CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
VERSION 01 (21 JANUARY, 2003)

CDM Project Design Document (PDD):
Final PDD, 10. Oct. 2005

CDM SOLAR COOKER PROJECT Aceh 1
INDONESIA

CONTENTS

Annexes

A. General description of project activity

A.1 Title of the project activity:

CDM SOLAR COOKER PROJECT Aceh 1

A.2 Description of the project activity:

The "CDM SOLAR COOKER PROJECT ACEH 1" aims for the district of
Sabang Islands/Aceh/Indonesia and Aceh Tenggara in the framework of a Small Scale CDM Project:

- Help people depending on traditional fuel (which causes environmental destruction, diseases, forest fires, non-sustainable logging of trees and emission of smoke and greenhouse gases) by introducing newly developed solar cookers and heat retention containers for cooking, heating and sterilizing of water and for preserving food.
- Training all steps of implementation of these technologies,
- Collect all data needed for the CDM project,
- Demonstrate chances of financing environmental projects by the help of CDM,

by cooperation of:

- Government of Aceh Province, Indonesia
- PT Petromat Agrotech, Jakarta, Indonesia
- Klimaschutz e.V., Bonn, Germany
- German experts on solar cookers, fuel saving devices and CDM.

The project strives to transfer and spread most advanced technologies of solar cookers and of heat retaining containers (to finish cooking by unattended simmering and to separate mealtime and cooking time).

The transferred state of the art technology from Germany uses renewable resources for cooking meals, heating and sterilising water and preserving food.

The transferred technology can be a source of additional income e.g. by preserving the quality of fish before further processing. The knowledge of advantages of applying renewable sources of energy and energy saving can be applied in various fields of production and daily life and results in household savings and environmental friendly behaviour. In this way, protecting the forest can be understood as protecting the resources for future generations.

One of the main reasons of deforestation in Indonesia is the use of firewood for cooking. The project aims to show that this can be changed without additional burdens to the country. The people who depend on firewood have not got the means to purchase solar cookers, which leads them into a vicious circle of poverty and leads consequently to environmental destruction that generates further poverty because of destroyed natural resources. Therefore pre-financing the returns of CERs enabling Klimaschutz e.V. to purchase solar cookers is meant to assist people in need of escaping from this vicious circle. In this way undesirable social developments can be prevented.

The solar cookers are delivered to Sabang City and the City of Badar partially prefabricated. Assembly is labour intensive. Two people will need approximately 4 hours to assemble one solar cooker. Therefore we intend to employ about 10 people who are trained and supervised by PT Petromat Agrotech to assemble the solar cookers. Although this project will produce direct employment by assembling and monitoring, the greater impact of generating wealth for the users is the application of the new devices for generating income and for saving expenses.

The solar cookers are meant to be used for the entire duration of the project. They are not intended to be replaced by another technology during this time. Spare parts and maintenance are provided by the entire project duration. Klimaschutz e.V. provides spare parts on necessity. PT Petromat Agrotech supplies spare parts to the users and takes care of correct use.

Monitoring of the project will be combined with an enduring educational program to ensure best use of the cooking devices. The educational program will also contain teaching of skills in building the cookers and other life skills.

State of the art technology for solar cooking and heat retaining will be transferred from Germany and adapted to meet local demands through intensive participation of the local company PT Petromat Agrotech.

Staff members of PT Petromat Agrotech have already been trained in assembling the solar cookers. It is planned that further staff will be trained in the skills of assembly, use and monitoring at project locations.

It is planned to cooperate intensively with local NGOs, especially for monitoring, training and environmental education. Willingness to cooperate has been expressed by several local NGOs already.

The project satisfies the eligibility criteria of CDM-projects:

1. Contribution to sustainable development
2. Environmental additionality
3. Financial additionality.

The project is designed to contribute to sustainable development by protecting the environment and by improving the living conditions. This is achieved by saving non sustainable harvested fuel wood and by avoiding the emission of greenhouse gases and smoke from traditional cooking and from forest fires, and by improving the living standard of households, promoting health and enabling income generation.

Additionality is described in chapter B3.

A.3 Project participants:

1. PT Petromat Agrotech

Person in Charge: Ir. Rudi Wahyudi

Core business: Renewable energy, especially solar drying, solar home systems and agricultural engineering; for more than 20 years in the business.

Function in the project:
Monitoring and project administration; assembly, distribution and maintenance of the equipment.

PT Petromat Agrotech is responsible for the annual project review. PT Petromat Agrotech coordinates with Klimaschutz e.V. in case one of the following changes is necessary:

a) providing additional equipment
b) adaptation of training methods
c) changes of beneficial users of equipment.

2. Klimaschutz e.V.

Project director: Klaus Trifellner

Function in the project: Investor and project supervision.

Klimaschutz e.V. receives 100% of the CERs resulting from the project activity. The revenues from the CERs are mainly used to cover the cost of equipment, its implementation and its improvement and maintenance.

The official contact for project activities is PT Petromat Agrotech.

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies): INDONESIA
Home country of investor: GERMANY

A.4.1.2 Region/State/Province etc.: Sabang Islands/Aceh and Aceh Tenggara

A.4.1.3 City/Town/Community etc: Sabang Islands and Badar

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity:

The project is designed for households and small scale fishing industry of the districts in Sabang Islands in the north of Aceh and the City of Badar in Aceh Tenggara.

A.4.2 Type and category(ies) and technology of project activity

Type 1: Renewable Energy Projects
Category I.C: Thermal energy for the user

The project falls into this category as it uses renewable energy by introduction of solar cookers and heat retaining containers. The project avoids the use of non-sustainable harvested fuel wood.

A solar cooker of the type K14 (diameter of reflector parabola about 140 cm), used by the project, has the nominal power[1] $P = 600$ W. The project consists of up to 1000 devices, thus the installed power adds up to maximum 0.600 MW, which is below the limit of 15 MW of Small Scale Projects (Appendix B, I.C., chapter 2).

The cookers are used in households and small scale enterprises (e.g. fishery). The technology is transferred from Germany by providing the knowledge and prefabricated solar cooker kits and by propagation of technology for cooking by retained heat. The cookers are built locally under the supervision of the local specialists trained by German trainers.

In the past many attempts have been undertaken to spread solar cookers[2] with limited success and valuable experience. The project has a new concept using CDM as a means of making devices of high quality and long durability accessible to the people who most need to overcome the disadvantages of conventional cooking. A further difference of the project's concept is the use of prefabricated kits. This enables production of high capacity and high quality and assures a transparent process of the project.

