

# VALIDATION REPORT

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**CarbonAided Limited**

**Kolar Biogas Project**

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**SGS Climate Change Programme**

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|   |              |   |  |                         |
|---|--------------|---|--|-------------------------|
| <b>Date of Issue:</b>   |              | <b>Project Number:</b>  |  |                         |
| 28-06-2011  |              | CDM.VAL2153   |  |                         |
| <b>Project Title:</b>   |              |   |  |                         |
| Kolar Biogas Project  |              |   |  |                         |
| <b>Organisation:</b>  |              | <b>Client:</b>  |  |                         |
| SGS United Kingdom Limited  |              | CarbonAided Limited   |  |                         |
| <b>Publication of PDD for Stakeholders Consultation</b>   |              |   |  |                         |
| <b>Commenting Period:</b>   |              | 16/09/2008 to 15/10/2008  |  |                         |
| First PDD Version and Date:   |              | Version 01, dated 12/09/2008  |  |                         |
| Final PDD Version and Date:   |              | Version 11, dated 11/04/2011  |  |                         |
| <b>Summary:</b>   |              |   |  |                         |
| CarbonAided Limited has commissioned SGS to perform the validation of the project: Kolar Biogas Project.  |              |   |  |                         |
| Methodologies Used:   |              |   |  |                         |
| <ol style="list-style-type: none"> <li>1. AMS I.C (version 18, valid from 01 October 2010 to 16 June 2011<br/>(Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ))</li> <li>2. AMS I.E (version 03, valid from 01 October 2010 to 28 April 2011<br/>(Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ))</li> <li>3. AMS III.R (version 01, valid from 19 October 2007 to 03 March 2011<br/>(Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ))</li> </ol> |              |   |  |                         |
| The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and applicable CDM requirements.  |              |   |  |                         |
| The report is based on the assessment of the project design document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, follow up actions (e.g. site visit, telephone or e-mail interviews) and also the review of the applicable simplified methodology and underlying formulae and calculations.  |              |   |  |                         |
| The report and the annexed validation describe total of 19 findings which include: 12 Corrective Action Requests (CARs); 06 Clarification Requests (CLs); 01 Forward Action Requests (FARs); and all findings have been closed satisfactorily. The project will be recommended to the CDM Executive Board with a request for registration.  |              |   |  |                         |
| <b>Subject:</b>   |              | <b>Document Distribution</b>  |  |                         |
| CDM Validation  |              |   |  |                         |
| <b>Validation Team:</b>   |              | <input checked="" type="checkbox"/> No Distribution (without permission from the Client or responsible organisational unit) |  |                         |
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| Name: Siddharth Yadav   |              |   |  |                         |
| Date: 17 August 2011  |              |   |  |                         |
| <b>Revision Number:</b>   | <b>Date:</b> |   |  | <b>Number of Pages:</b> |
| 0   | 30-04-2010   |   |  | 163                     |
| 1   | 11-08-2010   | 167   |  |                         |
| 2   | 14-09-2010   | 167   |  |                         |
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## Abbreviations

|                  |   |
|------------------|---|
| AMS              | Approved Methodology for Small scale                  |
| CAR              | Corrective Action Request                             |
| CDM              | Clean Development Mechanism                           |
| CMP              | CDM Modalities and Procedures                         |
| CER              | Certified Emission Reduction                          |
| CL               | Clarification Request                                 |
| COP              | Conference of Parties                                 |
| DNA              | Designated National authority                         |
| DOE              | Designated Operational Entity                         |
| EB               | Executive Board                                       |
| EIA              | Environment Impact Assessment                         |
| FAR              | Forward Action Request                                |
| GHG              | Green House Gas(es)                                   |
| GJ               | Giga Jules  |
| Govt.            | Government  |
| HCA              | Host Country Approval                                 |
| hrs              | Hours   |
| IPCC             | Intergovernmental Panel on Climate Change             |
| IMD              | Indian Metrological Department                        |
| INR              | Indian Rupees   |
| kW <sub>th</sub> | Kilo Watt ( thermal energy)                           |
| kW <sub>e</sub>  | Kilo Watt ( electrical energy)                        |
| MOC              | Modalities of Communication                           |
| MoEF             | Ministry of Environment and Forests                   |
| MOP              | Meeting of the Parties                                |
| MP               | Monitoring Plan                                       |
| MW <sub>th</sub> | Mega Watt (thermal energy )                           |
| MW <sub>e</sub>  | Mega Watt (electrical energy )                        |
| NGO              | Non-Governmental Organisation                         |
| NRDMS            | Natural Resources Data Management System              |
| Para             | Paragraph   |
| PDD              | Project Design Document                               |
| PP               | Project Participant                                   |
| SSC              | Small Scale   |
| SWDS             | Solid Waste Disposal Site                             |
| UNFCCC           | United Nations Framework Convention on Climate Change |
| VVM              | Validation and Verification Manual                    |

## DEFINITIONS:

### 1. Taluk: (also known as *Tehsil*)

Taluk is an administrative division of some countries of South Asia.

Generally, a Taluk consists of a city or town that serves as its headquarters, possibly additional towns, and a number of villages. As an entity of local government, it exercises certain fiscal and administrative power over the villages and municipalities within its jurisdiction. It is the ultimate executive agency for land records and related administrative matters. Its chief official is called the *tehsildar* or less officially the *talukdar* or *taluka muktiarkar*.

### 2. Self Groups or Self-help Groups:

These are the groups formed by the rural women. The group membership varies from 7 to 25 members. Each village can have one or more groups. The PP has contacted these groups and organized meetings with them to explain about the biogas project. Many of the groups have taken part in the Stake Holder Consultation Meetings and overwhelmingly supported the project.

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## 1. Validation Opinion

SGS United Kingdom Ltd has been contracted by CarbonAided Limited to perform a validation of the project: Kolar Biogas Project in India.

The Validation was performed in accordance with the UNFCCC criteria for the Clean Development Mechanism (CDM), Validation and Verification Manual version 1.2 and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The proposed project activity is community based project activity which will provide biogas units to households in rural areas of Kolar District in Karnataka State in India. The project covers 10,000 households in five Taluks in Kolar District Karnataka State in India namely Srinivasapur, Kolar, Mulbagal, Malur and Bangarapet. The biogas unit will be of either 2m<sup>3</sup> or 3m<sup>3</sup> capacity depending on the number and type of cattle owned by the household and the number of people in the household. At least two cattle will be required for a household to be eligible for a 2m<sup>3</sup> biogas unit and at least 3 cattle will be required for a household to be eligible for a 3m<sup>3</sup> biogas unit. As per implementation schedule, 3,000 units of 3m<sup>3</sup> capacity and 7,000 units of 2m<sup>3</sup> capacity will be installed under this project activity. SKG Sangha, an Indian non-governmental organisation (NGO), will implement this project activity. The project activity will reduce the amount of fuel wood and kerosene used for cooking and heating water and will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project activity will also reduce methane emissions from cattle manure and will contribute to the sustainable development of the rural households involved in this project activity. The project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

In our opinion, the project meets all relevant UNFCCC, CDM criteria and all relevant host country criteria. The project correctly applies methodologies AMS I.C version 18, AMS I.E version 03 and AMS III.R version 01. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be 551,479 t of CO<sub>2</sub>e over a 10 years crediting period, averaging 55,147 t of CO<sub>2</sub>e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount will be achieved given the underlying assumptions do not change.

The project will hence be recommended by SGS for registration with the UNFCCC.

### Signed on Behalf of the Validation Body by Authorized Signatory



Signature:

Name: Siddharth Yadav

Date: 17 August 2011

## 2. Introduction

### 2.1 Objective

CarbonAided Limited has commissioned SGS to perform the validation of the project: Kolar Biogas Project with regard to the relevant requirements for Clean Development Mechanism (CDM) project activities. The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP) and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reduction (CER). UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities and related decisions by the COP/MOP and the CDM Executive Board.

### 2.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. SGS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

### 2.3 GHG Project Description

The proposed project activity is community base project activity which will provide biogas units to households in rural areas of Kolar District in Karnataka State in India. The project covers 10,000 households in five Taluks in Kolar District Karnataka State in India namely Srinivasapur, Kolar, Mulbagal, Malur, and Bangarapet. The biogas unit will be of either 2m<sup>3</sup> or 3m<sup>3</sup> capacity depending on the number and type of cattle owned by the household and the number of people in the household. The project activity will reduce the amount of fuel wood and kerosene used for cooking and heating water and will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project activity will also reduce methane emissions from cattle manure and will contribute to the sustainable development of the rural households involved in this project activity.

### 2.4 The Names and Roles of the Validation Team Members

| Assessment Team      | Role   |
|----------------------|--|
| Vivek Kumar Ahirwar  | Lead Assessor and Local Assessor   |
| Tridip Kumar Goswami | Assessor   |
| Nitin Babber         | Sectoral Expert Scope 1.1 (Biomass based Thermal/ Electricity Utilization and Fuel Switch) |
| Vicmary Molina       | Sectoral Expert Scope 15.2 (Animal waste Management)                                       |
| Abhishek Mahawar     | Financial Expert   |

| Technical Review Team | Role   |
|-----------------------|--|
| Ashok Kumar Gautam    | Technical Reviewer   |
| Deng Liangwei         | Sectoral Expert Scope 15.2 (Animal waste Management)                                       |
| Sarang Khati          | Sectoral Expert Scope 1.1 (Biomass based Thermal/ Electricity Utilization and Fuel Switch) |

### 3. Methodology

#### 3.1 Review of CDM-PDD and Additional Documentation

The validation is performed primarily as a document review of the publicly available project document version 01 dated 12/09/2008<sup>01.a/</sup> and the subsequent versions: version 02 dated 09/03/2009<sup>01.b/</sup>, version 03 dated 28/04/2009<sup>01.c/</sup>, version 04 dated 17/06/2009<sup>01.d/</sup>, version 05 dated 04/08/2009<sup>01.e/</sup>, version 06 dated 15/12/2009<sup>01.f/</sup>, version 07 dated 24/03/2010<sup>01.g/</sup>, version 08 dated 11/04/2010<sup>01.h/</sup>, version 09 dated 16/07/2010<sup>01.i/</sup>, version 10 dated 04/03/2011<sup>01.j/</sup>, version 11 dated 11/04/2011<sup>01.k/</sup> (Final version). The assessment is performed by trained assessors using a validation protocol attached as Annex 2 Table 2

The site visit was performed on 06/01/2009 by members of the Validation Team. The team has checked the baseline, PDD related documents, CDM consideration, additionality and applicability and the results are summarised in Annex I: Local Assessment checklist. A few key stakeholders were interviewed and various environmental laws, sustainability issues, energy statistics and all relevant data were cross checked. The validation team has confirmed the statements of the PDD through review of documents.

#### 3.2 Use of the Validation Protocol

The validation protocol used for the assessment is designed in accordance with the Validation and Verification Manual, Version 1.2 dated 30 July 2010. It serves the following purposes:

- it organises, details and clarifies the requirements the project is expected to meet; and
- it documents both how a particular requirement has been validated and the result of the validation (reporting).

The validation protocol consists of several tables. The different columns in these tables are described below.

| Checklist Question  | Ref ID  | Means of Verification (MoV)  | Comment  | Conclusion/ CARs/CLs   |
|---|---|--|--|--|
| The various requirements are linked to checklist questions the project should meet. | Lists any references and sources used in the validation process. Full details are provided in the table at the bottom of the checklist. | Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable. | The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached. | This is either acceptable based on evidence provided (Y), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification Request (CL) is used when the validation team has identified a need for further clarification. |

The completed validation protocol for this project is attached as Annex 2 to this report

#### 3.3 Findings

As an outcome of the validation process, the team can raise different types of findings

**A Clarification Request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR)**. A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The CDM requirements have not been met;

III. There is a risk that emission reductions cannot be monitored or calculated.

The validation process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of an CL may also lead to a CAR.

**A Forward Action Request (FAR)** is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Corrective Action Requests and Clarification Requests are raised in the draft validation protocol and detailed in a separate form (Annex A.3). In this form, the Project Developer is given the opportunity to "close" outstanding CARs and respond to CLs and FARs.

### **3.4 Internal Quality Control**

Following the completion of the assessment process and a recommendation by the Assessment team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team. Findings can be raised at this stage and client must address them within agreed timeline.

## 4. Validation Findings

### 4.1 Approval

The proposed project activity is a bilateral project activity in India. India as host country (non-Annex I) and United Kingdom of Great Britain and Northern Ireland as the investor country (Annex I) are involved in this proposed project activity.

India has ratified the Kyoto protocol on 26/08/2002 whereas United Kingdom of Great Britain and Northern Ireland ratified on 31/05/2002 and both Parties are allowed to participate.

The PP has submitted the letter of approval (Host Country) issued by the Indian DNA, 'The Ministry of Environment & Forests' bearing Letter No. 4/9/2009-CCC dated 12/11/2009<sup>/04/</sup>.

The Letter of Approval from the Party confirmed that the host party involved has approved the project activity titled as 'Kolar Biogas Project', which complies with the requirement stipulated in the paragraph 44 of Annex 01 of EB 55 report<sup>/56/</sup>.

The name of the project activity and the host party in its Letter of Approval was verified against that in section A.1 and section A.3 of the PDD<sup>/1.k/</sup> and was found to be consistent and hence accepted as per Para 45 of Annex 01 of EB 55 report<sup>/56/</sup> and also the Letter of Approval confirms that:

- (a) The Government of India (non-Annex I as host country) has ratified the Kyoto Protocol on 26/08/2002; hence the host party is a Party to the Kyoto Protocol;
- (b) The host party India participates voluntarily in the proposed CDM project activity;
- (c) The proposed CDM project activity contributes to Sustainable Development in India;
- (d) The letter of approval refer to the precise proposed CDM project activity – 'Kolar Biogas Project' – mentioned in the PDD<sup>/1.k/</sup> being submitted for registration.

The authenticity of the Indian LOA has been checked with the list of projects with Indian DNA approval of participation available online on the CDM India website, which is the official website of the Indian DNA<sup>/72/</sup>.

The PP has also submitted two more letters of approval issued by the UK DNA, 'Department of Energy & Climate Change' bearing Letter No. CrbnAid/02/2009 dated 15/12/2009<sup>/05/</sup> addressed to CarbonAided Limited and Letter No. CH4NGE/02/2009 dated 15/12/2009<sup>/06/</sup> addressed to CH4NGE Limited.

The Letters of Approval from the Party confirmed that the Party involved has approved the project activity titled as 'Kolar Biogas Project', which complies with the requirement stipulated in the paragraph 44 of Annex 01 of EB 55 report<sup>/56/</sup>.

The name of the project activity and the Party in its Letters of Approval was verified against that in section A.1 and section A.3 of the PDD<sup>/1.k/</sup> and was found to be consistent and hence accepted as per 45 of Annex 01 of EB 55 report<sup>/56/</sup> and also each Letter of Approval confirms that:

- (a) United Kingdom of Great Britain and Northern Ireland (Annex I as the investor country) has ratified the protocol on 31/05/2002; hence the Party is a Party to the Kyoto Protocol;
- (b) United Kingdom and Northern Ireland participates voluntarily in the CDM;
- (c) The proposed CDM project activity contributes to Sustainable Development in India;
- (d) The letters of approval refer to the precise proposed CDM project activity – 'Kolar Biogas Project' – mentioned in the PDD<sup>/1.k/</sup> being submitted for registration.

The authenticities of the UK LOAs have been checked with the list of projects with UK approval of participation available online on Department of Energy & Climate Change website<sup>/73/</sup>.

Each Letter of Approval is unconditional with respect to (a) to (d) mentioned above. It is confirmed that all three Letters of Approval comply with the requirements stipulated in paragraphs 44-50 of VVM version 1.2.<sup>/56/</sup>

### Discussion of CARs/CLs

The Letter of Approval from the host Party DNA was not submitted by the project proponent with version 01 of PDD and hence **CAR #1 was raised**. In response to CAR #1, the PP has submitted a copy of the same and therefore **CAR #1 was closed out**.

