Distribution date of the SANYO PV LED lantern.
  - Lot number of the SANYO PV LED lantern.
  - Details of the distributor of the SANYO PV LED lantern.
  - Number of kerosene lanterns handed over in exchange for the SANYO PV LED lantern from its owner.
  - Date of return if the distributed SANYO PV LED lantern has any problem.

- Date and number of kerosene lanterns collected and scrapped.

2) Select sampling systems

Sampling method is defined following "General guidelines for sampling and surveys for small-scale CDM project activities". Multi-Stage Sampling will be applied as a sampling method of a CPA considering that the population is very large, geographically dispersed, and relatively homogeneous.

The following steps are undertaken to select sample systems:

Step I. Define sub-units
For each monitoring period, all districts where PV LED lanterns will be distributed are listed.

Step II. Select samples of sub-units
Sample districts will be selected randomly from the list described in Step I. The number of sub-units (districts) selected will be determined depending on the number of PV LED lanterns distributed per district.

Step III. Select sample systems from sample sub-units
Sample systems will be selected randomly from sample districts selected in Step II. The number of sample systems to be selected will be determined depending on the number of PV LED lanterns distributed in total and per district.

Survey sample size shall be determined to have at least 90% confidence level with 10% margin of error.

（Detailed sampling methodology will be decided depending on the distribution plan.）

3) Conduct Survey

Ex-post monitoring survey will be carried out annually among sample systems. In the survey, Balozi's partner distributors will visit the owners of sample systems and assess whether the PV LED lanterns are in operation or not.

The data will be collected and sent to the Data Manager (TBD) of Balozi. The Data Manager will record all the data collected in the database.

4) Monitoring of scrapping of kerosene lanterns

Balozi will verify whether the number of distributed PV LED lanterns is less than or equal to the number of kerosene lanterns collected and scrapped at the beginning of each monitoring interval. The scrapping of kerosene lanterns should be documented and independently verified.

5) Prepare the Monitoring Report

Balozi is responsible for preparing the Monitoring Report with the support of SANYO.

E.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

The baseline study was completed on dd/mm/10 by:

Hiroyuki Kakuchi
Clean Energy Solutions Department,
Global Sales Division International Sales & Marketing H.Q.
Sanyo Electric Co., Ltd.
5-15, Keihan-hondori 2-chome, Moriguchi City,
Osaka, 570-8677, Japan
hiroyuki.kakuchi@sanyo.com

Clean Energy Finance Committee
Mitsubishi UFJ Securities Co., Ltd.
2nd Floor, KR Toyosu Building,
5-4-9 Toyosu, Koto-ku,
Tokyo, 135-0061, Japan
watanabe-hajime@sc.mufg.jp

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

Organization:	Balozi Inc.
Street/P.O. Box:	
Building:	
City:	Kampala
State/Region:	
Postfix/ZIP:	
Country:	Uganda
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	Sanyo Electric Co., Ltd.
Street/P.O.Box:	5-5
Building:	Keihan-Hondori 2-Chome
City:	Moriguchi
State/Region:	Osaka
Postfix/ZIP:	570-8677
Country:	Japan
Telephone:	06-6994-7359
FAX:	
E-Mail:	
URL:	http://sanyo.com
Represented by:	
Title:	
Salutation:	
Last Name:	Kakuchi
Middle Name:	
First Name:	Hiroyuki
Department:	Clean Energy Solutions Department

Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	Hiroyuki.Kakuchi@sanyo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The PoA will not receive any public funds resulting from official development assistance from Parties included in Annex I to the Convention.

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION

CPA monitoring information is found in Section E.7. The sampling procedure and monitoring structure are shown as follows:

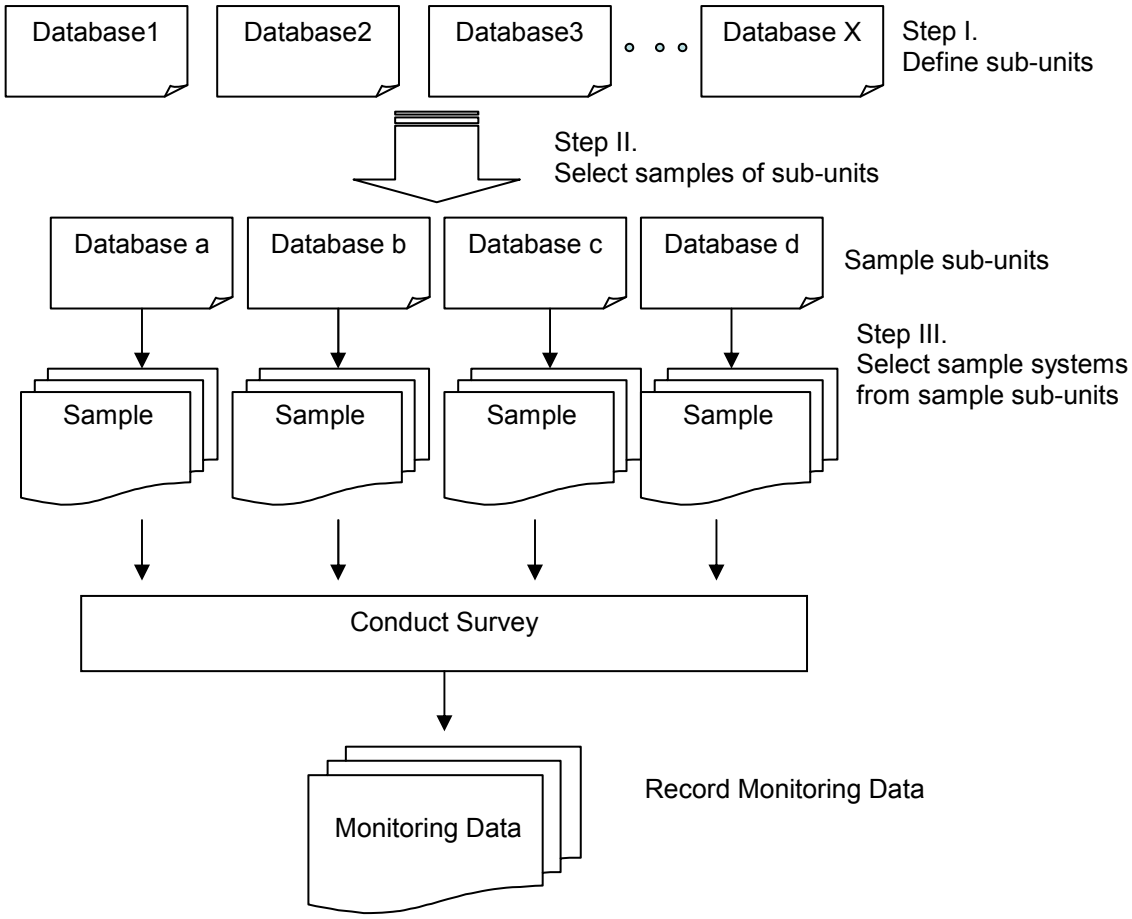

Figure 6. Sampling Procedure

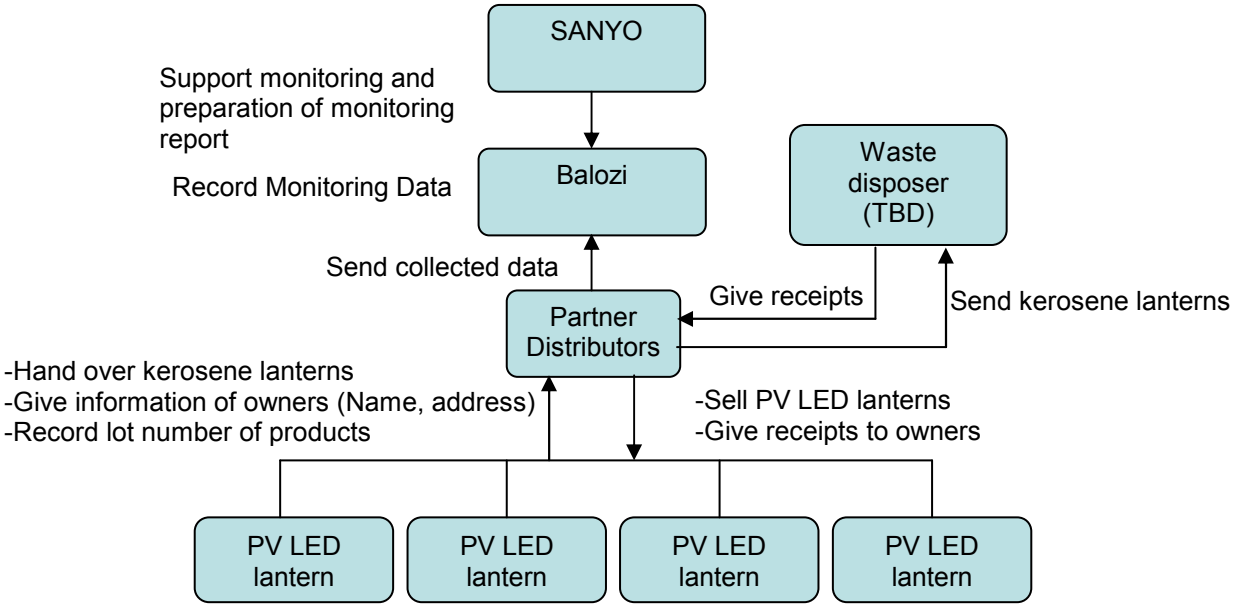

Figure 7. Monitoring Structure

Annex 5

Stakeholder meeting attendance list

SANYO Solar Lantern project
Stakeholder Meeting on 13th Sep, 2009 attendance list

	NAME	Occupation	Date	Signature
1	NANSAMBA REHEMAH	TEACHER	13th-09-09	
2	NaBANKE MAJoyce	Farmer	13-09-09	
3	NANSUBUGA ALICE	FARMER	13-09-09	Nansubuga
4	LUKOWE ROBINAR	FARMER	13-09-09	Lukowe
5	NAMPEWO FLORENCE	FARMER	13-09-09	Nampewo
6	NYONGO SARAH	FARMER	13-09-09	Nyongo
7	NAMAKULA ROSE	FARMER	13-09-09	Namakula
8	TUHUMULE LILIAN	HOUSEWIFE	13-09-09	Tumule
9	NANFUKA ANNET	TAILOR	13-09-09	Nanfuka
10	NAMUGERWA ANNET	HOUSE WIFE	13-09-09	Namugerwa
11	NALONGO KIMBUGWE	HOUSE WIFE	13-09-09	Nalongo
12	NAKIBUUKA MARGRET	FARMER	13-09-09	Nakibuuka
13	NABUKENYA SYLVIA	SOLOONIST	13-09-09	Nabukenya
14	MIREMBE JUSTINE	TAILOR	13-09-09	Mirembe
15	NAMAGEMBE GORACIOUS	HOTELICTIC	13-09-09	Namagembe
16	NANSEREKO SACHILINE	HOUSEWIVE	13-09-09	Nansereko
17	BALONDEMU FLORENCE	FARMER	13-09-09	Balondemu
18				
19				
20				