The design of the solar cooker K14 is based on more than 20 years of experience with development and

[1] see Equation (2a) in B5.1

[2] E. g.: DME-GTZ-field test in South Africa, s. "Moving Ahead with Solar Cookers - Acceptance and Introduction to the Market", GTZ, Eschborn. Also: Documentation provided by SCI, Solar Cookers International

(Complete references are given in Annex 7)

dissemination of parabolic solar cookers. Using effective containers for cooking with retained heat (simmering) in addition to the cooker is a highly recommended measure for saving energy, to separate cooking time from meal time, to conserve water at high temperature, to shorten the time when the pot is in the cooker, and to simplify the cooking process; this is because simmering takes place without the need of surveillance and intervention. The project will turn high attention to this technology.

Experience with the existing parabolic solar cookers has proved that the reflector material has a life span of more than 7 years if used appropriately. For the corrosive atmosphere near to the coast a special protection coating on the reflector is applied to ensure the long life span. Defect components can be replaced easily as a maintenance activity. Spare parts are delivered on necessity.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

Reduction of anthropogenic GHG emission is achieved by using solar cookers and heat retaining containers to avoid the non sustainable use of fuel wood.

Assumed mean emission reduction (CO_2-equivalents) by a solar cooker K14 in combination with a heat retaining container by avoiding non sustainable use of fuel wood is m_{CO2} = 3.5 CO_2 eq tonnes/year. After installation of 1000 units the total amount of emission reduction by about 1000 households is assumed[3] to be about 3500 CO_2 eq tonnes/year. As an education program and a maintenance service are incorporated into the project, it is assumed that the emission reduction is constant during the first crediting period.

CDM SOLAR COOKER PROJECT Aceh 1		
Year	**CO2 eq tonnes abated**	**Cumulative (tonnes)**
2006	3500	3500
2007	3500	7000
2008	3500	10500
2009	3500	14000
2010	3500	17500
2011	3500	21000
2012	3500	24500
Total	**24500**	

A.4.4 Public funding of the project activity:

There is no public development funding (ODA) going into this solar cooker project.

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

The project is not a debundled component of a larger project activity.

B. Baseline methodology

[3] Emission reduction is calculated by formula (7f) in chapter D.3, derived in chapter B5.1. The amount m_{CO2} = 3.5 CO_2 eq tonnes/device/year is calculated by formula (7c) in chapter B5.1 with the stated assumptions.

B.1 Title and reference of the project category applicable to the project activity:

Title: CDM SOLAR COOKER PROJECT Aceh 1
Type: Renewable Energy Projects
Category I.C: Thermal energy for the user

B.2 Project category applicable to the project activity:

Renewable energy technologies that displace non-renewable sources of biomass.

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity.

Without the project there will be an emission of GHGs by the combustion of fuel wood which is non sustainable harvested and by emissions due to products of incomplete combustion (PICs) of the fuel wood.

The logging for the purpose of firewood and losses from forest fires are higher than national forestation. Changes of forest area in Indonesia are reported by World Resources Institute (Earth Trends; Country profile Indonesia [11]). National policy is dedicated to avoiding forest fires due to conventional burning of firewood. The population continuously depends on logging trees for firewood. If the devices are provided, illegal and legal non-sustainable logging will be avoided.

The thermal capacity of the project is 600 kW (s. A4.2) which is below the limit of 15 MW, therefore a simplified methodology for small scale projects applies.

Sinks are not taken into account, until there it is a reliable base for calculation. The intention of the project however comprises the transition to sustainable firewood consumption. This enables trees to continue to grow and biomass is not exhausted, resulting in a durable stock of CO_2 which is removed from the atmosphere.

The only two alternatives that could be proposed for cooking for target households in the project area are either the use of fuel wood or solar cooking.

The project is additional, because the target group of users doesn't have the means to purchase the fuel wood saving devices. The average income in this area of the target group is about 30 Euro per month. It would mean a significant part of the income of the population. By the finance of an investor, who actually pre-finances the returns of the CERs, it is possible to realize the project.

Project barriers:

1. Risks from natural disasters:
Natural disasters cannot be avoided, but they are part of the risk. According to local statements and official records disasters that could affect the project happen in a frequency of about 100 years.

2. Lack of acceptance by population:
This barrier will be overcome by educational efforts, training, events and random visits.

3. Financial barriers:
Without CDM credits the entire project will not be self supporting. This barrier is already overcome by prefinancing the returns of the CERs by an investor.

B.4 Description of the project boundary for the project activity:

The project boundaries are the Sabang Islands of Aceh and the city of Badar in Aceh Tenggara.
In both islands and in the city of Badar the firewood is logged locally. The firewood is not transported from other locations.

B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

Appendix B of the simplified M&P for small-scale CDM project activities, I.C. §19 states:
"For renewable energy technologies that displace non-renewable sources of biomass, the simplified baseline is the non-renewable sources of biomass consumption of the technologies times an emission coefficient for the non-renewable sources biomass displaced. IPCC default values for emission coefficient may be used."

The displacement of the non renewable harvested fuel wood by a device consisting of a solar cooker in combination with the heat retaining container can be calculated in several ways. A method is applied which gives conservative values and enables a simplified monitoring procedure:

With the known effective power P of one device[4] and its monitored operating time t we get the effective energy E_{eff} delivered by the device:

$$E_{eff} = P * t. \quad (1)$$

P: nominal effective power of the solar cooker K14. "Effective" means that the power is effectively heating the pot content i.e. that losses have been subtracted.
t: variable t (operating time) as only input variable
E_{eff}: effective energy from solar cooker depending on operating time t.

(Please note: A list of dimension units, abbreviations and mathematical symbols used in the formulae is given in Annex 6.)

The nominal effective power P of the solar cooker is calculated by the formula[5]

$$P = (T_2 - T_1) * c_{p,W} * m_W / t_b \quad (2).$$

Solar cooker K14 brings 6 litres of water (specific heat capacity $c_{p,W}$ = 4,18 kJ/kg/K) with mass m = 6 kg from temperature T_1 = 20 °C to T_2 = 100 °C (boiling point for normal atmosphere) in a time t_b = 55 minutes[6] with bright sunshine:

$$P = (100 - 20)\ K * 4.18\ kJ/kg/K * 6\ kg / (55 * 60s) = 0.6\ kJ/s = 600\ W. \quad (2a)$$

P = 600 W is used in equation (1) to calculate the effective energy E_{eff}. This energy can be converted to the saved primary energy E by dividing E_{eff} by the overall efficiency η of the fuel wood use:

$$E = E_{eff} / \eta \quad (3)$$

[4] device = a solar cooker K14 and a heat retaining container

[5] heat capacity of the pot is neglected to give a conservative value

[6] GTZ-publication "Moving Ahead with Solar Cookers" reports 6 values for heating 6 litres of water from 40 °C to 80 °C resp. 96 °C. SK12 in the test has same reflector geometry as K14. The results confirm the value P = 600 W.