**CL#18 was raised** to clarify the roles and responsibility of CH4NGE Ltd in current project activity and also to submit the required documents to show that CH4NGE Ltd is a PP.

In response, the PP has clarified that CH4NGE Ltd will provide full up-front funding for the project activity once validation is completed. This funding will include all costs for preparation of PDD by CarbonAided Ltd, validation for project activity as well as ongoing monitoring and verification costs for the whole crediting period.

Furthermore, the validation team has requested to provide details of funding which will be provided by CH4NGE Ltd. and also requested to clarify the terms and conditions of this funding as well as its share in various stages of project development. The PP has also been requested to clarify the share of CERs that will be provided to CH4NGE Ltd in which terms and conditions.

In response, the PP has explained that CH4NGE Ltd. will provide all the funding required in various stages of the crediting period. There will be an agreed budget and the PP does not have to repay that amount. It also clarified that CH4NGE Ltd will receive all the CERs generated from the project and SKG Sangha will receive a 5% royalty on the gross proceeds of sales of the CERs. There was a confidential contract between "SKG Sangha" and "CH4NGE Ltd and CarbonAided Ltd." by which this will be implemented and CH4NGE Ltd. has its own provisions to raise their own funds to meet the cost to be incurred for validation purposes.

The validation team has verified the above information from documents 'Service agreement' dated 19/05/2009 between CH4NGE Ltd and CarbonAided Ltd<sup>/08/</sup> and 'Agreement for monetizing greenhouse gas emissions savings' dated 08/05/2009 between CH4NGE Ltd. and SKG Sangha<sup>/09/</sup> provided by the PP and was found to be satisfactory and hence was accepted.

The PP has submitted two Letters of Approval from the UK DNA, the validation team has verified these letters and confirmed that the UK DNA has approved the participation of CarbonAided Limited and CH4NGE Ltd, hence **CL#18 was closed**.

It has been noted that both UK Project participants involved have the same registered address. The Validation team verified both business registration information. This was found to be acceptable.

## Opinion

The validation team confirms that the HCA submitted by the PP is in compliance with the requirements of paragraphs 44-50 of the VVM version 1.2 (EB 55 Annex 1)<sup>/56/</sup>. It has been noted that the addresses of both parties were the same; however both of the parties have different business registration numbers as provided by the project proponent during the course of validation of additionality of the project.

## 4.2 Participation Requirements

The host country for this project is India and ratified the Kyoto Protocol on 26<sup>th</sup> August 2002<sup>/10/</sup>. The PP listed in tabular form in section A.3 of the PDD, version 06 dated 15/12/2009 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) is SKG Sangha. The HCA letter<sup>/04/</sup> from the Indian DNA approves the participation of SKG Sangha; therefore the PP is approved by the Party to the Kyoto Protocol. This is found inline with Para 52 of VVM (version 1.2)<sup>/56/</sup>.

CarbonAided Ltd and CH4NGE Limited from the United Kingdom of Great Britain and Northern Ireland as the investor country (Annex I Party ) have participated in the proposed project activity and the same has been listed in tabular form in section A.3 of the PDD version 09 dated 16/07/2010<sup>/1.i/</sup> (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>).

The United Kingdom of Great Britain and Northern Ireland has ratified the Kyoto protocol on 31<sup>st</sup> May 2002<sup>/11/</sup>. The Project Participant has submitted two Letters of Approval from the UK DNA, which approves the participation of CarbonAided Limited<sup>/05/</sup> and CH4NGE Limited<sup>/06/</sup>; therefore both Project Participants are approved by the Party to the Kyoto Protocol. This is found inline with Para 52 of VVM (version 1.2)<sup>/56/</sup>.

The PP has provided the MOC letter dated 19/08/2009<sup>/07/</sup>, which was duly verified against the project title and information mentioned in Annex 1 and was found to be consistent and hence accepted.

The proposed CDM project has been webhosted on the UNFCCC website for global stakeholders process to invite comments as per the CDM requirements. As per the CDM EB guidelines the proposed CDM project has been webhosted from 16/09/2008 to 15/10/2008<sup>/12/</sup>. From the above discussion, it has been concluded that the proposed CDM project activity meets the relevant CDM requirements.

#### Discussion of CARs/CLs

**CAR#2 was raised** to ask the PP to submit the Modalities of Communication (MOC) in accordance with EB45 annex 60. Initially the PP provided the MOC dated 09/03/2009 which was observed to be not consistent with the requirement. After that, the PP submitted the corrected MOC dated 19/08/2009 as per the request of the validation team. The Validation team has accepted the MOC dated 19/08/2009 with some minor corrections done by the PP. The Validation team has confirmed that the MOC letter dated 19/08/2009<sup>/07/</sup> was duly verified against the project title and information mentioned in Annex 1 of the PDD<sup>/01.i/</sup> (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) and was found to be consistent with the requirement stipulated in EB45 annex 60. Hence **CAR#2 was closed**.

#### Opinion

As per paragraphs 51 to 54 of the VVM version 1.2 (EB 55 Annex 1)<sup>/56/</sup>, the validation team is of the opinion that, the proposed CDM project activity meets all the relevant participation requirements.

#### 4.3 Project Design Document including Project Description

The project activity is titled "Kolar Biogas Project". The project design and its objectives have been transparently explained in the final PDD version 11 dated 21/04/2011<sup>/01.k/</sup> and are consistent with the timeline of the project history.

The proposed project activity is a community based project activity which will provide biogas units to households in rural areas of Kolar District in Karnataka State in India. The project covers 10,000 households in five Taluks in Kolar District Karnataka State in India namely Srinivasapur, Kolar, Mulbagal, Malur and Bangarapet. The biogas unit will be of either 2m<sup>3</sup> or 3m<sup>3</sup> capacity depending on the number and type of cattle owned by the household and the number of people in the household. At least two cattle will be required for a household to be eligible for a 2m<sup>3</sup> biogas unit and at least 3 cattle will be required for a household to be eligible for a 3m<sup>3</sup> biogas unit. As implementation schedule 3,000 units of 3m<sup>3</sup> capacity and 7,000 units of 2m<sup>3</sup> capacity will be installed under this project activity. SKG Sangha, an Indian non-governmental organisation (NGO), will implement this project activity. The project activity will reduce the amount of fuel wood and kerosene used for cooking and heating water and will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project activity will also reduce methane emissions from cattle manure and will contribute to the sustainable development of the rural households involved in this project activity. The project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change. The annual emission reductions are expected to be 55,147 t of CO<sub>2e</sub>.

In order to ascertain that the technology used for the project activity would not be substituted by any other more efficient technology, the PP provided a declaration<sup>/13/</sup> dated 10 June 2009, stating that the present technology at the project site would not be substituted by any other more efficient technology during the crediting period. The declaration submitted by the PP was accepted upon verification by the assessment team and was found to be authentic as the declaration letter was duly signed by the PP. All information provided in the PDD version 11 dated 21/04/2011<sup>/01.k/</sup> is in conformance with the situation on-site and with the project planning.

The information provided in the PDD version 11 dated 21/04/2011<sup>/01.k/</sup> allows a clear indication of the project site along with its geographical coordinates. The geographical coordinates were checked on site as follows:

| Taluks covered by proposed project activity in Kolar District | Latitude ° N | Longitude, ° E |
|---|--------------|----------------|
|   |              |                |

|                    |               |               |
|--------------------|---------------|---------------|
| Kolar Taluk        | 13°08'12.04'' | 78°08'20.44'' |
| Bangarapet Taluk   | 12°59'04.97'' | 78°10'42.40'' |
| Malur Taluk        | 12°59'20.71'' | 77°55'42.12'' |
| Mulbagal Taluk     | 13°09'39.22'' | 78°23'19.11'' |
| Srinivasapur Taluk | 13°20'19.13'' | 78°12'38.15'' |

The project description details mentioned in section A.2 of the PDD<sup>01.j/</sup> are found to be accurate and complete, and are also consistent with the observations made during the site visit. This is found in line with paragraphs 58, 59 and 64 of VVM (version 1.2)<sup>56/</sup>.

The final PDD version 11 dated 21/04/2011<sup>1.k/</sup> has been found to be prepared in the PDD template version 3 and it is found in accordance with the guidelines for completing the simplified project design document (CDM-SSC-PDD) Version 05 (EB34 Annex 09); thus it is acceptable. This is checked and it is found to be appropriate as per Para 55, 56 and 57 of VVM (version 1.2)<sup>01.i/</sup>.

|  |  |
|--|--|
| Main changes and reason for revision between the final PDD (PDD version 11 dated 11/04/2011) <sup>1.k/</sup> against the first version (PDD version 1 dated 12/09/2008) <sup>1.a/</sup> published for the international stakeholder consultation |  |
| PDD Section A.1  | PDD version 11 and date of revision 11/04/2011 change.   |
| PDD Section A.2  | Some information provided as background was removed or modified.   |
| PDD Section A.3  | CH4NGE Ltd as Project participant is included in table   |
| PDD Section A.4  | <ul style="list-style-type: none"> <li>Section A.4.1.4, Geographical co-ordinates of each taluk is included.</li> <li>Section A.4.3, section has been revised, in order to provide transparent technical details of project activity equipments.</li> <li>Section A.4.4, Estimation of annual emission reductions table has been revised in order to be consistent with emission reduction calculation.</li> <li>Section A.4.5, section has been modified, in order to provide transparent on non -de-bundling of project activity.</li> </ul> |
| PDD Section B.1  | The version of methodologies AMS I C and AMS I E has been revised and accordingly version of applicable tool has been revised.   |
| PDD Section B.2  | Corrections/amendment with respect to criteria mentioned in the methodology.   |
| PDD Section B.3  | Project Boundary Diagram and source of GHGs has been transparently mentioned.  |
| PDD Section B.4  | The section has been modified according to the baseline parameters were identified using a survey of a sample of target households in the Kolar region.  |
| PDD Section B.5  | The approach used to demonstrate project additionality has been based on the application of the "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10). In step 3 we have also referred to specific guidance for establishing the additionality of small scale CDM (SSC) projects, namely Annex 34 of EB 35 ("Non-binding best practice examples to demonstrate additionality for SSC project activities"). The section is updated accordingly.   |
| PDD Section B.6  | Emission reduction calculation formulae have been revised methodologies revisions, consequently validation parameters have been included in PDD and the emission reduction calculations have been revised.   |
| PDD Section B.7  | Monitoring Plan have been updated as per methodologies revisions & sampling plan.  |
| PDD Section B.8  | Date of baseline completion is updated.  |
| PDD Section C.1  | CDM Start date of project activity has been corrected  |
| PDD Section C.2  | Start date of crediting period has been updated  |
| PDD Section D  | No Change  |
| PDD Section E  | Section is modified, in order to provide transparent information on local stakeholders' process.   |

## Discussion of CARs/CLs

**CAR#3 was raised** requesting the PP to provide appropriate coordinates of the proposed project activity location as per the guidance stipulated in EB34 Annex 09. As response the PP provided the revised PDD. The validation team has confirmed that the final PDD version 09 dated 16/07/2010<sup>/01.i/</sup> (including PDD Version 11 dated 11/04/2011<sup>/1.k/</sup>) is in compliance with the guidelines for completing the simplified project design document (CDM-SSC-PDD) Version 05 (EB34 Annex 09). Hence **CAR#3 was closed**.

## Opinion

The validation team is of the opinion that the description of the proposed CDM project activity mentioned in the PDD<sup>/01.k/</sup> provides a clear understanding of the precise nature of the project activity and the technical aspects of its implementation. Thus, as per the requirements of paragraphs 58 to 64 of the VVM version 1.2 (EB55 Annex 1)<sup>/56/</sup> the validation team confirms that the project description in the PDD<sup>/01.k/</sup> is accurate and complete.

## 4.4 Eligibility as a Small Scale Project

The proposed project activity is a community based project activity which will provide 10,000 biogas units to households in rural areas of Kolar District in Karnataka State in India. The biogas unit will be of either 2m<sup>3</sup> or 3m<sup>3</sup> capacity depending on the number and type of cattle owned by the household and the number of people in the household. The project activity will reduce the amount of fuel wood and kerosene used for cooking and heating water and will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project activity will also reduce methane emissions from cattle manure and will contribute to the sustainable development of the rural households involved in this project activity.

As the proposed project activity will involve using cattle dung for the production of biogas (category R), which will displace the use of kerosene (category C) and non-renewable biomass (category E) for household cooking purposes. Therefore, the PP has demonstrated in the CDM-SSC-PDD that the proposed project activity's characteristics can be categorized by applying following CDM approved methodologies<sup>/14/</sup>:

AMS-I.C – “Thermal energy for the user with or without electricity”

AMS-I.E – “Switch from Non-Renewable Biomass for Thermal Applications by the User”

AMS-III.R – “Methane recovery in agricultural activities at household/small farm level”

The validation team has confirmed that under above said characteristics proposed CDM project activity falls in Type-I and Type –III project activity as defined within the Glossary of CDM terms version 05<sup>/15/</sup>.

The proposed CDM project activity qualifies within the threshold of Type-I and Type –III project activity as:

### ➤ For Type –I project activity :

The average capacity of a single unit that will be installed under the proposed project activity is 2.97 kW<sub>th</sub><sup>/51/</sup>; so the aggregate capacity of the systems is in the order of 29.7MW<sub>th</sub><sup>/51/</sup>. Hence the installed capacity of the proposed project activity will not increase beyond 45 MW<sub>th</sub>.

### ➤ For Type-III project activity:

Aggregate annual emission reductions from avoided methane of all 10,000 households included will be 27,135 t CO<sub>2</sub>e. Total annual emission reductions from the project activity as a whole are 55,147 t CO<sub>2</sub>e. In both cases emission reductions every year will not go beyond the limits of 60 ktCO<sub>2</sub>e over the entire crediting period.

The project activity meets the eligibility criteria as stipulated in paragraph 04 of AMS-I.C Version 18 and paragraph 05 of AMS-III.R Version 01.

As discussed above, the project activity falls under Type I as it is meeting the criteria of threshold limit of 15MW<sub>e</sub> or 45MW<sub>th</sub> and falls under category C as the generated biogas (renewable energy) is supplied directly to meet the thermal requirements of end users.

The project activity falls under category E as the biogas generated is displacing the use of non-renewable biomass by introducing biogas digester (a new renewable energy end-user technology).

Type III: Other project activities limited to those that result in emission reductions of less than or equal to 60 kt CO<sub>2</sub> equivalent annually;

The project activity also falls under Type III as the emission reductions from the project activity is not crossing the threshold limit of 60 ktCO<sub>2</sub>e per year. The project activity falls under category R as the generated biogas containing methane is recovered from the biogas digester at village level.

Thus, the project activity conforms to type-I and type-III and category C, category E & category R as per appendix B of the simplified modalities & procedures (Decision 4/CMP.1, annex II).

It is noted that the PDD was webhosted using AMS-I.C. version 13 and AMS-I E version 01 but due to expiry of this version of methodology during validation period, PDD version 11 dated 11/04/2011 has been revised as per the latest available version 18 of AMS-I.C (version 18, valid from 01 October 2010 to 16 June 2011 (Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ) and version 03 of AMS-I.E(version 03, valid from 01 October 2010 to 28 April 2011 (Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ). without re-webhosting the final PDD<sup>/01.k/</sup>.

The applicability criteria of the methodology have been described in section 4.5 below.

SKG Sangha is implementing another biogas CDM proposed project activity titled 'Hassan Biogas Project', which takes place in the same state (Karnataka State). This project is more than 100 km away from the location of the Kolar Biogas project activity. Thus both projects boundaries are not within 1 km radius of each other. This was further verified through discussions during the site with the Mr. Vidya Sagar, President and Mr K Kiran Kumar, Secretary of SKG Sangha.