E_{eff}: inserted from equation (1) with P from equation (2a)
η: overall efficiency of traditional fireplaces for cooking including simmering (conservative value).

A conservative value of overall efficiency η of traditional wood consumption (open fire) is

$$\eta = 10\%. \quad (3a).$$

Efficiency values of 5 to 15% for traditional open fireplaces - and higher values of laboratory studies with good wind protection - are reported but they do not express overall efficiency η.

The Policy Discussion Paper for the Environmentally Sustainable Development Group (ESDG) of the United Nations Development Programme (UNDP) "Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations", published by UNDP, Kingdom of Morocco and GEF [9][7], resumes on page 8: "The most common method of cooking throughout rural areas of the developing world is the open hearth or three-stone fire, which typically transfers only 5 - 15 per cent of the fuel's energy into the cooking pot."

For practical application an overall efficiency $\eta = 10\%$ is a conservative approach because η has to account for the whole energy of the burnt fuel wood which is only partially used for elevating the temperature of the pot content. A large part of the fuel wood consumption is used for simmering purposes which causes considerable fuel wood consumption and has efficiency zero because in this time the consumption of fuel wood is only used to cover the heat losses, including vaporisation losses.

Reported values of traditional fireplace efficiency higher than 10% don't account for these losses. This is evident from reported data of fuel wood consumption and will be discussed in detail below. The transferred technology avoids these losses by combining the use of solar energy with the heat retaining technique.

To estimate the saved carbon emission m_C from the calculated saved primary energy E we can multiply E by the default value for the Carbon Emission Factor (*CEF*) for solid biomass, disclosed on page 1.6 of IPCC Workbook, chapter "Energy" [4]:

$$CEF = 29.9 \text{ t C/TJ } [= 29.9 \text{ kg C/GJ} = 0{,}0299 \text{ kg C/MJ}] \quad (4)$$

$$m_C = E * CEF \quad (5)$$
$$= E * 0.0299 \text{ kg C/MJ} \quad (5a)$$
$$= P * t / \eta * 0.0299 \text{ kg C/MJ} \quad (5b)$$
$$= P * t * 0.299 \text{ kg C/MJ} \quad (5c)$$

m_C: saved carbon mass
E: energy value from equation (2)
P: nominal effective power of solar cooker K14; $P = 600$ W, see equation (2a)
t: measured operating time
η: overall efficiency of traditional fireplaces; $\eta = 10\%$ is entered in equation (5b) for equation (5c).

Conversion of the saved amount m_C of carbon to the saved amount m_{CO2} of CO_2 results from multiplication with the molecular weight ratio of CO_2 to C = 44/12 kg CO_2/kg C according step 6 of the ICPP Reference Manual, p. 1.10 and p. 1.30 [5]:

$$m_{CO2} = m_C * 44/12 \text{ kg } CO_2/\text{kg C} \quad (6)$$

[7] numbers in [ ] refer to the list of references, Annex 7

m_C: from equation (5c)

$$m_{CO2} = P * t / \eta * CEF * 44/12 \text{ kg } CO_2/\text{kg C} \quad (7)$$
$$= P * t * 1.096 \text{ kg } CO_2/\text{MJ} \quad (7a)$$
$$= E_{eff} * 1.096 \text{ kg } CO_2/\text{MJ} \quad (7b)$$

For the solar cooker K14 with power P = 600 W/device and an assumed annual operating time t = 1500 h/device/year the effective energy E_{eff} is according equations (1) and (2):

$$E_{eff} = P * t = 0.6 \text{ kW} * 1500 \text{ h/device/year} * 3600 \text{ s/h} \quad (1a)$$
$$= 3240\,000 \text{ kWs/device/year} \quad (1b)$$
$$= 3240 \text{ MJ/device/year} \quad (1c).$$

The assumed time t = 1500 h is just used as a sample calculation. Real time is provided by the monitoring.

The calculated value of E_{eff} = 3240 MJ/device/year according equation (1c) corresponds to a CO_2-emission according formula (7b):

$$m_{CO2} = E_{eff} * 1.096 \text{ kg } CO_2/\text{MJ}$$
$$= 3240 \text{ MJ/device/year} * 1.096 \text{ kg } CO_2/\text{MJ}$$
$$= 3551 \text{ kg } CO_2/\text{device/year} \quad (7c).$$

The annually saved CO_2-emission m_{CO2} per device with an assumed operating time of 1500 h/year is about 3.5 tonnes CO_2/device/year.

Assumed annual operating time t = 1500 h is about half of the sun hours at the location. In periods unfavourable for solar cooking other means for cooking are used. This is considered in the assumed operating hours.

To check the plausibility of the savings and for justification of the assumed value of 10% for the overall efficiency of the traditional fireplace we can use another way to estimate the saved CO_2-emission, using data about the average energy consumption:

According Annex III §1 of FAO-paper "Wood Fuel Surveys" [2], the energy consumed per capita for cooking in developing countries is about E_1 = 8.0 GJ/capita/year. Data about energy end-use for cooking and for water heating of low income households can be derived from the publication "The Challenge of Rural Energy Poverty in Developing Countries" of World Energy Council. Section 2.3.1 "Cooking" quotes the result of a research project: "… daily cooking energy consumption per capita varied from 11.5 to 49 MJ, based on field measurements. Despite a wide range of locations and conditions the range of consumption is quite small. In all the cases food was cooked predominantly on an open fire. However, the lower figures are those applying to efficient wood or charcoal stoves and modern energy sources." [10]

The upper value of 49 MJ/capita/day refers to households which have no access to efficient wood or charcoal stoves or modern energy sources and would apply for the project households. Conversion to the annual consumption leads to

$$E_{1,\text{ upper value}} = 49 \text{ MJ/capita/day} * 365 \text{ day/year}$$
$$= 17.88 \text{ GJ/capita/year}$$

$E_{1,\text{ upper value}}$: annual primary energy consumption per person derived from 49 MJ/capita/day.

To get a conservative value, the further calculation is using as primary energy consumption E_1 = 10

GJ/capita/year (instead the upper value of 17.88 GJ/capita/year), which corresponds to a daily value of 27.4 MJ/capita/day. This is below the medium of the cited values (11.5 to 49 MJ/capita/day).

$$E_1 = 10 \text{ GJ/capita/year} \quad (8)$$

E_1: assumed annual primary energy consumption per person for further calculation.

The value E_1 = 10 GJ/capita/year also includes the energy used for sterilizing water and for preserving food. This is additionally contributing to the conservative assumption.

The mean number N of the group members of the target groups (families) in Indonesia is about

$$N = 5.5 \text{ capita/group} \quad (9)$$

as most target groups (households) have 5 to 6 members.

With these data the calculated primary energy consumption E_p of a group using a solar cooker is

$$E_p = E_1 * N = 10 \text{ GJ/capita/year} * 5.5 \text{ capita/group} \quad (10)$$
$$= 55 \text{ GJ/group/year.}^8$$

The above mentioned Carbon Emission Factor (*CEF*) from IPCC Guidelines Workbook [4] enables the conversion of the primary energy consumption E_p to the correspondent amount of $m_{C,p}$

$$m_{C,p} = E_p * CEF = 55 \text{ GJ/group/year} * 29.9 \text{ kg/GJ} \quad (11)$$
$$= 1644.5 \text{ kg C/group/year.}$$

CEF from equation (4), E_p from equation (10).

This annual consumption $m_{C,p}$ of carbon leads by equation (6) to an annual CO_2-emission

$$m_{CO2,p} = m_{C,p} * 44/12 \text{ kg } CO_2/\text{kg C} \quad (12)$$
$$= 1644.5 \text{ kg C/group/year} * 44/12 \text{ kg } CO_2/\text{kg C}$$
$$= 6030 \text{ kg } CO_2/\text{group/year.}$$

This calculated value $m_{CO2,p}$ is higher than m_{CO2} calculated by equation (7c):
(m_{CO2} = 3551 kg CO_2/device/year.) This reflects also the fact, that a solar cooker and the heat retaining container used by the group cannot substitute totally the fuel wood consumption.

Klimaschutz e.V. has made a preliminary survey about the fuel wood consumption in Indonesia. Results after questioning more than 20 potential user families have shown that energy consumption E_1 = 10 GJ/capita/year is a conservative assumption: A typical amount of fuel wood consumption of a family is about 100 kg/week, i.e. 5200 kg/year. This may correspond to more than 4000 kg dry wood per year, corresponding to a CO_2-emission of about 7300 kg CO_2/group/year.This is more than the calculated amount $m_{CO2,p}$ = 6030 kg CO_2/group/year calculated by using the value of E_1 = 10 GJ/capita/year according equation (8) and affirms that E_1 = 10 GJ/capita/year is a conservative value.

The annual saving of fuel wood can be higher by inserting the locally determined properties of the fuel wood instead of default values.

There are other methods for determining the saving of greenhouse gas emissions by the use of solar

[8] "group" corresponds to "device" as it is assumed that one group (family) uses one solar cooking device.

cookers and heat retaining containers, by comparing the amount of fuel wood consumption with and without the project implementation. But monitoring of this method is problematic.

In any case, it has to be confirmed that there would be a non-sustainable fuel wood logging in absence of the project.

To give a conservative estimation, the amount of non-CO_2 greenhouse gases produced by incomplete combustion, especially methane, is not included in the calculation. Sinks of greenhouse gases by the growing of otherwise - in absence of the project - logged trees also have not been considered yet.

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*: 09/05/2005

B.5.3 Name of person/entity determining the baseline:

Dr.-Ing. Dieter Seifert
Senior Engineer
E-mail: bdiv.seifert@t-online.de
in co-operation with Klimaschutz e.V.
Klimaschutz e.V is listed in annex 1; Dr. Seifert is not separately listed in annex 1 of this document.

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity: 1st January 2006

C.1.2 Expected operational lifetime of the project activity: 21y-0m

C.2 Choice of the crediting period and related information: *(Please underline the selected option (C.2.1 or C.2.2) and provide the necessary information for that option.)*

(Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, the starting date of the crediting period can be prior to the date of registration of the project activity as provided for in paragraphs 12 and 13 of decision 17/CP.7 and in any guidance by the Executive Board, available on the UNFCCC CDM web site.)

C.2.1 **Renewable crediting period** ***(at most seven (7) years per crediting period)***

C.2.1.1 Starting date of the first crediting period *(DD/MM/YYYY)*: 1.1.2006

C.2.1.2 Length of the first crediting period *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*: 7y-0m

C.2.2 **Fixed crediting period *(at most ten (10) years)*:**

C.2.2.1 Starting date *(DD/MM/YYYY)*:

C.2.2.2 Length (max 10 years): *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

D. Monitoring methodology and plan

D.1 Name and reference of approved methodology applied to the project activity:

Monitoring according to Appendix B/9 of the simplified modalities and procedures of small scale CDM project activity:

The emission reduction per system[9] is less than 5 tonnes of CO_2 a year. Thus monitoring according (c) is applicable, consisting of

(i) Recording annually the number of systems operating and
(ii) Estimating the annual hours of operation of an average system.

For the present pilot project additionally a more detailed monitoring is planned, and the monitoring is incorporated into an educational program. PT Petromat Agrotech has the responsibility of the monitoring in all phases. It is intended to draft a detailed agreement between PT Petromat Agrotech and Klimaschutz e.V. outlining the responsibilities of each party. PT Petromat Agrotech has the right to contract local partners to fulfil parts of the monitoring activity.

Each solar cooker will only be given out upon signing of a user agreement for 7 years (with prolongation clause), which states, that in case of not using the solar cooker will be handed over to an interested user group. Monitoring takes place by using control cards submitted together with the solar cooker and replaced periodically. These cards are collected and re-emplaced regularly. The data of the users will be filed by PT Petromat Agrotech and evaluated electronically by PT Petromat Agrotech. The evaluation consists of adding up the operating hours and the results forwarded by e-mail to Klimaschutz e.V. for recording on a quarterly basis.

PT Petromat Agrotech cooperates with local NGOs, governmental institutions, religious institutions and village leaders. If there are reports from one of the monitoring assistance that one or more users don't use the solar cooker, PT Petromat Agrotech will instruct within a grace period of one month to hand over the devices to an interested user.

Verification of the credibility of the data takes place as following:
The central monitoring agency PT Petromat Agrotech files the weather data of the project location, especially the sunshine hours of each day. These data are compared with the operating hours to check plausibility. By counterchecking it can be found out if the user is actually using the equipment and if he is reliable in recording the data. Visits of the users and regular meetings in the communities will help to obtain additional feedback about the actual usage, cooperativeness and correct recording. The visits of the users and the discussions at the communities will show if a cooker is not applied appropriately and the respective reasons. In the meetings, those problems are confronted by solving them or possibly handing over the equipment to another family.

The control card will be a form where the responsible user fills in the data of the usage. He has to fill in the following data daily:

- Date;
- Duration *t* of usage (in hours per day during the period under report, e.g. during one month);
- In case of certain times of not using the equipment, reason of not using has to be given;
- Weather condition (recorded with help of symbols).

Each equipment has a monitoring card (sample see Annex 9). The monitoring cards are used for recording the daily usage hours. The cards are collected on a regular basis and replaced by new cards for the next period by the local monitoring entities. It is planned to organize regular meetings of the user community where the users discuss their experience and hand over the control card to the local representative of the project. Initially these meetings will take place quarterly, but the frequency can be adapted to the experience acquired.