The validation team has verified from the UNFCCC website (Project Search Interface) that there is no registered small scale CDM project activity or a request for registration by the same PP in the same project category and technology/measure or one that has been registered within the previous two years; whose project boundary is within 1 km of the project boundary of the proposed small-scale activity. Hence, according to the decision hierarchy for determining the occurrence of de-bundling (EB36 annex 27) the validation team concluded that the proposed project activity is not a debundled component of a large-scale project activity.

### Discussion of CARs/CLs

**CL#05 was raised** to justify the non debundled status of the Kolar Biogas project activity, as another similar project activity (Hassan Biogas Project) situated at similar region with the same project participants, in the same project category and technology/measure is currently undergoing CDM validation.

In response, the PP has justified that the similar project activity (Hassan Biogas project) is more than 100 km away from the location of the Kolar Biogas Project activity as shown in section A.4.5, pages 10-11 of the PDD version 03 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>). Thus both projects boundaries are not within 1 km radius of each other.

The validation team has checked the distance of the two project sites (developed by same project proponent) by analysing the political map of India and same has also been verified during the validation site visit. Since the distance between the two project activities is more than 1 km, this project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB30, Para 37)<sup>/57/</sup>. However, the validation team has requested that the PP provide a self declaration/undertaking towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling".

In response, the PP has provided a self declaration dated 10 June 2009 towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling"<sup>/57/</sup>.

The validation team has confirmed that the proposed project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB30, Para 37)<sup>/57/</sup>; this was accepted with the written declaration dated 10 June 2009 submitted by the PP towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling"<sup>/57/</sup>. Hence, **CL#5 was closed**.

### Opinion

As per the requirements of paragraphs 133-135 of VVM version 1.2 (EB55 Annex 1), the validation team is of the opinion that the proposed project activity is eligible as a small scale CDM project activity.

#### 4.5 *Applicability of selected methodology to the project activity*

The project activity applied the following approved small scale baseline methodologies:

1. AMS I.C (version 18, valid from 01 October 2010 to 16 June 2011  
(Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ))<sup>/16/</sup>
2. AMS I.E (version 03, valid from 01 October 2010 to 28 April 2011  
(Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ))<sup>/17/</sup>
3. AMS III.R (version 01, valid from 19 October 2007 to 03 March 2011  
(Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ))<sup>/18/</sup>

However, it is noted that the PDD published for the global stakeholder consultation under methodologies AMS I.C version 13 and AMS I.E version 01. These versions expired on 28<sup>th</sup> March 2008 and 08<sup>th</sup> April 2010 respectively, but Executive Board allowed grace periods (28/03/2008 to 07/04/2009) for the submission of project activities for registration using AMS I.C, version 13 and grace period (08/04/2010 to 08/12/2010) for AMS I E version 01. The proposed project activity could not be submitted with a request for registration within the grace period thus the PP revised the PDD version 11 dated 11/04/2011 applying the latest available revised versions of the methodologies , . The validation team confirmed that this revision has been done as per the guidance published by the EB in its 50<sup>th</sup> meeting under paragraph 6 of Annex 48, wherein there is no requirement to re-publish the final PDD<sup>/1.k/</sup> for this methodology and so the validation team accepted this.

The following steps have been taken for assessment of applicability conditions of the methodologies:

- I. AMS-I.C. "Thermal energy for user with or without electricity", version 18 (Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ):
  1. The proposed project activity displacing kerosene use (fossil fuel) in household cooking stoves (thermal energy) with the use of biogas generated from cattle dung and organic kitchen waste (renewable sources) , which complies with the applicability condition stipulated in Para 01 .
  2. The project activity is not biomass based co-generation; hence applicability conditions Para 02, 03 and Para 06 are not applicable for proposed project activity.
  3. The thermal capacity for proposed project activity calculated based on the following assumptions:-
    - a. 60% CH<sub>4</sub> content in biogas produced from cattle manure and kitchen waste in household bio-digester.
    - b. Calorific value of biogas is 21.6 MJ/m<sup>3</sup>.
    - c. Biogas flow rate in stove burner is 900 litre/hr
    - d. Average thermal efficiency of stove burner is 55%.
    - e. Unit conversion factor 1 MJ = 0.278 kWh and 1m<sup>3</sup> = 1000 litre.
    - f. Average thermal capacity for each biogas unit with respect to stove used for burning of biomass calculation
 
$$= (0.278 \text{ kWh}) \times (21.6 \text{ MJ/m}^3) \times (10^{-03} \text{ litre}^{-01}) \times (900 \text{ litre/hr}) \times (55\%)$$

$$= 2.97 \text{ kW}_{\text{thermal}}$$
    - g. The proposed project activity capacity with respect to 10,000 units of bio-digesters :
 
$$= 2.97 \text{ kW}_{\text{thermal}} \text{ per Unit X } 10,000 \text{ Units}$$

$$= 29.7 \text{ MW}_{\text{thermal}} (< 45 \text{ MW}_{\text{thermal}})$$

The above calculation shows that the average thermal capacity for biogas unit with respect to stove used for burning of biomass is  $2.97 \text{ kW}_{\text{thermal}}$  and the aggregate capacity of 10,000 systems is in the order of  $29.7 \text{ MW}_{\text{thermal}}$  which is less than  $45 \text{ MW}_{\text{thermal}}$ ; which complies with the requirement of Para 04.

4. The stove burner used for burning of biogas produced due to proposed project activity will burn only biogas for cooking purposes. This was verified from manufacturer specification of stove provided by the PP and it was found that the design of stoves is very specific for biogas and it does not allow to be co-fired with fossil fuel; therefore the proposed project activity is not a co-fired system and the applicability condition of Para 05 is not applicable for proposed project activity.
5. The heat produced by the biogas units will not be delivered to another facility; the applicability condition in Para 07 is not applicable for proposed project activity.
6. The proposed project activity will replace inefficient traditional cooking stoves with cleaner biogas stoves; therefore proposed project activity is not a retrofit or modification of an existing facility for renewable energy generation and the applicability condition in Para 08 is not applicable for proposed project activity.
7. The proposed project activity is green field project activity, therefore the applicability condition in Para 09 is not applicable for proposed project activity.
8. The proposed project activity is not using charcoal, therefore the applicability condition in Para 10 is not applicable for proposed project activity.
9. The proposed project activity is not using solid biomass fuel (i.e. briquette), therefore the applicability condition in Para 11 is not applicable for proposed project activity.

The validation team therefore confirms that the project activity meets the applicability conditions stipulated in Paras 01 and 04 of AMS I.C version 18 and the applicability conditions in Paras 02, 03, 05, 06, 07, 08, 09 and 10 of AMS I.C version 18 are not applicable for the proposed project activity. Therefore the approach for selection of approved methodology (AMS I.C version 18) with appropriate applicability conditions (Para 01 and 04) is consistent with requirements stipulated in Para 75 of VVM (version 1.2)<sup>56/</sup>.

II. AMS I.E "Switch from non-renewable biomass for thermal applications by the user", version 03 (Requests for registration can be submitted until 29 December 2011 23:59:59 GMT):

1. The proposed project activity comprises biogas systems (consist of biogas-digester and biogas stove) for the supply of thermal energy for household cooking needs. The purpose of proposed project activity is displacing the use of fuel wood for cooking as non-renewable biomass by introducing the use of biogas generated in small biogas reactors (renewable energy derived from cattle dung) as new renewable energy end-user technology. Same was noted by validation team during site visit and confirmed through the stakeholder interviews that the household needs fuel wood for cooking needs in absence of proposed project activity. This was further verified from baseline survey report that the 78% of fuel wood is used for cooking purposes in Kolar district. Therefore the applicability condition stipulated in Para 01 are met by the proposed project activity.
2. During the site visit it was confirmed that no other similar registered small scale project activity exists in the same region (Kolar District). However a similar proposed small scale project activity titled 'Hassan Biogas Project' has been observed, but not in the same region (as distance is more than 100 km) and also baseline survey report<sup>48/</sup> has been provided by the PP to show that the average distance for collection of fire wood is 2km, and the maximum distance is 15km. Therefore it is ensured that the proposed project activity is not saving non-renewable biomass accounted for by the other project activities; which complies with the requirement stipulated in Para 02.
3. Para 3 of the AMS I.E says the "Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods". The validation team has verified the "Bio resource status in Karnataka" Volume 8, Issue 1, February 2004,

pages 1-47 and "Inventorying, Mapping and Monitoring of Bio-resources Using GIS and Remote Sensing"<sup>/19/</sup> which confirms that the non-renewable biomass has been used in the Kolar District since 31st December 1989. This has been cross checked through interviewing the local stakeholders and the same can also be confirmed from the "baseline survey report"<sup>/48/</sup>.

Therefore applicability condition stipulated in Para 03 are met by proposed project activity.

The validation team therefore confirms that the project activity meets all the applicability conditions and all other stipulations of the selected approved methodology AMS I.E. version 03 in with Para 75 of VVM (version 1.2)<sup>/56/</sup>.

III. AMS-III.R. "Methane recovery in agricultural activities at the household/small farm level", version 01 (Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ):

1. During the site visit it was observed that each household has a pit in the ground which is at least 1m deep, where waste from the cattle shed – cow dung, straw, green fodder and urine – is dumped. During the site visit it was confirmed through stakeholder interview that waste is not turned or mixed during the year, during the rainy season the pits also get filled with rainwater and pits are cleaned out once a year. Additionally the average annual temperature in the region is 29.7° C<sup>/20/</sup>. The animal waste is decaying anaerobically in the pit and generates methane. After introducing a biogas unit, the amount of animal manure fed into bio-digesters will not be left to decay anaerobically in the pit. Instead the manure that is fed into the bio-digester will break down anaerobically in the bio-digester. Therefore applicability condition stipulated in Para 01 (b) are met by proposed project activity.
2. The proposed project activity will install biogas digesters with digester volume capacity of 2 m<sup>3</sup> or 3m<sup>3</sup> for individual households in rural areas. A 2m<sup>3</sup> single biogas system annually avoids 2.36 tCO<sub>2</sub>e and a 3m<sup>3</sup> unit 3.54 tCO<sub>2</sub>e emissions due to methane avoidance. The detailed calculation is mentioned in ER spreadsheet<sup>/02/</sup> submitted by PP. The calculation and relevant assumptions used in the calculation were found correct and acceptable. Therefore it is confirmed that biogas-digester systems (2 m<sup>3</sup> or 3 m<sup>3</sup>) are achieve an annual emission reduction is less than 5 tonnes of CO<sub>2</sub>e per system .Hence proposed project activity meets the applicability criteria stipulated in Para 02 .
3. The proposed project activity is applied the AMS-I.C. version 18 as the generated biogas will be used for thermal energy (cooking and heating water); which complies the applicability condition under Para 03.
4. The digester slurry will be used to enhance soil quality by spreading thinly and directly on the ground and bio-digesters will not create any surplus gas over and above household requirements. This was confirmed through stakeholder interview and also further accepted by the comparing the maximum energy which can obtain by biogas digester system to the actual household energy requirement provided by the PP<sup>/49/</sup> The comparison analysis shows that the bio-digesters will provide maximum energy to the household of 2.77. GJ per year which is lower than the actual household energy requirement of 5.7 GJ; therefore proposed project activity satisfied the condition stipulated under Para 4 (a) & (b).
5. The PP has submitted the ER spread sheet which shows that aggregate annual emission reductions from avoided methane of all 10,000 households included will be 27,135 t CO<sub>2</sub>e which is less than the 60,000t CO<sub>2</sub>e limit. The calculation and relevant assumption used in calculation was checked and found to be correct. Therefore the proposed project activity meets the applicability condition stipulated under Para 5.

The validation team therefore confirms the opinion that the project activity meets all the applicability conditions and all other stipulations of the selected approved methodology AMS-III.R. Version 01, inline with Para 75 of VVM (version 1.2)<sup>/56/</sup>.

## Discussion of CARs/CLs

**CL#4 was raised** requesting the PP to clarify the following issues:

1. The estimated annual average amount of emission reductions for the year 2011 to year 2018 in section A 4.3 of the PDD Version 01 is exceeding the threshold limit of 60ktCO<sub>2</sub> per annum for Type-III small scale project activity; hence the validation team has requested the PP to clarify the same. In response the PP has clarified that estimated average amount of emission reductions in the revised PDD version 03 is decreased from the value mentioned in the PDD version 01 and with in the threshold limit of 60ktCO<sub>2</sub> per annum. Furthermore, the PP has justified that the reduction in the PDD version 03, in comparison with the webhosted PDD version 01, reflects the application of the 95% confidence level to the emission reduction calculations. Validation team has examined the section A.4.3 of the PDD version 03 dated 28/04/2009 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) that has mentioned the aggregated annual estimated emission reductions due to the project activity which is less than the threshold limit of 60ktCO<sub>2e</sub> and is in compliance with the Para 5 of AMS III.R version 01. This was verified from estimated emission reduction calculation spreadsheet version 03 dated 23/04/2009 (including ER Spreadsheet Kolar Project version 04 dated 17.06.2009<sup>/2.d/</sup>) provided by the PP. The validation team has confirmed that the PP has correctly applied 95% confidence level for adjustment of input baseline survey values used in the estimation of emission reduction. Hence, the validation team has satisfactorily **closed this issue**.
2. The web hosted PDD version 01 has not discussed following conditions of methodology AMS-III.R version 01, therefore the validation team has requested the PP to provide the justification for the same.
  - a. The sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures that ensure that there are no methane emissions must be ensured.
  - b. Measure shall be used to ensure that all the methane collected by the recovery system is destroyed

In response the PP has justified that the digester slurry will be used to better the quality of soil by spreading thinly and directly on the ground and bio-digesters will not create any surplus gas over and above household requirements. This was confirmed through stakeholder interview and also further accepted by comparing the maximum energy which can be attained by biogas digester system to the actual household energy requirement provided by the PP<sup>/49/</sup>. The comparison analysis shows that the bio-digesters will provide maximum energy of 2.77 GJ per year to the household which is lower than the actual household energy requirement of 5.7 GJ; therefore proposed project activity satisfies the condition stipulated under Para 4 (a) & (b) of methodology AMS-III.R version 01. Hence, the validation team has accepted the justification provided by the PP and **closed this issue**.

3. The PP has not provided the above justification (refer Point 2 a & b) in the PDD version 01; hence the validation team has requested to provide the same in the PDD. The PP has incorporated the above justification (refer Point 2 a & b) in the revised PDD version 03 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>). This was verified by checking the PDD version 03 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) which was to be found appropriate and hence accepted; **closed this issue**.
4. The validation team has requested the PP to demonstrate that the amount of waste or raw materials that would decay anaerobically in the absence of the project activity is determined by survey of a sample group of households with a confidence level of 95%.

In response, the PP has demonstrated that the PP has carried out a survey of a sample group of households to determine the amount of waste that would decay anaerobically in the absence of the project activity in the Kolar district. This survey was carried out by SKG Sangha during December 2008. In total 361 households were surveyed: 75 in Bangarapet Taluk, 69 in Kolar Taluk, 69 in Malur Taluk, 68 in Mulbagal Taluk, and 80 in Srinivasapur Taluk. The PP has submitted the survey reports for each Taluk and the validation team has verified and confirmed the duration of survey and number of surveyed householder by checking and accepting these survey reports.

Furthermore, the PP has clarified that the emissions from all the parameters of the manure that would decay an-aerobically in the absence of the project activity have been adjusted in a conservative manner in order to ensure a precision at 95% confidence level according to the following equation:

$$\sigma_{BE,th} = \sqrt{\frac{\sum (BE_{th,h} - \mu_{BE,th})^2}{n_{bl} - 1}}$$

|                  |   |   |
|------------------|---|---|
| $\sigma_{BE,th}$ | = | Standard deviation of CO <sub>2</sub> emission in the baseline situation  |
| $\mu_{BE,th}$    | = | Mean of CO <sub>2</sub> emission of households included in the baseline sample group                                  |
| $BE_{th,h}$      | = | The amount of CO <sub>2</sub> emission in household h included in the baseline sample group in the baseline situation |
| $n_{bl}$         | = | Total number of households included in the baseline sample group  |

$$BE = n_{hh,y} \left( \mu_{BE} - z \cdot \frac{\sigma_{BE}}{\sqrt{n_{bl}}} \right)$$

|               |   |   |
|---------------|---|---|
| BE            | = | The total amount of CO <sub>2</sub> emission in the pre-project situation             |
| $n_{hh,y}$    | = | Total number of households participating in the program for the monitoring interval y |
| $\sigma_{BE}$ | = | Standard deviation of CO <sub>2</sub> emission in the baseline situation              |
| $\mu_{BE}$    | = | Mean of CO <sub>2</sub> emission of households included in the baseline sample group  |
| $n_{bl}$      | = | Total number of households included in the baseline sample group                      |
| z             | = | Standard normal for a confidence level of 95% (1.96)                                  |

Where:

$$\frac{\sigma_{BE}}{\sqrt{n_{bl}}}$$

is the standard error of the baseline emissions per households and  $z = 1.96$

Furthermore, the source and reference of formula used for the 95% confidence level has not been provided by the PP. Therefore, the validation team has requested the PP to provide the same.

In response the PP has clarified that the formula used for the 95% confidence level is based on statistical methods. The statistical formula is adopted from the draft general guideline on sampling and surveys that have been published in EB47 Annex 27.

The validation team has examined the formula and confirmed that presented formula is referred from the Para 05 of Annex 1 in the document 'Draft General Guideline on Sampling and Surveys' that have been published in EB47 Annex 27. The validation team has confirmed that the sampling formulas show the theoretical approach to estimate the 95% confidence level, including the equation to calculate the standard deviation and the mean of a sample group used in the Kolar baseline calculations.

However, the PP has further clarified that the Voluntary Gold Standard has developed a methodology titled "Indicative program, baseline, and monitoring methodology for small scale biogas projects".

[http://www.cdmgoldstandard.org/fileadmin/editors/files/6\\_GS\\_technical\\_docs/manuals\\_and\\_methodologies/GS\\_Methodology\\_Biodigester.pdf](http://www.cdmgoldstandard.org/fileadmin/editors/files/6_GS_technical_docs/manuals_and_methodologies/GS_Methodology_Biodigester.pdf)

This methodology shows in page number 6 and 7 the equation that should be used to calculate the total amount of CO<sub>2</sub> emissions in the pre – project situation with a 95% confidence level. The validation team has observed that the same formula has been adopted by the ‘Draft General Guideline on Sampling and Surveys’, EB 47, Annex 27 as well as by “Indicative program, baseline, and monitoring methodology for small scale bio-digester projects” in the Voluntary Gold Standard. Hence, the PP has used the same statistical methods for all the equations.

The validation team has verified and accepted as the PP has deducted the maximum error from the mean of CO<sub>2</sub> baseline emissions which is conservative. Hence, the validation team has satisfactorily **closed this issue**.

Further, **CL#4 was open** due to following applicability issues:

#### For AMS-I.C:-

1. The PDD version 03 mentioned the thermal capacity of one unit as 2.97 kW which has been calculated in separate spread sheet “Calculation of Thermal Equivalent V 2”; therefore the validation team has requested the PP to clarify that which installed unit has capacity of 2.97 kW among the 2m<sup>3</sup> unit or 3m<sup>3</sup> units. Also requested to clarify that the thermal energy generation due to single biogas unit depends on methane generated by that biogas unit but the thermal equivalent as mentioned does not reflected the same.

In response, the PP has clarified that the installed capacity of one unit is 2.97 kW irrespective of whether the household has a 2m<sup>3</sup> unit or 3m<sup>3</sup> bio-digester. This is because the installed capacity is determined by the technical characteristics of the stove that is being used to burn the bio-gas – specifically the maximum thermal energy that the stove can provide in an hour – and all the households in the project activity will be using the same type of stove. The difference between having a 2m<sup>3</sup> unit or 3m<sup>3</sup> bio-digester will determine the overall volume of biogas available for each household and hence the total number of hours over which the stove can be used for cooking. Hourly energy generation potential for each stove – that is thermal capacity for each unit – will however be the same for all households, irrespective of size of bio-digester. The PP has further clarified that the thermal capacity is also consistence with the guidance stipulated under EB41 annex 20.

The validation team has confirmed that the thermal capacity of single unit is in compliance with the EB 41 annex 20. As per the general guidance of EB 41 annex 20, Para 7, “*Output capacity of renewable energy equipment...For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MWth is the installed/ rated capacity of the thermal application equipment or device/s (e.g. biogas stoves).*” Thus it was found justified that thermal capacity of the biogas unit is not dependent on the gas stove efficiency and not on the varying digester capacity (2m<sup>3</sup> unit or 3m<sup>3</sup>). As all the biogas units will be using gas stove of same technical characteristics, therefore consideration of 2.97 kW thermal equivalent capacities for 2m<sup>3</sup>/ 3m<sup>3</sup> biogas units is found to be justified. Thus this issue has been satisfactorily **closed**.

2. The validation team has requested the PP to clarify that whether Para 3 and Para 4 of AMS I C version 13 is not applicable to project activity as this has not been mentioned in the PDD Version 03.

The PP has clarified that there are no existing renewable energy facilities. Hence Para 3 and Para 4 of AMS I.C version 13 is not applicable for project activity and same has been provided in the revised PDD (including PDD version 11 dated 11/04/2011<sup>1.K</sup>) and accepted by the validation team. This **issue is closed**.

#### For AMS I.E:-

1. The validation team has requested the PP provide an undertaking that the proposed project activity is not saving the non-renewable biomass accounted for by another registered project activities for justify Para 2 of AMS I.E version 1.

In response, the PP has provided an undertaking dated 10<sup>th</sup> June 2009<sup>/53/</sup> stating that the proposed project activity is not saving any non-renewable biomass accounted for by another registered project activity. This has been accepted and **issue is closed**.

#### For AMS III.R:-

1. The PDD has not discussed the justification on applicability criteria of Para. 01 of AMS-III.R. version 01, therefore the validation team has requested to the PP to discuss the same. The validation team has also requested the PP to justify that how the animal manure is anaerobically decaying in the pit and requested to support this justification by providing the details of depth of pit, retention time of animal manure and ambient temperature of the region.

The PP has provided the justification for the requested applicability criteria in the revised PDD. The PP has justified that the animal manure is currently dumped in pits of 1 m deep. Waste from the cattle shed is dumped in the pit along with some crop waste, any food waste, and sometimes toilet waste. The waste is not turned or mixed during the year. Cow urine, wastewater from the kitchen and other liquids are added to keep the mass in the pits wet or liquid and during the rainy season the pits also get filled with rainwater. The pits are cleaned out once a year. Additionally the average annual temperature in the region is 29.7° C. In the condition stated the mesophile organism usually produces methane, i.e in the temperature range 15 to 40°C. This can be verified from the link: <http://en.wikipedia.org/wiki/Mesophilic> and

[http://en.wikipedia.org/wiki/Anaerobic\\_digestion](http://en.wikipedia.org/wiki/Anaerobic_digestion)

The average annual temperature 29.7° C has been verified from the past trend of climatic conditions of Kolar District. The PP has provided the annual average temperature data from Karnataka Natural Resources Data Management System (NRDMS), which is an organization initiated by Govt. of India and Govt. of Karnataka for data management and overall science and technology initiative (<http://kscst.org.in/nrdms.html>). Thus the validation team is of the opinion that in the condition stated the animal waste is therefore decaying anaerobically in the pit and emits methane.

The Validation team has examined the revised PDD (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) and confirmed that the animal waste is decaying anaerobically in the pit in absence of the proposed project activity; this was justified by the PP in the revised PDD version 04 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) by means of explaining baseline management practice for treatment of animal manure and also by discussing average ambient temperature<sup>/20/</sup> of region and depth of pit to demonstrate anaerobic condition and accepted with evidence provided by the PP. This was confirmed from the baseline survey report<sup>/48/</sup> and discussions with stakeholders during the site visit. Thus the **issue is closed**.

2. The validation team has requested the PP to justify that how the project scenario (b) of Para 1 of AMS III.R version 1 is applicable as project activity involves installation methane recovery system (domestic biogas digester) instead of conventional pit.

In response, the PP stated that the proposed project activity involve installation of biogas digester to change the management system of animal manure treatment which was treated in pit and found satisfactory as per the Para 1 (b) of AMS III.R version 01. The same has been accepted as satisfactory and **issue is closed** (for more details please refer assessment of applicability criteria as per Para 1.b of AMS III R discussed under section 4.5 of report).

3. The PDD version 03 mentioned that a single biogas system would achieve an annual emission reduction of 2.12 tCO<sub>2e</sub>, therefore the validation team has requested the PP to clarify that which biogas system (i.e. 2 m<sup>3</sup> or 3 m<sup>3</sup>) would be achieving an annual emission reduction of 2.12 tCO<sub>2e</sub>.

In response the PP has clarified that the 2.12 tCO<sub>2e</sub> figure is a typing error and the correct figure is 2.43 tCO<sub>2e</sub>. Furthermore, the PP has clarified that the calculation of 2.43 tCO<sub>2e</sub> was a weighted average annual reduction per bio-digester used in the project activity as a whole. The weights used to calculate this figure reflect the 70:30 ratio of 2m<sup>3</sup> units and 3m<sup>3</sup> units that would be used in the project activity. The validation team has examined the calculation and confirmed that the revised

the PDD version 04 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) correctly mentions the annual emission reduction from single biogas system and also the 2m<sup>3</sup> unit and 3 m<sup>3</sup> unit will achieve 2.36 t CO<sub>2</sub> / year and 3.54 t CO<sub>2</sub> / year respectively which is less than threshold value 5 t CO<sub>2</sub> / year; hence it was accepted and **issue is closed**.

4. The PDD version 03 presented the justification of Para 4 (ii) as per AMS III.R; wherein the project participant has compared maximum energy required to household in a year ; therefore the validation team has requested the followings to the PP :-

- a. To provide the spread sheet calculation for the comparison between energy provided by the bio digester and current energy used by the households.

In response, the PP has provided the spreadsheet for comparison. The validation team has examined the spread sheet and confirmed that calculation in spread sheet is correct, hence accepted and **issue is closed**. For more details please refer the description of validation of the calculation spreadsheet provided under section 4.8 and. Finding overview in Annex 3 of this report.

- b. To clarify that how the methane production (115.95 kgCH<sub>4</sub> / year) in the biogas digester has been calculated as reference source given for this data has not been traceable in baseline calculation. Also reference source for "Quantity of methane in the biogas" as 50% has been missing in analysis. Since the calorific value of the biogas has calculated considering 60% CH<sub>4</sub> concentration in the biogas, then the same also needs to be adopted for this calculation as well.

In response, the PP has provided all reference sources in the spreadsheet and provided the justification towards the value used in the calculation of methane production in the biogas digester. For more details please refer the description of validation of the calculation spreadsheet provided under section 4.8 and. Finding overview in Annex 3 of this report.

The PP also stated that "Quantity of methane in the biogas" as 50%, is the default value for the fraction of methane in the SWDS published in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 04"<sup>/51/</sup>, <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v4.pdf>

However, in order to be consistent with the calorific value of the biogas calculation, a 60% CH<sub>4</sub> concentration in the biogas will be considered. The validation team found its response as satisfactory and the value as conservative and hence it is accepted. Thus the **issue is closed**.

The **CL#4 was open**; as the version 13 of approved methodology AMS I.C was expired and the grace period for submission of requests for registration was 07 December 09 23:59 GMT for this version 13, hence validation team has requested project participant to up-date the PDD as per latest valid version of approved methodology AMS I.C available on the UNFCCC web site.

The PP has updated the PDD with the version 16 of AMS. I.C (letter on PDD version 11 dated 11/04/2011<sup>/1.k/</sup> was updated on version 18 of AMS I C) This was verified by the validation team and confirmed the applied methodology version 16 is valid and same has been used in the revised PDD (letter on PDD version 11 dated 11/04/2011<sup>/1.k/</sup> was updated on version 18 of AMS I C).

Further the sequence of justification was not in correct order as mentioned in the version 16 of AMS-I.C. (letter on PDD version 11 dated 11/04/2011<sup>/1.k/</sup> was updated on version 18 of AMS I C) hence validation team has requested to correct the same. In response, the PP has revised the PDD<sup>/01.i/</sup> and provided the correct sequential order of justification and this was found to be in consistence with version 16 of AMS-I.C. (letter on PDD version 11 dated 11/04/2011<sup>/1.k/</sup> was updated on version 18 of AMS I C) and hence accepted. Further, final PDD version 11 dated 11/04/2011<sup>/1.k/</sup> has been updated on latest version 18 of AMS-IC (version 18, valid from 01 October 2010 to 16 June 2011

(Requests for registration can be submitted until 17 February 2012 23:59:59 GMT) by PP and same was confirmed by validation team.

Based on the above discussion, the validation team has satisfactory **closed the CL#4.**

## Opinion

Based on the above discussion, that the validation team confirms that the proposed CDM project activity meets all the applicability conditions and all other stipulations of the selected methodologies AMS-I.C. version 18, AMS-I.E. version 03 & AMS-III.R version 01.

## 4.6 Project Boundary

The spatial extent of the project boundary is assessed through the description in the final PDD<sup>/01.k/</sup>. The proposed project activity boundary is physical, geographical site of

- the project equipment (i.e. biogas digester) producing the renewable energy ( i.e. biogas ) which complies the requirement stipulated in Para 12 of AMS-I.C. version 18.
- area of the use of biomass or the renewable energy(i.e. biogas cookers) which complies the requirement stipulated in Para 04of AMS-I.E. version 03.
- the methane recovery (i.e. biogas digester ) and combustion systems (i.e. biogas cooker ) which complies the requirement stipulated in Para 06 of AMS-III.R. version 01.

Therefore the project activity boundary includes the biogas digesters and biogas cookers. During the site visit it was confirmed by the Assessor that the description of the proposed CDM project activity as contained in the PDD<sup>/01.k/</sup> sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity.

The project design is accurate and explanatory and the geographical (Kolar, Bangarapet, Malur, Mulbagal and Srinivaspur taluk of Karnataka state of India) boundaries of the project are clearly defined. The validation team confirms that the only greenhouse gases relevant to the project activity are CO<sub>2</sub> and CH<sub>4</sub>. These gases are addressed as:

- The kerosene and non-renewable biomass fuel wood were used in absence of project activity which leads the emission of CO<sub>2</sub> gas; so this CO<sub>2</sub> is considered in baseline emissions.
- The biogas leakage from the bio-digester is leads the emissions of CH<sub>4</sub> gas; so this CH<sub>4</sub> is considered in project emissions.

Further, it is confirmed that the project activity does not involve any transfer of equipment from or to the project activity and thus there is no leakage accountable to the project activity which complies the requirement of Para 45 of AMS-I.C. version 18, Para 12 of AMS-I.E. version 03, and Para10 of AMS-III.R. version 01.

As no biomass residue is used in the proposed project activity; therefore Para 46 of AMS-I.C. version 18 is not applicable.

The generated biogas from bio-digester is the renewable biomass for the project activity which displace the non-renewable biomass fuel wood used by house-holder, therefore the applicability conditions stipulated under Para 10 & 11 of the selected approved methodology AMS-I.E. version 03 are not applicable for the proposed project activity.

The validation team assessed during the on-site inspection and confirmed that no greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which is expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology.

## Opinion

The validation team is of the opinion that the delineation of the project boundary in the PDD<sup>/01.k/</sup> is correct and meets the requirements of the selected baseline methodology. The validation team also confirms that identified boundary and the selected sources and gases are justified for the project activity.