[9] system = device = a solar cooker K14 and a heat retaining container

The number of valid control cards must correlate to the number of solar cookers given out to the local government. The number of solar cookers supplied can be counterchecked with the bill of lading from the shipment of the kits.

Coordination and responsibility of the monitoring has PT Petromat Agrotech (Director Ir. Rudi Wahyudi). Petromat Agrotech is assisted by institutions like the NGO Yayasan Citra Aceh and by educational institutions. If parts of the areas of implementation are too remote and too difficult to reach, the monitoring entities should mention the quantity of devices (households) they couldn't verify.

PT Petromat Agrotech transfers the data into a database. The control cards are kept by PT Petromat Agrotech. The database and following reports will be submitted quarterly to Klimaschutz e.V. for data back-up and verification. The control cards are prepared in Indonesian language to enable the user to report correctly. The reports are prepared in English language.

The reports will cover the following issues:

a. List of events
b. List of monitoring assistants
c. List of training activities
d. Number of active users of the equipment
e. Summarized usage hours
f. Reported problems
g. Proposed and implemented solutions
h. Individual reports
i. Analysis of social and environmental impacts

The summary of all monitoring teams is intended to provide information for the following aspects in the monitoring report:

a) Social impacts
b) Environmental impacts
c) Obtained income generation for families and small scale industries
d) Reorientation of people's occupancy towards agriculture and fishing away from fuel wood harvesting.
e) Health related improvements by avoidance of interior cooking with open fire and by usage of the solar cooker for boiling water for sterilisation
f) Improvements attained by using heat retention containers
g) Impacts on the forests.

Based on the quarterly reports, an annual report will be prepared by PT Petromat Agrotech. PT Petromat Agrotech is also responsible for calculating the emission reduction according to the given formulae and the collected data. The final report, together with the calculated emission reduced will be submitted to TUEV Sued, the responsible DOE. TUEV Sued has the right to verify the bookkeeping of PT Petromat Agrotech.
The prompt reporting should avoid a systematic erroneous trend.

The monitoring is not a singular control process. It is accompanied by continuous education on how to apply solar cookers and heat retaining containers for one's benefit. Educational institutions are supporting the spreading of the technology by providing lectures in the framework of teaching life skills to the rural population. The continuous teaching effort in the duration of the project will provide sufficient feed-back, which tends to make controlling more automated, because the population will be included in a process that makes the use of the new devices a habit. Through education people can understand the impact of changing their cooking habits in a world wide context. In this way everybody

can personally take part in improving actual living conditions and safeguarding the environment for future generations. This will lead to a durable use of this new technology and to the participation in the necessary monitoring activity.

Regular control by the monitoring entities will verify if the user applies the new technology. If a family doesn't use the new technology it will be marked on the control card and the monitoring entity has the right to transfer the equipment to another family. This will be formulated in the contract between the responsible user and the monitoring entity when the equipment is handed over.

The project is included in a life skill program. It is intended to include the religious leaders, village chiefs, governmental institutions (especially ministry of social affairs) and NGOs, who are already present at the project location. The local entities are meant to report continuously about the usage of the solar cookers and eventual problems in the applications. In case of problems, PT Petromat Agrotech in cooperation with the local entity will decide which steps are to be taken for solving possible problems in the acceptance. Those local entities are continuously supported by regular demonstrations by representatives of PT Petromat Agrotech.

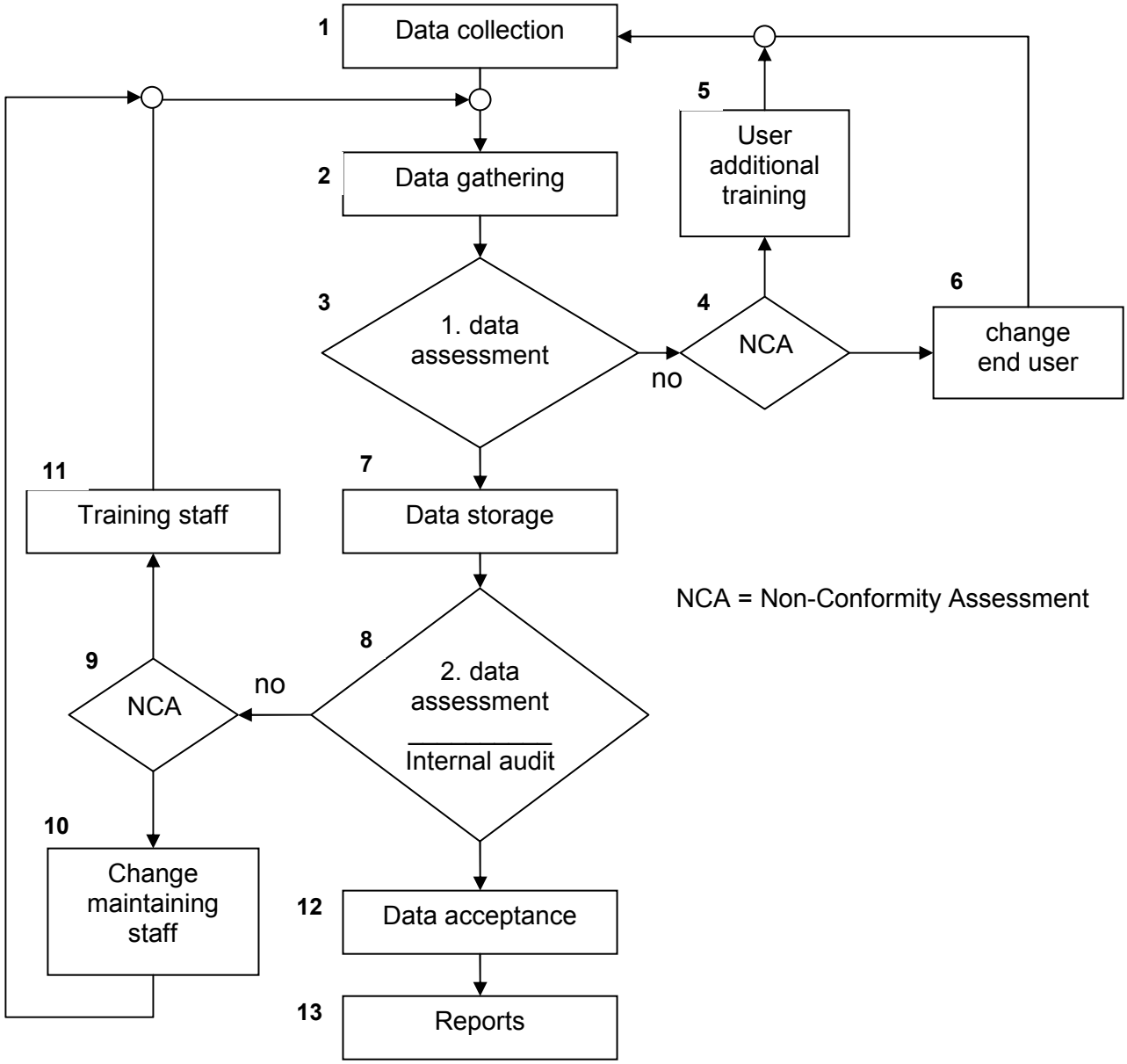
There are no approved methodologies yet to give the monitoring methodology for this project activity a specific name.