#### 4.7 Baseline Selection and Additionality

The proposed project activity will generate the biogas in biogas-digester by anaerobic decay of cattle manure. The generated biogas will meet the thermal requirement for cooking and heating purpose in household. In absence of proposed project activity, the kerosene (as fossil fuel) and fuel wood (as non-renewable biomass) are used for cooking and heating purpose in household whereas the cattle manure is dumped in the pit for uncontrolled anaerobic decay. Therefore the baseline scenario identified following components:

##### 1. Kerosene as fossil fuel:

The proposed project activity will use biogas in biogas stove for cooking & heating requirement of household (i.e. renewable energy technologies) that displace the use of kerosene (i.e. fossil fuel) in traditional stove; the simplified baseline is the kerosene consumption of traditional stove that would have been used in the absence of the project activity times an emission factor for the kerosene displaced which complies the requirement stipulated in Para 13 of AMS-I.C. version 18.

The PP has carried out the survey in 361 household in the Kolar district of Karnataka state of India. The baseline survey report<sup>/48/</sup> has been submitted by the PP. The survey report confirmed that the average total kerosene consumption of a household in the project area is 42.5 litres per year. The average amount of kerosene that is used for starting fires and cooking from this total amount is 24.12 litres per year. The balance of the kerosene is used for lighting.

##### 2. Fuel wood as non-renewable biomass:

The use of kerosene is an appropriate baseline to those householders which can afford the cost of fuel (kerosene) and equipment. But for the households in the project area, fossil fuels generally are too expensive and/or need expensive equipment for their use for cooking purposes. So, there is no clear projected fossil fuel to which such families would switch, as the gap between current income and the income needed to afford fossil fuel use for cooking purposes is large. This was verified from the Baseline Survey report conducted by the PP and was found to be satisfactory.

Nevertheless, kerosene could theoretically be considered as a projected fossil fuel, as it does not need expensive cooking equipment, is available in the market, and some kerosene is already used by households as an accelerant in cooking fires. Therefore the baseline for the non-renewable biomass is the use of kerosene for supplying the same amount of thermal energy that of non-renewable woody biomass generates, which is also inline with the Para 05 of AMS-I.E. version 03.

Further, in the section B.4 of the PDD, the PP has clearly demonstrated that the studies at the Karnataka State level have shown that Kolar District is a bio-resource deficit zone where the demand for fuel wood and other bio-resources far exceeds supply. This demonstration has further supported with the study "*Bio-resource Status in Karnataka*"<sup>/31/</sup>. The validation team has confirmed that the study concluded that Kolar District was included in the Eastern Dry Agro Climatic Zone which identified as having a bio-resource availability to demand ratio of 0.39 i.e. only 39% of the bio-resources. The information was also cross-checked with another study titled as "*Bio-resource Potential of Karnataka: Technical Report No. 109*"<sup>/33/</sup>. These state level studies support the results of specific studies on bio-resource used in Kolar District.

The out come of this study shows that ratio of bio-resource availability to demand for each Taluk in Kolar District with an average ratio for Kolar District is of 0.22. This ratio means that on average only 22% of the bio-resources that are used in Kolar District are renewable and that 78% of the bio-resources used in Kolar District are non renewable.

The validation team has gone through these studies and confirmed that the study "*Inventoring, Mapping and Monitoring of Bio-resources Using GIS and Remote Sensing (Kolar District)*"<sup>/32/</sup> is specific to Kolar District rather than a more general state level study and given that the study incorporates detailed analysis of villages in the project area, these results represent the most accurate and appropriate figure for non renewable biomass used in the Kolar District. The above information is found consistence in the PDD also.

The validation team confirmed from the baseline survey report<sup>/48/</sup> that shows the average participating household uses 4.7 tonnes of fuel wood per year for cooking. Hence based on the study, the PP has

concluded that the baseline for the non-renewable biomass part of the programme is the use of kerosene. The same amount of thermal energy would have been generated by 3.70 t of non-renewable woody biomass. This information has been analysed by the validation team and was found to be appropriate and acceptable; also in line with the Para 05 of AMS-I.E. version 03.

### 3. Cattle manure

The validation team has carried out the onsite inspections by visiting some of household in villages of Kolar district, during which the team identified the general pattern of manure and waste management used by villagers (householders). The validation team has found that each household has a pit in the ground where waste from the cattle shed – cow dung, straw, green fodder and urine – is dumped. The assessor has confirmed that the depth of pit is varying from 1.5 m to 2 m by dipping the stick of wood around 3 m length. During the stakeholder interview; the validation team confirmed that the households collect animal manure produced when cattle is kept in a shed.

During interviews, householder said that they collect manure waste from the cattle shed and then dump in the pit along with some crop waste and any food waste and after dumping the waste, they never turned or mixed the waste during the year. The validation team has analysed that the upper thin layer of waste in the pit seems fresh layer of waste where as the middle layer little bit harder. The validation team has also observed bubbling in the pit which implies emission of some kind of gases to the atmosphere. It has been confirmed during stakeholder interview, that in the rainy season the pits get filled with water and in order to keep the material in the pit wet or liquid, kitchen waste water is also poured into the pits. The pits are cleaned out once a year and the raw waste is applied in the fields.

Therefore, on the basis of above traditional management system of waste carried by villagers, the validation team has confirmed that animal waste is decaying anaerobically in the pit and emits methane to atmosphere which is found inline with the baseline scenario situation stipulated in the Para 08 of AMS-III.R. version 01.

Further, it is confirmed by the validation team that manure and pit management which was seen during the site visit, is also described in the study carried out by the Regional Biogas Development and Training Centre, University of Agriculture Sciences, Bangalore<sup>/30/</sup>.

The PP has carried out the baseline survey to calculate the baseline emissions based on the amount of the waste that would decay anaerobically in the absence of project activity. The validation team has checked the baseline survey sheet used during the survey and the same copy of baseline survey sheet is enclosed in Annex 3 of the PDD<sup>/01.i/</sup>. The validation team has found the questions that were included in the baseline survey appropriate.

Further, it is confirmed that survey categories correspond to the following manure management systems given in Table 10.18, Chapter 10.4, Volume 4 of the IPCC 2006 Guidelines<sup>/66/</sup>: (i) liquid/slurry manure management system, (ii) liquid/slurry with crust cover manure management system and (iii) solid storage manure management system. The baseline survey<sup>/48/</sup> is found to be consistent with the requirement stipulated under Para 08 of AMS-III.R. version 01.

The validation team has examined the approach for determine the baseline values for manure collection. The approach is based on the time when the animals are kept in the sheds that are attached to or close by the house and considering that all manure from the shed is put into the pit. When animals are grazing outside, dung is only rarely collected and put into the pit.

The PP has conducted the sample test (check) to determine the share of the amount of manure that is collected and dumped in to the pit with respect to the approximate total manure production per day and result comes 76%. As per baseline survey report; animals are kept in the sheds on average for 17.7 hours per day, 74% of the total time i.e. 24hrs per day.

Accordingly, 74% of the total manure produced by the cattle is collected from the sheds and put into the pit as described above. Although some manure that is dropped in the fields is also collected and put into the pit, this manure has not been included in the baseline calculations for the sake of conservativeness.

The validation team has confirmed that estimation of the total amount of manure excreted by cattle is considered to be less accurate than estimation of the time per day when animals are kept in the shed; therefore the share identified according to the time the cattle are kept in the shed (i.e. 74%) is used for

calculating the baseline. Also the above approach is found to be appropriate and conservative enough. Furthermore, this value has been adjusted as 17.4 hours per day which is 72% of the total time, to ensure a precision at 95% confidence level.

The validation team has examined the survey results<sup>/52/</sup> provided by the PP. The results have shown that manure is handled in a liquid/slurry manure management system for 5.5 months, in a liquid/slurry with crust cover manure management system for 3.3 months and in a solid storage manure management system for 2.8 months. In the remaining 0.5 months the material is solid and dry. It is further confirmed by the assessor that the survey results are backed up by the University of Agriculture Sciences study<sup>/53/</sup>.

The PP has adjusted these parameters in order to ensure a precision at 95% confidence level, given a result of: in a liquid/slurry manure management system for 5.3 months, in a liquid/slurry with crust cover manure management system for 3.2 months and in a solid storage manure management system for 2.7 months. In the remaining 0.4 months the material is solid and dry.

Furthermore, the validation team confirmed that the parameters that are archived from the survey result have a precision at 95% confidence level, and meets the requirement stipulated under Para 09 of AMS-III.R version 01.

### Discussion of CARs/CLs :

**CL#6 (Point 01)** was raised to justify the appropriateness of the baseline study which was conducted outside of the current project boundary. It was also requested to substantiate with objective evidences how the baseline survey conducted at Hassan Taluk of Hassan District should be considered as the most appropriate for Kolar Biogas project occurring at Kolar district.

In response the PP has informed that they have wrongly used baseline data from baseline survey report of Hassan District. They later corrected the same and informed that they conducted the survey in Kolar District during the December 2008, to identified baseline for proposed project activity in the Kolar district. The total 361 households were surveyed: 75 in Bangarapet Taluk, 69 in Kolar Taluk, 69 in Malur Taluk, 68 in Mulbagal Taluk and 80 in Srinivasapur Taluk. Project participant has provided the survey sheets were completed for every household surveyed. The weighted averages (according to different Taluks) for parameters were calculated using survey data and were used to determine emission reductions. Project participant has also provided the summary survey results in Annex 3 of the revised PDD version 03 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>). The PP has used all quantitative data attained from the survey results in the calculation of emission reduction. This was verified with the survey sheets provided by the PP and was found to be satisfactory and accepted, hence **CL#6 (Point 01) was closed.**

**CL#6 (Point 02)** was raised for the baseline survey results related to average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area needs to be substantiated through survey documents/ reports. In response the PP provided the survey result conducted in Kolar district during December 2008 and the validation team has examined the value of average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area which are found consistence with survey results. Furthermore, the value of baseline<sup>/48/</sup> parameter for kerosene consumption used in the PDD is 24.12 l/year; where as the surveyed value saying the same as 2.00 l/month i.e. 24 l/year, therefore the validation team has requested the project participant to clarify the same.

The PP has clarified that the value for  $F_{\text{kerosene}}$  is 24.12 litres which is the average value surveyed for kerosene consumption. For cooking purpose consumption of kerosene is 1.6911 l/month and for starting fire in traditional stove is 0.3154 l/month, this leads to a total kerosene consumption of 2.0065 l/month. Same was crossed – checked with submitted survey data and was found to be correct. Hence

**CL#6 (Point 02) was closed.** For more details please refer the description of validation of the calculation spreadsheet provided under section 4.8 and Finding overview in Annex 3 of this report.

### Opinion:

The validation team has assessed and verified the reliability and creditability of all data, rationales, assumptions, justifications and documentation provided by the PPs to support the identification of baseline. The validation team has checked each element during the validation assessment and found the proposed

project activity is in compliance with the requirement stipulated under Para 80, 81, 86 a-e of the VVM version 1.2 (EB55 Annex 1)<sup>/56/</sup>.

#### 4.7.1 Additionality

The additionality of the project has been presented in the PDD<sup>/01.i/</sup> using “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)<sup>/22/</sup>. Steps 1, 2, & 4 of the additionality Tool were used to demonstrate additionality. In step 3; project participant has also referred to specific guidance for establishing the additionality of small scale CDM (SSC) projects “Non-binding best practice examples to demonstrate additionality” for SSC project activities” stipulated in the Annex 34 of EB 35 report<sup>/23/</sup>. This is in accordance with general guidance to SSC methodologies (EB 59 Annex 09, Version 16)<sup>/24/</sup>.

The step wise approach has discussed in further section 4.7.3 to section 4.7.6 of this report.

During the site visit, the issue of additionality was discussed as mentioned in section 6 of this report. The information in the below mentioned documents were also verified against the actual situation on the site and was found to be accurate.

The data, rationales, assumptions and justifications and documentation provided have been checked using local knowledge and sectoral expertise, the same has been cross checked by the following sources of information:

- A report produced by the International Energy Initiative in 2004 entitled “Report on the use of LPG as a domestic cooking fuel option in India”<sup>/35/</sup>,
- Baseline survey report<sup>/48/</sup> (subsidised kerosene cost),
- Official subsidised LPG cost and bio-digester cost provided by SKG Sangha<sup>/58/</sup>.

#### Opinion

Based on the responses to the various approaches mentioned above and the requirements of paragraphs 93-95 of the VVM version 01.2 (EB 55 Annex 1)<sup>/56/</sup>, the validation team confirms that the documents provided for the project activity are appropriate. Hence, the data, rationales, assumptions, and justifications provided in the PDD are accepted as reliable and credible.

#### 4.7.2 Prior Consideration of the Clean Development Mechanism

The start date of the proposed CDM project activity has been mentioned in the PDD<sup>/1.k/</sup> as 18/12/2008. This is the date of the signed agreement between SKG Sangha and CH4NGE Ltd<sup>/54/</sup>. This signed agreement was checked for the date and it was found to be consistent with that mentioned in the PDD<sup>/01.k/</sup>. Also, the start date was found to be in line with the definition of start date mentioned in the Glossary of CDM terms version 5<sup>/15.a/</sup> and paragraph 67 of EB 41<sup>/15.b/</sup>.

The first version of the PDD version 01 dated 12/09/2008<sup>/1.a/</sup> was published for global stakeholder consultation at the commencement of the validation of the PDD<sup>/1.a/</sup> on 16/09/2008, i.e. before the start of the project activity, and hence it is a new project activity and in line with the requirement of guideline stipulated under Para 02 of EB 62 Annex 13 entitled “Guidance on the demonstration and assessment of prior consideration of the CDM” version 04<sup>/25/</sup>.

#### Discussion of CARs/CLs:

**CAR#7 (Point 01) was raised** to the PP that the CDM project start date as described in the Section C.1.1 of the PDD version 01<sup>/1.a/</sup> is not representing the complete transparency, as it is an assumed timeline. Thus the validation team has requested the PP to the specific start date of the proposed CDM project activity in accordance with the definition of “Starting date of a CDM project activity” Para 67 of EB 41<sup>/15.b/</sup>.

In response, the PP has clarified that the project start date is 01/06/2009 which is the start date for project construction. The PP has provided a purchase order for pipes<sup>/59/</sup>, which also refers to the start date of 01/06/2009 and also provided a certificate from CH4NGE Ltd<sup>/60/</sup>.

The validation team has examined the explanation given by the PP towards the CDM project start date of 01/06/2009 and found that the start date of project activity (i.e. 1 May 2009) has not been correctly identified

as per Para 67 of EB 41 report<sup>/15.b/</sup>. Therefore the validation team has requested the PP to clarify that why the start date of project activity has been considered as 01/06/2009 as the project activity start date as per Para 67 of EB41<sup>/15.b/</sup> report which states that “starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins”;

The validation team observed that the agreement between SKG Sangha and CH4NGE Ltd dated 18/12/2008 which states that the fund for Kolar Biogas Project will be provided by CH4NGE Ltd<sup>/54/</sup>. The date of agreement is that earliest date at which real action of a project activity begins.

In response the PP has changed the start date of CDM project activity in section C.1.1 of the PDD version 04<sup>/1.d/</sup> as 18/12/2008<sup>/54/</sup>. Furthermore, the PP has also demonstrated that the PDD version 01<sup>/1.a/</sup> was published for global consultation on the 16/09/2008; thus a notification to DNA/UNFCCC is not needed in order to justify the prior consideration of the project activity.

The validation team has examined the revised start date of project activity with the explanation given by the PP and confirmed that the start date of the project activity is 18/12/2008<sup>/54/</sup> and considered it as the appropriate start date as per CDM glossary of terms<sup>/15.a/</sup> and EB41 Para 67 guidance<sup>/15.b/</sup>. It is further confirmed that the first version of the PDD<sup>/1.a/</sup> was published for global stakeholder consultation at the commencement of the validation of the PDD<sup>/1.a/</sup> on 16/09/2008, i.e. before the start of the project activity, and hence is a new project activity and in line with the requirement of guideline stipulate under Para 02 of EB 62 Annex 13 entitled “Guidance on the demonstration and assessment of prior consideration of the CDM” version 04<sup>/25/</sup>, thus accepted and **CAR#7 (Point 01) was closed.**

**CAR#7 (Point 02) was raised;** as per description presented in the PDD version 01<sup>/1.a/</sup>, the project activity would have not occurred due to the described project barriers; therefore the validation team has requested to the PP to clarify that how the CDM revenue has been seriously considered by the PP revive the project acceptability and needs to be explained further along with the requirement of EB 41 Annex 46 Guideline (now EB 62 Annex 13)<sup>/25/</sup>.

The PP has justified that the project activity would not have occurred anyway because of the investment barrier referred to in EB35 Report Annex 34 Non-Binding Best Practice examples to Demonstrate Additionality for SSC Project Activities<sup>/23/</sup>. Project participant also further explained that the PDD version 01<sup>/1.a/</sup> was published for global consultation on the 16/09/ 2008 and a notification was not needed in order to justify the prior consideration of the project activity which is also in compliance with the requirement of 41 Annex 46 Guideline (now EB 62 Annex 13)<sup>/25/</sup>.

The validation team has confirmed that the start date of project activity is after 02/08/2008 and PDD<sup>/1.a/</sup> was web hosted for public comment on UNFCCC web site during 16/09/2008 to 15/10/2008 and contract was signed with the assessment team on 08/09/2008<sup>/52/</sup> which shows that project activity is inline with Annex 46 of EB report 41(now EB 62 Annex 13)<sup>/25/</sup>. Hence the **CAR#7 (Point 02) was closed.**

## Opinion

Based on paragraph 02 of EB 62 annex 13<sup>/25/</sup>, the validation team is of the opinion that project activity is a new project activity as starting date of proposed project activity is after 02 August 2008 and a PDD<sup>/1.a/</sup> has been published for global stakeholder consultation for this specific project before the project activity start date, thus no notification from the project participant required to inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. This is in compliance with the CDM requirement stipulated under Para 99 and Para 102 of VVM version 1.2 (EB 55 Annex 1)<sup>/56/</sup>.

### 4.7.3 Identification of alternatives (if applicable)

The PDD has identified the baseline scenario by using the “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)<sup>/22/</sup>.

In the pre-project scenario, the householders in rural areas of Kolar District used traditional cooking stoves fired with fuel wood and additionally with kerosene. This has been confirmed by the validation team during the site visit and it was found that the cooking stoves were made of three stones or were simple design stoves made of clay. During the stakeholder interview; team has realized that the cost of three-stone cooking stove is negligible where as cost of the traditional constructed stove approximate 100 Indian

Rupees. The cost of traditional constructed stove has been further verified by the assessment team with the shop-keepers nearer to the village.

During back to back stakeholder interview, the validation team has identified that the fuel wood is collected from woody shrubs and forested areas and the demand for fuel wood is much higher than the regeneration of the woody biomass so there is a severe shortage of fuel wood and forest resources are depleting.

Further, it is confirmed by the assessment of baseline survey results that shows 78% of the collected fuel wood is non-renewable and each household uses 24.12 litres of kerosene per year for cooking purposes.

### **Step 1: Identification of alternatives to the project activity consistent with current laws and regulations**

#### **Sub-step 1a: Define alternatives to the project activity:**

The PP has identified the following five alternatives to the proposed project activity under sub-step 1a:

1. Use of kerosene for all cooking purposes (subsidised fuel);
2. Use of Liquid Petroleum Gas (LPG) Systems (subsidised fuel);
3. Use of sustainable agricultural residues (traditional stove);
4. Project activity – use of project bio-gas systems or
5. Pre-project situation: three stones stove plus subsidised kerosene.

The alternatives mentioned above, includes the project activity undertaken without being registered as a CDM project activity. The alternatives presented include all plausible scenarios taking into account the local and sectoral situations. Hence the list of alternatives is considered to be complete.

#### **Outcome of Step 1a:**

The outcome of sub-step 1a is that all five alternatives are realistic and credible alternative scenarios to the project activity.

#### **Sub-step 1b: Consistency with mandatory laws and regulations:**

Sub-step 1b checks the consistency of the alternatives with mandatory laws and regulations. The alternatives identified above are consistent with current laws and regulations and there are no legal and/or regulatory requirements that prevent the above alternatives from occurring. This has been validated through discussion with the PP and also through the knowledge of local laws and regulation.

#### **Outcome of Step 1b:**

The outcome of sub-step 1b is that all five alternatives are realistic and credible alternative scenarios to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

**“Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both Steps 2 and 3.)”**

The PP has been selected to complete both Steps 2 and 3 and same has been described the final PDD<sup>/1.k/</sup>.

The step wise approach has discussed in further section 4.7.4 to section 4.7.6 of this report.

### **Opinion**

Thus according to the requirements of paragraph 86 a-e of VVM version 01.2 (EB 55 Annex 1)<sup>/56/</sup>, the validation team is of the opinion that:

1. All the assumptions and data used by the project participants are listed in the PDD<sup>/1.k/</sup>, including their references and sources
2. All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD<sup>/1.k/</sup>
3. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable

4. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD<sup>/1.k/</sup>
5. The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.

#### 4.7.4 Investment analysis (if applicable)

The PP uses the investment analysis to demonstrate the additionality as per the “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)<sup>/22/</sup>.

#### Step 2: Investment analysis

To demonstrate and assess additionality of the project activity investment analysis requires to determine whether the proposed project activity is the economically or financially less attractive without the revenue from the sale of certified emission reductions (CERs).

The PDD has conducted the investment analysis by using the following sub-steps and the investment guideline stipulate in ‘Guidelines on the Assessment of Investment Analysis’ version 05 (EB62 Annex 05)<sup>/26/</sup>.

#### Sub-step 2a: Determine appropriate analysis method

The PP has applied simple cost analysis (Option I, of the tool) as the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income. The PP has determined the average annual costs of the proposed project activity and each alternative scenario, such that:

Average annual cost = (capital costs ÷ technology lifetime) + annual fuel costs + annual maintenance costs).

The average annual cost of each scenario has been calculated to demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity which is inline with Para 107 (a) of VVM (version 1.2)<sup>/56/</sup>.

#### Sub-step 2b: Option I. Apply simple cost analysis

The Validation of Input values:

The validation team has analysis the calculation provided by the PP in the PDD<sup>/01.k/</sup> and confirmed that the input values used in calculation of the cost was attained from:-

- A report produced by the International Energy Initiative in 2004 entitled “Report on the use of LPG as a domestic cooking fuel option in India”<sup>/35/</sup>,
- Baseline survey report <sup>/48/</sup>(subsidised kerosene cost),
- Official subsidised LPG cost and bio-digester cost provided by SKG Sangha<sup>/58/</sup>.

Calculation spread sheet:

The PP has provided the detailed calculation in Investment analysis spread sheet<sup>/3.g/</sup> for calculation of average annual cost for each scenario. The calculation of average annual cost for each scenario has been checked by the validation team and the reference for each input values has been checked. The calculation for each scenario is mentions below:

Alternative Scenario 01: Use of kerosene for all cooking purposes (subsidised fuel)

| Sr. No. | Description  | Unit    | Scenario 01 | Applied formula /Reference validated by validation team   |
|---------|--------------|---------|-------------|---|
| A       | Capital cost | INR     | 400         | A report on the use of LPG as a domestic cooking fuel option in India”, International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| B       | Useful life  | Year(s) | 5           | A report on the use of LPG as a domestic cooking fuel option in India”,   |

|   |                             |              |      |   |
|---|-----------------------------|--------------|------|---|
|   |                             |              |      | International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup>   |
| C | Average annual capital cost | INR          | 80   | $C = A/B$   |
| D | Fuel price                  | INR/ litre   | 10   | Baseline Survey Report <sup>/48/</sup>  |
| E | Annual fuel usage           | litre / Year | 200  | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| F | Annual fuel cost            | INR          | 2000 | $F = D \times E$  |
| G | Annual maintenance expenses | INR          | 25   | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| H | Average annual costs        | INR          | 2105 | $H = C + E + I$   |

Alternative Scenario 02: Use of Liquid Petroleum Gas (LPG) Systems (subsidised fuel)

| Sr. No. | Description                 | Unit         | Scenario 02 | Applied formula /Reference validated by validation team   |
|---------|-----------------------------|--------------|-------------|---|
| A       | Capital cost                | INR          | 1800        | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| B       | Useful life                 | Year(s)      | 15          | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| C       | Average annual capital cost | INR          | 120         | $C = A/B$   |
| D       | Fuel price                  | INR/ litre   | 24.60       | A domestic LPG cylinder has 14.2 kg and it sells at INR 350 <sup>/61/</sup>   |
| E       | Annual fuel usage           | litre / Year | 115         | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| F       | Annual fuel cost            | INR          | 2829        | $F = D \times E$  |
| G       | Annual maintenance expenses | INR          | 75          | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| H       | Average annual costs        | INR          | 3024        | $H = C + E + I$   |

Alternative Scenario 03: Use of sustainable agricultural residues (traditional stove)

| Sr. No. | Description  | Unit | Scenario 03 | Applied formula /Reference validated by validation team   |
|---------|--------------|------|-------------|---|
| A       | Capital cost | INR  | 10          | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |

|   |                             |              |         |   |
|---|-----------------------------|--------------|---------|---|
| B | Useful life                 | Year(s)      | 3       | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| C | Average annual capital cost | INR          | 3.33    | $C = A/B$   |
| D | Fuel price                  | INR/ litre   | 1       | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| E | Annual fuel usage           | litre / Year | 1395    | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| F | Annual fuel cost            | INR          | 1395    | $F = D \times E$  |
| G | Annual maintenance expenses | INR          | NIL     | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| H | Average annual costs        | INR          | 1398.33 | $H = C + E + I$   |

Alternative Scenario 04: Project activity – use of project bio-gas systems (data from SKG Sangha)

| Sr. No. | Description                 | Unit         | Scenario 04    | Applied formula /Reference validated by validation team                        |
|---------|-----------------------------|--------------|----------------|--|
| A       | Capital cost                | INR          | 20899          | 2 m <sup>3</sup> biogas digester cost calculated by SKG Sangha <sup>/62/</sup> |
| B       | Useful life                 | Year(s)      | 20             | Nijaguna, B.T, Biogas Technology <sup>/34/</sup>                               |
| C       | Average annual capital cost | INR          | 1044.95        | $C = A/B$  |
| D       | Fuel price                  | INR/ litre   | Not Applicable | Free of Cost   |
| E       | Annual fuel usage           | litre / Year | Not Applicable | Free of Cost   |
| F       | Annual fuel cost            | INR          | Not Applicable | $F = D \times E$ ( as Free of Cost)  |
| G       | Annual maintenance expenses | INR          | 500            | As per SKG Sangha's assumption based on past experience                        |
| H       | Average annual costs        | INR          | 1544.95        | $H = C + E + I$  |

Alternative Scenario 05: Pre-project situation: three stones stove + subsidised kerosene

| Sr. No. | Description                 | Unit    | Scenario 05    | Applied formula /Reference validated by validation team |
|---------|-----------------------------|---------|----------------|---|
| A       | Capital cost                | INR     | Negligible     | Contracted based on raw material available in house     |
| B       | Useful life                 | Year(s) | Not Applicable |   |
| C       | Average annual capital cost | INR     | Not Applicable | $C = A/B$   |

|   |                             |           |            |   |
|---|-----------------------------|-----------|------------|---|
| D | Fuel price                  | INR/ kg   | 10         | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| E | Annual fuel usage           | kg / Year | 36         | A report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see Annex 3) <sup>/35/</sup> |
| F | Annual fuel cost            | INR       | 360        | $F = D \times E$  |
| G | Annual maintenance expenses | INR       | Negligible | As per SKG Sangha's assumption based on past experience   |
| H | Average annual costs        | INR       | 360        | $H = C + E + I$   |

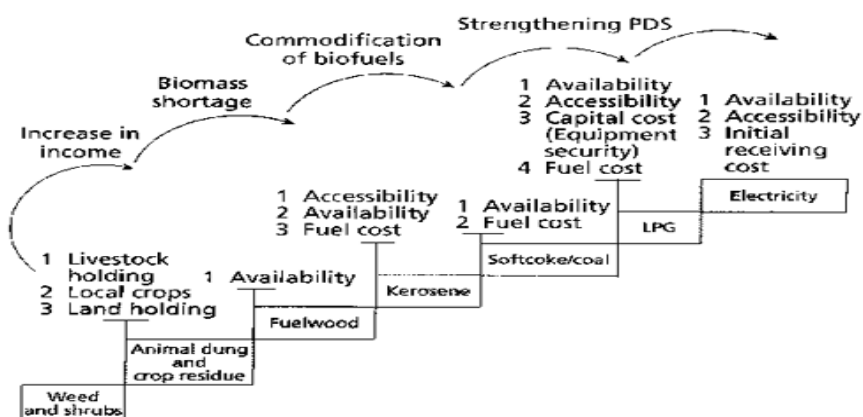
Outcome of analysis:

| Scenario serial no. | Alternative Scenarios  | Average annual cost (INR) |
|---------------------|--|---------------------------|
| 1                   | Use of kerosene for all cooking purposes (subsidised fuel)               | 2105.00                   |
| 2                   | Use of Liquid Petroleum Gas (LPG) Systems (subsidised fuel)              | 3024.00                   |
| 3                   | Use of sustainable agricultural residues (traditional stove)             | 1398.33                   |
| 4                   | Project activity – use of project bio-gas systems (data from SKG Sangha) | 1544.95                   |
| 5                   | Pre-project situation: three stones stove + subsidised kerosene          | 360                       |

The above analysis shows that the scenario 05 (Pre-project situation: three stones stove + subsidised kerosene), scenario 03 (Use of sustainable agricultural residues (traditional stove)) are alternatives which are less costly than the project activity scenario 04 (Project activity – use of project bio-gas systems (data from SKG Sangha)). Hence the PP has concluded that there is at least one alternative which is less costly than the project activity.

The results were also corroborated against an article written by Preeti Malhotra entitled 'Environmental implications of the energy ladder in rural India' <sup>/27/</sup> which depicts a graphical representation of fuel use in India as a "ladder", on which the first step shown on the far left of the image denotes the most common and cheapest fuel sources used. Each subsequent step on the ladder from left to right of the diagram denotes the next fuel used, which is generally used less frequently than the fuel source denoted in the previous step because of cost or availability. The energy ladder obtained from this article is shown in the figure below.

### Energy Ladder in Rural India



## Outcome of sub-step 2b:

The outcome of sub-step 2b is that the proposed CDM project activity is more costly than at least one alternative.

## Discussion of CARs/CLs:

**CAR# 8 (Point 01) was raised** because the project additionality has not been described in the PDD version 01 as per the requirements of EB35\_repan34, Non-binding best practice examples to demonstrate additionality for SSC project activities. In response, the PP described that proposed project activity would not have occurred anyway due to at least one of the two barriers (a) Investment barrier: a simple cost analysis and (b) Access to finance barrier. The validation team has examined the demonstration given by the PP and requested to the PP to provide the justification for following issues:

1. Scenario 1, 2 & 3 of Annualised cost of alternative scenario comparison mentioned in the Annex 7 of the PDD version 3 is based on June 2004 data. The selection of data for investment analysis was not as per Para 6 of Annex 45 of EB 41 (now EB 62 Annex 05) which states that input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the PP.

In response, the PP has clarified that the latest available published data (June 2004) were used to prepare the annualised cost scenario in case 1, 2 and 3. However, the LPG and kerosene prices have been up – dated to 2008 data. 2008 data were used also for scenario 4 and 5. The annualised case shows that there are several financially more viable activities (scenarios 1, 3 and 5) that would have lead to higher emissions than the Project Activity – depicted by scenario 4. It is inevitable that costs have risen since the latest publicised data and if increased costs are used, the baseline scenario will be always scenario 5 (a continuation of the current situation), as it is the most financially attractive scenario for beneficiary households. The validation team has examined the explanation given by project participant with the provided document and confirmed that all input values used in investment analysis are valid and applicable at the time of the investment decision taken by the project participant. Thus, the **issue is closed**.

2. To provide the annex 7 ( Annualised cost of alternative scenario) with source of data for capital cost, useful life, discount rates, price of fuel, annual fuel cost and annual maintenance cost.