Project risks may arise from natural disasters or lack of acceptance by the population.

Monitoring responsibilities:

1. Collection of Data is done by user
2. Gathering of data is data by Rudi Wahyudi or his designee
3. Handing out, replacement of completed or damaged monitoring cards is done by Rudi Wahyudi or his designee.
4. Data assessment is done by Rudi Wahyudi or his designee
5. Training of monitoring personal is done by Klaus Trifellner or his designee
6. Change end user is decided by Rudi Wahyudi or his designee
7. Data storage is done by Rudi Wahyudi or his designee
8. Data 2nd assessment is performed by Rudi Wahyudi and an internal audit is done by Klaus Trifellner or his designee
9. Change of monitoring personal is done by Klaus Trifellner or his designee
10. Preparing monitoring reports is done by Rudi Wahyudi or by his designee.

Scheme of Monitoring Procedure:



Scope of monitoring procedure: The procedure aims to monitor and register the operating time of the devices.

There are two stages of implementation of the monitoring procedure. The first stage is an experimental stage which will last for approximately 6 months. The first six months will implement the procedure and teach all stages of the monitoring to the involved parties. The first stage will allow training and all necessary corrective actions to enable correct application of the monitoring procedure in the second stage.

The procedure of the monitoring is following steps which are going to be implemented within the monitoring scheme. During the second stage of implementation of the monitoring procedure, the steps will be followed.

Step 1 (data collection):
Every solar cooker is accompanied with a monitoring card. This monitoring card has to be filled out by the user according to a user agreement. The cards will be exchanged on a regular basis by the local monitoring entity. Mr. Rudi Wahyudi or his designee will ensure that sufficient cards are made available to the local users at all the times.

Step 2 (data gathering):
After collecting the monitoring cards the total usage hours are transferred to a data base which is carried by the monitoring assistants. The data is transferred to a book where the total usage hours are summed up. All the data will be forwarded to Mr. Rudi Wahyudi

Step 3 (first data assessment):
The data will be assessed. It will be checked if the monitoring cards are filled out correctly and if the usage hours are not more than the actual sunshine hours in the area. In case the cards are filled out correctly the data will be forwarded for storing. In case the data are not filled out correctly following cases have to be distinguished:

Case 1: The responsible user doesn't know how to fill out the cards: Then he will be trained by the monitoring personal to fill out the cards correctly.

Case 2: The responsible user doesn't use the solar cooker or he doesn't cooperate in monitoring after being trained: The solar cooker will be handed over to another user.

Step 7:
After assessing the gathered data by Rudi Wahyudi or his designee the data will be centrally stored on a data base.

Step 8:
Rudi Wahyudi or his designee will check all gathered data if they are consistent. After completing the data collection and completing the report Rudi Wahyudi will hand over all the data to Klaus Trifellner or to his designee for auditing purposes.

In case the results are satisfactory in terms of correct reporting, data completeness and correct analysis the data will be accepted for the monitoring report.

In case the interim report by the monitoring entity
- doesn't reflect the results of the monitoring cards
- monitoring has not been performed partly or completely
- faulty data have been stored
- monitoring data have been lost,

then Klaus Trifellner or his designee can decide to perform additional training for the monitoring personal or exchange monitoring personal.

In either case data have to be collected again. In case of a major data loss or data fault, a random analysis can be undertaken by the monitoring staff with the users and missing data can be estimated by comparing results of nearby users.

In case data have been accepted by Rudi Wahyudi and his designee a monitoring report will be prepared based on collected data of one year.

Monitoring leakages:

Leakage sources and corrective actions are:

a) Faulty completion of monitoring cards:
Corrective action within procedure.

b) Faulty management of data by the monitoring personal:
Corrective action with procedure.

c) Data loss by loss of monitoring cards:
Corrective action by estimating and random checks within the procedure.

d) Data loss by computer breakdown or loss of memos:
Corrective action by estimating and random checks within the procedure. Preventive action will be undertaken by monthly back up and regular forwarding of data to Klimaschutz e.V. by email.

Training of monitoring personal:

During implementation of the project the monitoring will be trained to enable the responsible users to perform the monitoring according to the procedure. The training of the monitoring team contains the following:

1. Overall understanding of the main objectives of the project.
    a) Transferring conventional cooking habits to sustainable ways of cooking
    b) Health protection
    c) Income generation
    d) Forest protection
    e) Environmental education
    f) Reduction of CO_2 emissions
2. Information about impacts of the projects
3. Explanation of the importance of the monitoring for the projects
4. Responsibilities within the project activity
5. Data to be monitored regularly
    a. Usage hours
    b. Sunshine hours
6. Data to be checked by random visits
    a. social impacts
    b. implemented income generation by the project
    c. health effects and further improvements on quality of life
    d. effects on forest and fuel wood consumption
7. Training to educate user about possibilities for income generation
8. Monitoring procedures
9. Global impact of green house gases and aims of CDM.

D.2 Justification of the choice of the methodology and why it is applicable to the project

activity:

The methodology is considered, because education ensures the sustained use of solar cookers. The use of questionnaires in conjunction with continuous training was already successfully tested in a pilot project in Ghana.

D.3 Data to be monitored:

ID Number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	number of solar cookers	n_1	-	m	quarterly/ annually	100%	paper and electronic	9 years	
2	mean operation time of a solar cooker	t_1	hours per period	m and e	daily	10%	paper and electronic	9 years	Data measured daily and verified quarterly

Description of formulae when not provided in appendix B:

Saved fuel wood consumption is calculated from the energy provided by the solar cooker and by converting this energy into amount of biomass with the same effective energy. The effective energy provided by the solar cooker is calculated by multiplication of its nominal power P and the effective time t of use. To calculate the energy of biomass equivalent to this effective energy E_{eff}, the overall efficiency η of a traditional fireplace (including simmering processes) is used. Thus the corresponding energy E of saved biomass per solar cooker is according equation (1) and (3) in B.5.1

$$E = P * t / \eta \qquad (3a)$$

E: saved primary energy per solar cooker
t: recorded duration of use of the solar cooker, determined by monitoring
P: nominal effective power of solar cooker K14; P = 600 W = 600 J/s, according equation (2a) in B.5.1
η: overall efficiency of traditional cooking method (including simmering);
η = 10% according deduction given in B.5.1

As the saving takes place in a region of non sustainable fuel wood logging the saving can be converted into a saving of C-emission by using the default value of Carbon Emission Factor *CEF*. CO_2-emission is calculated from C-emission by multiplication of the saved carbon emission with the quotient of molecular weight of CO_2 (44 kg/kmol) and atomic weight of carbon (12 kg/kmol).

Saved CO_2-emission $m_{CO2}(t_1, n_1)$ by using n_1 solar cookers with a mean operation time t_1 during the actual period can be calculated by equation (7) resp. (7a) in B.5.1:

$$m_{CO2} = P * t / \eta * CEF * 44/12 \text{ kg } CO_2/\text{kg C} \qquad (7)$$
$$= P * t * 1.096 \text{ kg } CO_2/\text{MJ} \qquad (7a)$$

$$m_{CO2}(t_1, n_1) = (n_1 * P * t_1) / \eta * CEF * 44/12 \text{ kg } CO_2/\text{kg C} \qquad (7c)$$
$$= (n_1 * P * t_1) * 1.096 \text{ kg } CO_2/\text{MJ} \qquad (7d)$$

CEF : Carbon Emission Factor for solid biomass; *CEF* = 29.9 t C/TJ (see equation (4) of present PDD)
n_1: number of solar cookers K14 existing in the project boundary in the current period
P: *P* = 600 W = 600 J/s (according equation (2a)
t_1: mean operating time (in hours per period) of these solar cookers in the actual period.

For equation (7d) the mean operating time t_1 during the period considered is calculated by summing up the recorded duration *t* of the monitored equipment use and dividing the sum by the number *n* of equipments which are applied for the summation:

$$t_1 = 1/n * \Sigma\, t \qquad (7e)$$

n: number of monitored solar cookers K14 in the project boundary in the current period
$\Sigma\, t$ sum of the operation hours of the monitored solar cookers in the project boundary in the current period.

When the mean operating time t_1 of a cooker in the actual period is determined according equation (7e), the amount $m_{CO2}(t_1, n_1)$ of saved CO_2 in the actual period is calculated by using equation (7d). Introducing the factor 3600 s/h and using *P* = 600 J/s, equation (7d) transforms in:

$$m_{CO2}(t_1, n_1) = (n_1 * P * t_1) * 1.096 \text{ kg } CO_2/\text{MJ}$$
$$= 2.37 \text{ kg } CO_2 * (n_1 * t_1/\text{h}) \qquad (7f).$$

By equation (7f) the amount of saved CO_2 in the actual period can be calculated easily from the actual number n_1 of the solar cookers and the determined mean operating time t_1 in the actual period.

D.4 Name of person/entity determining the monitoring methodology:

Dr.-Ing. Dieter Seifert
Senior Engineer
E-mail: bdiv.seifert@t-online.de
in co-operation with Klimaschutz e.V.
Klimaschutz e.V is listed in annex 1; Dr. Seifert is not separately listed in annex 1 of this document.

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

E.1.1 Selected formulae as provided in appendix B:

According to the baseline methodology described in appendix B, emission reductions are those that result from application of the formulae in section B.5.1 and therefore, project GHG emissions are zero.

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

Not applicable. GHG emissions by sources are zero since solar energy is a clean energy.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

Leakage due to the project activity is negligible.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

Emissions are negligible.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: *(for each gas, source, formulea/algorithm, emissions in units of CO_2 equivalent):* Formula (7a), described in section B.5.1.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period: See Section B.5.1.

E.2 Table providing values obtained when applying formulae above: See table in Section A.4.3.

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The DNA from Indonesia informed us, that there is no environmental impact assessment necessary in case of this type and size of project.

It is a characteristic of the project that there are no emissions and no wastes. The solar cookers have a long life time, defect parts will be replaced, and all parts are totally recyclable.

Solar cooking has a high potential for reducing GHG-emission and smoke by using clean energy and avoiding non sustainable logging. CDM makes solar cooking accessible for poor people, who particularly suffer from the diminishing forest resources and the subsequent environmental deterioration.

The environmental impacts of the project may be summarised by the keywords

- Prevention of resource depletion by unsustainable logging
- Avoidance of indoor air pollution from smoke of traditional fireplaces
- Diminishing GHGs emission
- Protection of soil fertility
- Protection of biodiversity
- Protection of coastal areas
- Prevention of desertification
- Diminishing risks of fires caused by open fireplaces.

One of the main positive environmental impacts of the project will be the rising awareness about environmental challenges, enabled by the transferred sustainable technology and by the accompanying educational program.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

The information that the solar cooker project is planned in Aceh Province was published in the newspaper of Banda Aceh on the 18th December 2004 (see Annex 4).

According to the Designated National Authority there is no format for stakeholder comments.

It is intended to make demonstrations of solar cooking in public and invite local media like radio and newspapers for reporting about details of the project.

The project received letters of approval from both German and Indonesian DNAs.

G.2 Summary of the comments received:

Project is recommended by the Government of Aceh (see Annex 3) and by local NGOs.

G.3 Report on how due account was taken of any comments received:

Until now there have not been negative comments to the project. Received advices and recommendations regarding the implementation have been considered in the PDD.

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	PT Petromat Agrotech
Street/P.O.Box:	Taman Bougenville Estate Blok A, No. 44, Kali Malang Jati Bening Gede
Building:	
City:	Raya Bekasi Jakarta
State/Region:	Jakarta
Postcode/ZIP:	17412
Country:	Indonesia
Telephone:	+62 21 8647766
FAX:	+62 21 8647422
E-Mail:	petromat@bit.net.id
URL:	
Represented by:	
Title:	Ir.
Salutation:	
Last Name:	Wahyudi
Middle Name:	
First Name:	Rudi
Department:	Director
Mobile:	+62 816 826818
Direct FAX:	+62 21 8647766
Direct tel:	+62 21 8647422
Personal E-Mail:	petromat@bit.net.id

Organization:	Klimaschutz e.V.
Street/P.O.Box:	Im Tulpenfeld 7/111
Building:	
City:	Bonn
State/Region:	Nordrhein-Westfalen
Postcode/ZIP:	53113
Country:	Germany
Telephone:	+49 228 6883910
FAX:	+49 228 6883912
E-Mail:	solargie@yahoo.com
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	Trifellner
Middle Name:	
First Name:	Klaus
Department:	CDM, Finance
Mobile:	+49 174 1910940
Direct FAX:	+49 8671 92 75 83
Direct tel:	+49 174 191 0940; +62 8131 49 39 547
Personal E-Mail:	ktrifellner@yahoo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the project