In response, the PP has provided the summarised annualised cost spreadsheet with sources of data to the validation team. The validation team has examined and requested to the PP to clarify that how the “Annual fuel Cost” is calculated in submitted spread sheet – Annex 24 “Financial Analysis Alternative Scenario”. The PP has clarified that the calculation of “Annual fuel Cost” in spread sheet – Annex 24” is based on annual fuel usage for scenario 1, 2 and 3 and this was verified with document “Report on the use of LPG as a domestic cooking fuel option in India”<sup>35/</sup>, International Energy Initiative, 2004” provided by project participant and for scenario 5 is based on average of 3 litres of subsidized kerosene per month per household, the annual subsidized kerosene usage was verified with the results of survey study submitted by the PP. The Up –dated Annex 24 was submitted by the PP and the corrections was checked and was found to be satisfactory. Thus, the **issue is closed**.

3. To substantiate with some documentary proof for cost per unit of material involved for biogas unit construction. In response, the PP has submitted the Cost Break-up for construction of biogas unit along with supportive evidences. The validation team has examined the same and found it to be appropriate and was accepted, hence the **issue is closed**.

Based on above discussion, the **CAR#8 (Point 01) is closed**.

**CAR#8 (Point 02) was raised** to substantiate the facts and figures as discussed under financial/investment analysis for identified baseline alternatives regarding the following –

- Cost of kerosene and use of kerosene,
- Cost of LFG systems and use of LPG systems in rural India,
- Use of sustainable agriculture residues,
- Availability of government subsidies for biogas systems in rural India,
- Average annual household income in project region and
- Installation cost of biogas units (2m<sup>3</sup> and 3m<sup>3</sup> variety).

In response, the PP has discussed the fact and arguments used for the analysis of all baseline alternative. The validation team has examined the explanation given by the PP which are also discussed in details in section 4.7.3. However, the titles of these alternatives are revised by the PP but the fact and argument are still valid. The PP has also revised the section B.5 of PDD version 03 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) according to explanation given in response and same was checked and accepted with their supporting evidence, thus the **CAR#8 (Point 02) was closed.**

**CAR#8(Point 03) was raised**, requesting the PP to provide proper traceable statistics regarding the numbers of biogas plants already installed in the project region and initiatives under which the biogas plants have been implemented. In response, the PP has provided the Letter Ref. No Gen/JAY/irep/2008-09/3 from the local government (Zila Panchayath, Kolar) dated 29/11/2008 which shows the number of biogas units installed in the project area using government funds. This was checked and found to be acceptable as there are total 2084 biogas units in the all 11 taluks of Kolar district, under the "rashtriya jaivarila yojane". The validation team has confirmed that an average of 416 bio-digesters units per year have been built in the project area from 1995 to 2000 which represents only the 0.16 % of the total biogas construction per year in India (250,000 per year). Therefore, validation team has **closed the CAR#8 (Point 03).**

**CAR#8 (Point 04) was raised** requesting the PP to provide proper substantiation for the claim regarding no initiatives for installation of biogas units supported by other NGOs or public agencies are available at the project boundary. The PP has provided the letter from the local government confirming that SKG Sangha is the only organisation implementing a biogas programme in the Kolar district. The letter Ref. No. Gen/JAY/irep/2008-09/2 from the local government (Zila Panchayath, Kolar) dated 29/11/2008<sup>/65/</sup> was provided by the PP shows that there are no other organisation other than SKG Sangha that has implemented the biogas project. Therefore, **CAR#8 (Point 04) was closed.**

**CAR#8 was open** due to following issues raised with consulting the Financial Expert:

1. Section B.5 of PDDV6:- Please provide the reference of EB guidance (i.e. EB35 Annex 34 'Non-binding best practice examples to demonstrate additionality for SSC project activities') before starting discussion on demonstrate of additionality. In response, the PP has included the requested information in the section B.5 of the revised PDD version 07, this was verified by the validation team and found that the PP has incorporated some aspect of additionality tool EB39 Annex 10 also, therefore, the validation team has requested to the PP to clarify that which approach has been followed by the PP to demonstrate additionality as the PDD version 07 presented the demonstration of additionality by applying both EB35 Annex 34 and EB39 Annex 10.

In response to the PP the validation team has examined the section B.5 of the revised PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) and found that the approach is based primarily on the tool for the demonstration and assessment of additionality version 05.2. However, some guideline of EB35 Annex 34 'Non-binding best practice examples to demonstrate additionality for SSC project activities' also referred. Hence the validation team has confirmed that the approach to demonstrate additionality of proposed project activity is transparent and is in compliance with the requirement of additionality tool version 5.2 and also consistence with EB35 Annex 34, hence this was accepted and **the issue is closed.**

2. Section B.5 of PDD V6: Financial/investment analysis :-

- a. There are no 'Financial' term defines under EB35 Annex 34. Therefore, validation team has requested project participant to correct the same. In response, project participant has corrected the same in the revised PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>).

- b. The description of this barrier is not as per Para 01 (a) of EB35 Annex 34. Therefore, validation team has requested project participant to provide the same. In response, project participant has provided the description in the revised PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>).
- c. Discussion of alternatives is required as per Para 01 (a) of EB35 Annex 34. Therefore, validation team has requested project participant to provide the same. In response, project participant has modified the description in the revised PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>).
- d. As per Para 01 (a) of EB35 Annex 34; *'Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency).'*

As per above best practice example, PP is requested to clarify that the demonstration of additionality falls under which of the following options:

- i. the application of investment comparison analysis using a relevant financial indicator
- ii. application of a benchmark analysis or
- iii. a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency).

In response, project participant has provided the revised PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) and clarified that the PDD has been modified by using a simple cost analysis for the project to demonstrate the investment barrier analysis using some part of EB35 Annex 34.

Furthermore, the validation team has observed that the project participant has applied relevant aspects of the *"Tool for the demonstration and assessment of additionality"* Version 05.2 (EB39 Annex 10), therefore, validation team has requested project participant to use the appropriate investment analysis method and financial indicator as per the definitions provided in the tool. In response project participant has provided the approach in the PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) and the validation team has verified this approach and found that the demonstration of additionality is based on *"Tool for the demonstration and assessment of additionality"* Version 05.2 (EB39 Annex 10), however, step-3 of tool is also using the guidance stipulated under EB35 Annex 34 in the PDD. Thus, the validation team has satisfactory **closed these issues**.

3. The PP was requested to clarify how it has demonstrated the common practice analysis and Impact of CDM Registration which is not a requirement of EB35 Annex 34 'Non-binding best practice examples to demonstrate additionality for SSC project activities'. In response, project participant has modified the section B.5 of the PDD version 08 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>), this was checked by the project participant and found that the demonstration of additionality is based on *"Tool for the demonstration and assessment of additionality"* Version 05.2 (EB39 Annex 10), however, step-3 of tool is also using the guidance stipulated under EB35 Annex 34 in the PDD (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>). Thus, the validation team has satisfactory **closed these issues**.

Based on above discussion, the validation team has **closed the CAR#8**.

### Opinion

Based on the description of the investment analysis provided in the PDD<sup>/01.k/</sup> and the assessment conducted, the validation team is of the opinion that the investment analysis are credible and are correctly presented to demonstrate the additionality of the proposed CDM project activity and inline with Para107 (a), Para 108, Para 109, Para 111, Para 112, Para 113 and Para 114 of VVM version 1.2 (EB55 Annex 1)<sup>/56/</sup>.

#### 4.7.5 Barrier analysis (if applicable)

The PP has demonstrated the additionality as per the *"Tool for the demonstration and assessment of additionality"* Version 05.2 (EB39 Annex 10)<sup>/22/</sup>.

The PP has uses the Step 2 (Investment analysis) of additionality tool (EB39 Annex 10)<sup>/22/</sup> to demonstrate that the proposed CDM project activity is more costly than at least one alternative. The validation team has examined the demonstration presented in the final PDD<sup>/01.k/</sup> and corresponding analysis sheet and concluded that the average annual cost of each scenario has been calculated to demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity which is inline with Para 107 (a) of VVM (version 1.2)<sup>/56/</sup>. Hence Step 4 of the tool needs to follows as per additionality tool which says that *"If it is concluded that the proposed CDM project activity is more costly than at least one alternative then proceed to Step 4 (Common practice analysis)"*.

However, the PP has selected Step 3 (Barrier analysis) to further demonstration additionality as per as per the "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup> which says that *"Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both Steps 2 and 3.)"*. Hence validation team has examined the Step 3 also for further demonstration of additionality.

### Step 3: Barrier analysis

Project participant has presented the Step 3 of the "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup> in the PDD<sup>/01.k/</sup>. The step wise approach fro same has been discussed below:

#### Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

Project participant has presented the demonstration of additionality by using 'Access to finance barrier' under 'Investment barrier' guidelines stipulated Step 3 .a (Para 01 (a)) in "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup>. Project participant also refers the guidelines stipulated in Non-binding best practice examples to demonstrate additionality for SSC project activities (Annex 34 of EB 35 report<sup>/23/</sup> and Annex 13 of EB 50 report<sup>/69/</sup>) for demonstration additionality under 'Access to finance barrier'.

#### Investment Barrier:

Project participant has demonstrated the 'investment barrier' by the following approaches:-

1. Demonstration of Investment barrier by showing that similar activities have only been implemented with grants or other non-commercial finance terms by using the guidelines stipulated under Para 01 (a) of sub-step 3 a of "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup>.

Project participant has demonstrated in the PDD<sup>/01.k/</sup> that the project activity would not have occurred without the CDM because beneficiary households cannot afford the bio-digester units without the 73% cost subsidy provided by the CDM. Validation team has examined the demonstration towards above justification and found that the demonstration is based on cost estimation of 2 cubic metre and 3 cubic metre bio-digesters and average annual householder income in the project activity area.

Furthermore, the project participant has provided the baseline survey report<sup>/48/</sup> wherein the average annual household income in the project activity area is around INR 25,468 whereas the 2 cubic metre and 3 cubic metre bio-digesters cost INR 20,899 and INR 26,219, respectively. The validation team has confirmed that average annual household income in the project activity area is around INR 25,468 after examined the survey report<sup>/48/</sup>.

Furthermore, the project participant has provided the cost estimation for 2 cubic metre and 3 cubic metre bio-digesters in the separate spread sheet, input values and assumption used by the project participant in cost estimation was found to be appropriate based on the correct reference documents.

| Item                                    | Unit           | Cost per unit (in INR) | Small-2M3 |               | Large-3M3 |               | Remark from Validation Team  |
|---|----------------|------------------------|-----------|---------------|-----------|---------------|--|
|   |                |                        | Quantit y | Cost (in INR) | Quantit y | Cost (in INR) |  |
| Material cost brake-up                  |                |                        |           |               |           |               |  |
| Bricks                                  | 1 Brick        | 4.5                    | 950       | 4275          | 1,250     | 5625          | The input values have been checked from the quotation from “suppliers of building material about the cost” and “Deenbadu Manual by Anil Dhussa and others” for the quantity <sup>/70/</sup>  |
| Sand                                    | Cubic feet     | 30                     | 80        | 2400          | 112       | 3360          |  |
| Metal chips                             | Cubic feet     | 40                     | 30        | 1200          | 45        | 1800          |  |
| Cement                                  | 1 Bag of 50 kg | 280                    | 14        | 3920          | 16        | 4480          |  |
| Mild steel                              | 1 Kg           | 50                     | 12        | 600           | 16        | 800           |  |
| 6” dia Asbestos cement pipe             | 1 m            |                        | 1.6       | 144           | 1.6       | 144           |  |
| G.I nipple with welded brackets 1/2 dia | 1 Nos.         | 60                     | 1         | 60            | 1         | 60            | The input values has been checked from the actual existing prices taken from the material suppliers <sup>/70/</sup> , those have been provided by SKG Sangha and also crossed checked with the other suppliers through telephonic interview. |
| Stove with double burner                | 1 Nos.         | 1200                   | 1         | 1200          | 1         | 1200          |  |
| High density polyethylene pipe 20 mm    | 1 m            | 15                     | 30        | 450           | 30        | 450           |  |
| Gate valve and other pipe fittings      | 1 Nos.         | 500                    | 1         | 500           | 1         | 500           |  |
| Transport and handling                  |                |                        |           | 400           |           | 450           |  |

|  |  |  |  |              |  |              |   |
|--|--|--|--|--------------|--|--------------|---|
|  |  |  |  |              |  |              | to be conservative  |
| <b>Labour cost brake-up</b>                    |  |  |  |              |  |              |   |
| Digging of a pit                               |  |  |  | 1400         |  | 2000         | Calculated on the basis of labour requirement and their wages. The wages are based on local prevailing rates for labourers. This has been confirmed by conducting interviews during site visit. |
| Masonry  |  |  |  | 1200         |  | 1600         |   |
| Unskilled labour                               |  |  |  | 2000         |  | 2600         |   |
| Pipe fitting                                   |  |  |  | 150          |  | 150          |   |
| Overheads                                      |  |  |  | 1000         |  | 1000         |   |
| <b>Total bio-digester costs (per digester)</b> |  |  |  | <b>20899</b> |  | <b>26219</b> |   |

Therefore, the validation team has confirmed that the cost of 2 cubic metre and 3 cubic metre bio-digesters cost INR 20,899 and INR 26,219 respectively and this lies between 82% (2 cubic metre) and 103% (3 cubic metre) of the average annual household income in the project activity area.

Furthermore, the project participant says that the prohibitive cost of the bio-digesters is substantiated by the fact that nearly all of the biogas systems that have been installed to date have been paid for by the government subsidy programme and almost all biogas plants owners are basically farmers with an average annual income of INR 49,640 this is shown in the "Evaluation Study On National Project on Biogas Development"<sup>28/</sup>. The validation team has been examined the document titled as "Evaluation Study On National Project on Biogas Development" (Page 70, Distribution by Income) and confirmed that the reported figure for an average annual income of INR 49,640 is appropriately taken from the correct source.

As per Annex 13 EB 50<sup>69/</sup> guideline 1, the assessment team confirmed that the project proponent, SKG Sangha, is a registered NGO in India under the Karnataka Societies Registration Act under number 768/92-93. Its registered offices are at Devarayasamudra Village, Mulabagal Taluk, Karnataka State, India and central office at N0.532, 2<sup>nd</sup> Main Road, Gandhinagar, Kolar – 563101, Karnataka State, India. The incorporation certificate<sup>71/</sup> of SKG Sangha dated 25/10/2006 has been provided by the PP along with English translated version<sup>71/</sup>.

SKG Sangha relies on charitable donations for its project funding. In 2008/9 its turnover was INR 1, 62, 02,710. They made a profit of INR 1, 50,009 and their assets totalled INR 2, 17,428. The PP has provided the account detail of the Income and Expenditure Account<sup>63/</sup> of SKG Sangha certified by third party Chartered Accountant. The figure has been checked and accepted upon verification with the third party firm by conducting a telephonic interview.

It was also validated by the validation team that the financing agency, CH4NGE is a private company and provided their confirmation for funding of the project activity purely on commercial

terms. As per the agreement<sup>/9/</sup> CH4NGE Limited will provide finance for project implementation in return for which it will receive title to all CERs on certification. CH4NGE is registered in England and Wales under company number 06695049. Its registered office is at c/o Martineau (Ref. DRJ), 35 New Bridge Street, London, EC4V 6BW.

Thus as per the Guidance 01 of EB50 Annex 13<sup>/69/</sup>, the validation team has concluded that the PP has demonstrated the nature of the project proponents as well as the financier from where it can be implied that SKG Sangha is a non-profit organization and CH4NGE is an investor who is financing the project based solely on the registration of the project activity whereby they can benefit from the sale of CERs. The nature of the entities has been further cross checked from their website <http://www.skgsangha.org/index01.html> and <http://www.ch4nge.co.uk/> respectively.