Annex 3: Statement of Government of Aceh and Letter to Ministry of environment from Governor of Aceh

Annex 4: Report about implementation of solar cookers in Indonesia Serambi Indonesia 18th December 2004, p.11, PT Banda Aceh Press JI, Indonesia

Annex 5: Cost Calculation for duration of 7 years

Annex 6: List of dimension units, abbreviations and mathematical symbols used in the formulae

Annex 7: References

Annex 8: Pictures

Annex 9: Monitoring card sample

Annex 5 to PDD Aceh 1

Cost calculation for duration of 7 years

Cost for implementation:

Description	Quantity	Unit price Euro	Total Euro
A) Investment			
Cost of prefabricated solar cooker:	1.000	115	115.000
Cost of heat retention containers	1.000	12	12.000
Transportation sea freight to Medan	1	2.500	2.500
Land freight to Sabang and Batar	1	1.500	1.500
Clearing	1	800	800
Assembling of solar cookers	1.000	5	5.000
Project preparation cost	1	15.000	15.000
Validation fee	1	12.000	12.000
Registration fee	1	4.000	4.000
Total cost for investment			**167.800**
B) Yearly costs:			
Monitoring costs:			
Supervision	1	5.000	5.000
Travel expenses	12	300	3.600
Administration fee	1	2.500	2.500
Monitoring staff	5	1.000	5.000
Events			5.000
Total yearly costs			**21.100**
Sum of yearly costs for 7 years:			**147.700**
Total cost (investment and current costs)			**315.500**
Total returns from CERs: (24500 tons)			
In case of 4 Euro per ton: 98.000,- Euro	24.500	4	**98.000**
In case of 7 Euro per ton: 171.500,- Euro	24.500	7	**171.500**
In case of 10 Euro per ton: 245.000.- Euro	24.500	10	**245.000**
In case of 15 Euro per ton: 367.500.- Euro	24.500	15	**367.500**
In case of 20 Euro per ton: 490.000.- Euro	24.500	20	**490.000**

Annex 6

List dimension units, abbreviations and mathematical symbols (*cursive*) used in the formulae

°C	degree Celsius; centigrade
device	a solar cooker K14 and a heat retaining container
t	metric ton = 1000 kg
C	carbon
CO_2	carbon dioxide
CO_2 eq tonnes/device/year	equivalent weight of carbon dioxide saved per device per year
GJ	10^9 J
group	group using one device, e.g. family, household
h	hour = 3600 s
J	Joule = W*s
K	degree Kelvin; degrees Celsius scale differences
kg	kilogram
kJ	10^3 J
kW	10^3 W = kJ/s
minutes	60 s
MJ	10^6 J
period	unit of monitoring time interval, e.g. 1 month
s	second
TJ	10^{12} J
year	calculated with 365 days
W	Watt = J/s

CEF	Carbon Emission Factor (carbon weight/primary energy of fuel) *CEF* for solid biomass*: CEF* = 29.9 t C/TJ	t C/TJ
$c_{p,W}$	specific heat capacity of water	kJ/kg/K
E	saved primary energy per solar cooker (energy of saved firewood)	MJ
E_{eff}	saved effective energy per solar cooker ("energy in the pot")	MJ
E_1	saved effective energy per person	MJ/capita
m	mass	kg
m_C	saved carbon mass per solar cooker	kg C
m_{CO2}	saved carbon dioxide mass per solar cooker	kg CO_2
$m_{CO2}(t_1, n_1)$	saved carbon dioxide mass by the project in the period	kg
m_W	mass water	kg
N	mean number of persons per group using a solar cooker	
n	number of monitored solar cookers applied for summation of duration of use	
n_1	number of installed solar cookers (in the period existing solar cookers)	
P	nominal effective power of solar cooker K14	kW
t	recorded duration of use of a solar cooker	h/period
t_1	mean operation time of a solar cooker in the period	h/month
t_b	time for heating water to boiling temperature	minute
η	overall efficiency of traditional cooking method (open fire, including simmering)	
Σt	sum of recorded duration of solar cooker use during period	h/period
T	temperature	°C
T_1	start temperature	°C
T_2	end temperature	°C

Annex 7

References

[1] European Committee for Solar Cooking Research (ECSCR): "Second International Solar Cooker Test – Summary of Results – June 1994". Summary in: BMZ aktuell #060: Solarkocher in Entwicklungsländern – Erfahrungen, Grenzen, Potentiale. BMZ Eschborn 1996

[2] FAO: "Wood Fuel Surveys", Annex III - (a) Measuring cooking fuel economy, 1. Introduction http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/Q1085e/q1085e09.htm

[3] GTZ: Moving Ahead with Solar Cookers - Acceptance and Introduction to the Market". Eschborn (1999): http://www2.gtz.de/dokumente/bib/00-0160.pdf

[4] IPCC : Workbook (Vol.2, Energy) of "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories" http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1wb1.pdf

[5] IPCC: Reference Manual, Chapter 1, Energy of "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories" http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref2.pdf

[6] Solar Cookers International (SCI): Reviews, (http://solarcooking.org/) s. Newsletters

[7] Solar Cookers International (SCI): Portrait of a Popular Solar Cooker. Solar Cooker Review, Apr. 2000, Sacramento, CA http://solarcooking.org/newsletters/scrapr00.htm#Portrait%20of%20a%20Popular%20Paraboloic%20Cooker

[9] UNDP, Kingdom of Morocco, GEF: "Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations Growth" http://www.undp.org/energy/publications/2002/Clean_Energy_Biomass.pdf

[10] World Energy Council: "The Challenge of Rural Energy Poverty in Developing Countries", 2. Energy Use in Rural Areas, 2.3 Rural household energy, 2.3.1 Cooking http://www.worldenergy.org/wec-geis/publications/reports/rural/energy_use_in_rural_areas/2_3.asp

[11] World Resources Institute: Earth trends; Country profile Indonesia http://earthtrends.wri.org/pdf_library/country_profiles/For_cou_360.pdf

Monitoring Card for Recording Time of Use of the Solar Cooker

CDM SOLAR COOKER PROJECT Aceh 1

Responsible person:

Equipment number:

Location:

Date of issue: Year: Month:

Month (please mark) **Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec**

	Time >>> (please mark by horizontal stroke the time of use)											
	7h	8h	9h	10h	11h	12h	13h	14h	15h	16h	17h	sum
Day: 1st												
2nd												
3rd												
4th												
5th												
6th												
7th												
8th												
9th												
10th												
11th												
12th												
13th												
14th												
15th												
16th												
17th												
18th												
19th												
20th												
21th												
22nd												
23rd												
24th												
25th												
26th												
27th												
28th												
29th												
30th												
31st												
										Sum (total)		

Remarks:

Signature: **Date:**