Further to this, the PP has stated that since the project generates no revenue for the PP other than through the sale of CERs, the financiers will only provide the funding for implementation of the project in return for the CERs generated under the CDM. The validation team has confirmed that similar activities have only been implemented in India with the help of grants or other fiscal incentives. Thus, as per guidance 02 of EB 50 Annex 13<sup>/69/</sup>, the project would not have been implemented in absence of CDM benefits.

The validation team have confirmed by assessing financial statements of the PP that they could not secure funds from financial institutions due to insufficient assets and there was no income stream generated by the project activity. Thus it was not possible to arrange capital funding for the project activity without any CDM revenue. The PP identified CH4NGE as a source of capital but this was contingent upon validation of the project as it was only able to attain a finance agreement from CH4NGE because of its ability to generate CER income.

Thus as per Guidance 06 of EB50 Annex 13<sup>/69/</sup>, validation team is of the opinion that PP has demonstrated that CH4NGE has agreed to finance the project only on the basis of CER benefit. The agreement provided by the PP has clearly supported the PP's claim, which has been verified by the validation team.

Therefore the validation team has concluded based on above justification and evidences provided by the project participant, that the proposed project activity is facing the investment barrier and demonstration presented by project participant in the PDD<sup>/01.k/</sup> is in line with the guidance stipulated under Para 1a of sub-step 3a of "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup>

Project participant has provided the finance agreement between CH4NGE (financer for the proposed project activity) and S K G Sangha (the project participant) and CarbonAided (project developer). The validation team has examined the two financial agreements provided by project participant; first agreement between CH4NGE and CarbonAided titled as 'Service agreement'<sup>/8/</sup>, dated 19 May 2009 and second agreement between CH4NGE and S K G Sangha titled as 'Agreement for monetizing greenhouse gas emissions savings'<sup>/9/</sup> dated 08 May 2009 .

The validation team has concluded that:

1. 'Service agreement' dated 19 May 2009 between CH4NGE and CarbonAided<sup>/8/</sup>:
  - a. CarbonAided and Turquoise Capital LLP have established CH4NGE in order to develop and fund Project Activities that reduce greenhouse gas emissions and promote sustainable development; ( Refer 'Back Ground' section of 'Service agreement' (Pg 02) )
  - b. CH4NGE wishes to provide finance for the implementation of the Project Activities and monetize the resulting Offsets; and ( Refer 'Back Ground' section of 'Service agreement' (Pg 02) )

- c. CarbonAided has agreed to provide certain advisory services to CH4NGE as specified in this Agreement. ( Refer 'Back Ground' section of 'Service agreement' (Pg 02) )
  - d. SKG Sangha will receive a 5% royalty on the gross proceeds of sale of the CERs. ( Refer section 05 'Fee and Expense ' ( Pg 17, Point 5.1.5) of 'Service agreement') and (Refer section 9 'Sales of Offsets' of 'Agreement for monetizing greenhouse gas emissions savings' (Pg 12))
2. 'Agreement for monetizing greenhouse gas emissions savings' dated 08 May 2009 between CH4NGE and S K G Sangha<sup>/9/</sup>:
- a. The CH4NGE will provide all of the funding required to prepare, implement, maintain, and monitor the project activities during the crediting period. ( Refer 'Appendix 1- Description of SKGS services' of 'Agreement for monetizing greenhouse gas emissions savings')
  - b. The amount provided will be to an agreed budget and project proponent will not be required to repay this funding. Instead, CH4NGE will receive all of the CERs and will use the sale of these to repay the investment in the proposed project activity. (Refer section 9 'Sales of Offsets' and section 10 ' SKGS Royalty' (Pg 12-13) and 'Appendix 2- Budget' of 'Agreement for monetizing greenhouse gas emissions savings')
  - c. CH4NGE has made provision from its own internal resources to meet the costs incurred by CarbonAided under its contract with SGS for the Validation. (Pg 03 of 'Agreement for monetizing greenhouse gas emissions savings')

Based on the above information and documents provided by the project participant; the validation team has confirmed that proposed project activity has funded by CH4NGE, CarbonAided is providing the guidance for developing the proposed project activity and the SKG Sangha is the project participant (owner of project activity ) who implement the project in india and do the monitoring as per CDM requirement .

The validation team has concluded that the project activity could not access appropriate capital without consideration of CDM revenues due to fact that the CH4NGE will provide the necessary fund to the proposed project activity and project proponent will not be required to re-pay this funding. The CH4NGE will be will receive all of the CERs and will use the sale of these to repay the investment in the proposed project activity. This is in line with the guidance stipulated under 'Guidelines for Objective Demonstration and Assessment of Barriers' (EB 50 Annex 13)<sup>/69/</sup>.

### Outcome of Step 3a:

Project participant has demonstrated that in absence of CDM benefits, the project activity will not be implemented due to 'investment barrier' as per guidance stipulated under Para 1a of sub-step 3a of "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)<sup>/22/</sup> and also facing 'access to finance' barrier as per guidance stipulated under 'Guidelines for Objective Demonstration and Assessment of Barriers' (EB 50 Annex 13)<sup>/69/</sup>.

### Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

Project participant has an alternative scenario 5 (Pre-project situation: three stones stove + subsidised kerosene). The 'investment barrier' would not prevent the implementation of scenario 5 as in absence of project activity , the households would continue using fuel wood and kerosene, which do not require any upfront finance. Project participant has provided the survey report as supportive evidence; the validation team has examined the survey report and concluded that

householders have been used fuel wood and kerosene to meet the cooking and water heating requirement in pre-project scenario, furthermore the validation team has conducted the site visit and interviews with the stakeholder of project activity for confirmation of pre-project scenario. Furthermore, the validation team has found that the project participant has meets the requirement stipulated under sub-step 3 b of “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)

As per above discussion, the validation team has confirmed that the project participant has satisfactorily demonstrate both Sub-steps 3a – 3b of “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)<sup>/22/</sup>, hence the project participant has allowed to proceed for Step 4 (Common practice analysis).

The step wise approach for demonstration of step 4 (Common practice analysis) is mentions in further section 4.7.6 of this report.

## Opinion

Based on the description of the barriers provided in the PDD<sup>/01.k/</sup> and the assessment conducted, the validation team is of the opinion that the barriers are credible and are correctly presented to demonstrate the additionality of the proposed CDM project activity and inline with Para115, Para 116, Para 117 and Para 118 of VVM version 1.2 (EB55 Annex 1)<sup>/56/</sup>.

### 4.7.6 Common practice analysis

Project participant has presented the common practice analysis in the final PDD<sup>/01.k/</sup> as per the “Tool for the demonstration and assessment of additionality” Version 05.2 (EB39 Annex 10)<sup>/22/</sup>. The validation team has examined the common practice analysis as below:

#### Step 4: Common practice analysis

Project participant has presented the demonstration of the common practice in the final PDD<sup>/01.k/</sup> as complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region. As per guidance EB39 Annex 10<sup>/22/</sup>, this test is a credibility check to complement the investment analysis (Step 2) and barrier analysis (Step 3) as discussed in above relevant section 4.7.1 to section 4.7.5 of report. Project participant has identified and discuss the existing common practice through the following Sub-steps in the final PDD<sup>/01.k/</sup>:

##### Sub-step 4a: Analyze other activities similar to the proposed project activity:

Project participant has identified that the majority of rural households use traditional cooking stoves and burn fuel wood with some kerosene. This has been verified and confirmed during interview with stakeholders at site visit. Validation team has made the consultation with sectoral expert and Local Assessor and it has concluded that the project participant has defined the geographical scope (e.g. Kolar district in Karnataka state of India) of the common practice analysis is appropriate for the assessment of common practice related to the biogas digester technology and is in consistence with Para 118 (a) of VVM version 1.2 published in EB55 Annex 1<sup>/56/</sup>

Project participant has mentioned that there is a small number of existing biogas schemes in the Kolar District. Project participant has provided a letter (No. Gen/JAY/irep/2008-09/3)<sup>/64/</sup> dated 29/11/2009 from the local Government (Zilla Panchayath, Kolar), the validation team has examined and confirmed that the following number of biogas plants were installed during the corresponding years under ‘rashtriya jaivanila yojane’<sup>/64/</sup> by local Government office (Zilla Panchayath, Kolar) in the district consisting of all the 11 taluks. Rashtriya Jaivanila Yojane is a Karnataka State Govt Initiative under the National Program on Biogas Development of Ministry of New and Renewable Energy (MNRE). The term “Rashtriya Jaivanila Yojane” is in local language in the state of Karnataka, i.e Kanada language.

| Serial Number | Year of Installation | No. of Plants |
|---------------|----------------------|---------------|
| 01            | 1995-96              | 573           |
| 02            | 1996-97              | 662           |
| 03            | 1997-98              | 199           |

|    |           |     |
|----|-----------|-----|
| 04 | 1998-99   | 344 |
| 05 | 1999-2000 | 306 |

Furthermore, the project participant has provided a letter (No. Gen/JAY/irep/2008-09/2)<sup>65/</sup> dated 29/11/2009 from the local Government (Zilla Panchayath, Kolar), the validation team has examined this letter and confirmed that SKG Sangha is the only organisation implementing a biogas programme in the Kolar district and no other organisation is implementing this programme in this area. The validation also verified that the project participant has provided the appropriate official sources and local data to demonstrate that the extent similar and operational projects (e.g., using biogas digester) and it has been found that there are other than CDM proposed project activity in Kolar district which are further demonstrated under Sub-step 4b. Hence the validation team has concluded that proposed project activity is consistence with requirement stipulated under Para 118 (b) of VVM version 1.2 published in EB55 Annex 1<sup>56/</sup>.

#### **Sub-step 4b: Discuss any similar Options that are occurring:**

Project participant has discussed the similar biogas systems under sub-step 4b in the final PDD<sup>1.k/</sup>. The PP has mentioned that the similar biogas systems have been installed in poor rural households of Kolar District, but they have been either supported by schemes using charity or development assistance funding or government subsidies. The Indian government used to provide annual subsidies for around 250,000 biogas units per year but now only provides subsidies for around 10,000 biogas units per year for the whole country. This amounts to only a handful of biogas units per year at a Taluk level and Kolar district has accounted only 100 biogas units, which are not part of the proposed CDM project activities. Thus, SKG Sangha has not got any subsidy for any of their projects for installing biogas units under the project activity. This is further explained in the next paragraphs.

Government subsidies were available under the centrally sponsored scheme National Project on Biogas Development (NPBD) under the Ministry of Non-conventional Energy Sources (MNES). Typically between 30 to 50% cost for building plant came in the form of subsidy provided under this programme, and the balance amount (50 to 70%) was met by plant owners from their own resources and/or by taking loans from banks.

Government subsidies have contributed to biogas units in the past but such financing was not able to cover the vast need for improving the energy supply to rural households in India. This is has been verified from a letter from the local government (Zilla Panchayath, Kolar), which provides details on biogas units built in the project area using government funds.

The Karnataka State targets for installation of biogas units in financial year 2007-08 and 2008-09 are 4,000 and 2,500 in the whole state, respectively, but none of these planned units are foreseen for the Kolar district. Project participant has provided a letter<sup>55/</sup> dated 02/01/2008 with Ref No RDPR/19/JAY/2007 issued to Chief Executive Officers of all Zilla Panchayats from Karnataka Government Secretariat, Multistoried building, Bangalore. The validation team has verified this letter and found that the Government of India has allotted 4000 physical target under National Programme on Biogas Development to the Karnataka State. The Annex of this letter mentions the details of the state-wise allocation of biogas units:

National Programme on Biogas Development Annexure: Government Letter No: RDPR 4/Jay/2008, Dated 12/08/2008

| Sl.No | Name Of The Zilla Panchayat | Allotted Annual Physical Target |
|-------|-----------------------------|---------------------------------|
| 1     | Bagalakote                  | 100                             |
| 2     | Bangalore Rural             | 50                              |
| 3     | Bangalore Urban             | 100                             |
| 4     | Belgaum                     | 100                             |
| 5     | Bellary                     | 100                             |
| 6     | Bidar                       | 25                              |
| 7     | Bijapur                     | 100                             |
| 8     | Chamarajanagar              | 75                              |
| 9     | Chikkamagalur               | 150                             |

|           |                |             |
|-----------|----------------|-------------|
| 10        | Chikkaballapur | 100         |
| 11        | Chitradurga    | 50          |
| 12        | South Canara   | 100         |
| 13        | Davanagere     | 100         |
| 14        | Dharwad        | 75          |
| 15        | Gadag          | 25          |
| 16        | Gulbarga       | 50          |
| 17        | Hassan         | 100         |
| 18        | Haveri         | 100         |
| 19        | Kodagu         | 100         |
| <b>20</b> | <b>Kolar</b>   | <b>100</b>  |
| 21        | Koppal         | 100         |
| 22        | Mandya         | 100         |
| 23        | Mysore         | 100         |
| 24        | Raichur        | 50          |
| 25        | Ramanagara     | 50          |
| 26        | Shimoga        | 150         |
| 27        | Tumkur         | 100         |
| 28        | Udupi          | 75          |
| 29        | North Canara   | 75          |
|           | <b>Total</b>   | <b>2500</b> |

The biogas units for this project will be installed in villages where there are no initiatives supported by other NGOs or public agencies for the installation of biogas digesters and the proposed biogas project activity will be solely dependent on carbon finance (apart from a small in kind contribution of labour and materials from the beneficiary households).

**“If Sub-steps 4a and 4b are satisfied, i.e.(i) similar activities cannot be observed or (ii) similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional)”.**

As per above condition, the validation team has confirmed that sub-steps 4a and 4b are satisfied (ii) similar activities are observed, but essential distinctions between the project activity and similar activities has been reasonably explained in sub-step 4b , hence the proposed project activity is additional.

#### Opinion

As project activity is located in Karnataka region, which is considered as appropriate region for the assessment of the common practice analysis through local and sectoral expertise. It is observed that there is no similar project activity which is widely observed and commonly carried out in the region. Thus proposed project activity is not common practice as per Para 118 of VVM version 1.2 (EB55 Annex 1)<sup>/56/</sup>.

#### 4.8 Application of Baseline Methodology and Calculation of Emission Factors

The proposed project activity will generate the biogas in biogas-digester by anaerobic decay of cattle manure which will meets the thermal requirement for cooking and heating purpose in household. In absence of proposed project activity, the kerosene ( as fossil fuel) and fuel wood (as non-renewable biomass) is used for cooking and heating purpose in household where as the cattle manure is dumped in the pit for uncontrolled anaerobic decay. Therefore the baseline emissions from relevant components are identified by the project participant as follow:

1. Baseline emission reduction due to displacement of kerosene;
2. Baseline emission reduction due to displacement of non-renewable biomass and
3. Baseline emission reduction due to capture and destruction of methane from animal manure.

Hence, the proposed project activity use the following simplified baseline & monitoring methodologies for the calculation of emission reduction.

1. AMS-I.C (version 18 , valid from 01 October 2010 to 16 June 2011 (Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ))
2. AMS-I.E (version 03, valid from 01 October 2010 to 28 April 2011 (Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ))
3. AMS-III.R (version 01, valid from 19 October 2007 to 03 March 2011 (Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ))

Project participant has presented the emission reduction calculation as the difference between the baseline emissions of the three components (1.displacement of kerosene, 2. displacement of non-renewable biomass and 3. the capture and destruction of methane from animal manure) and the project emissions due to project activity. This can be further explanatory as below:

#### Emission Reduction due to project activity

= **Baseline Emission** (kerosene + non-renewable biomass + methane from manure) – **Project Emission** due to project activity.

( **Leakage Emission** due to project activity = **0**; as project activity does not involve any transfer of equipment from or to the project activity and thus there is no leakage accountable to the project activity which complies the requirement of Para 45 of AMS-I.C. version 18, Para 12 of AMS-I.E. version 03, and Para10 of AMS-III.R. version 01. Also no any biomass residue is used in the proposed project activity; therefore Para 46 of AMS-I.C. version 18 is not applicable.

The generated biogas from bio-digester is the renewable biomass for the project activity which displaces the non-renewable biomass fuel wood used by house-holder, therefore the applicability conditions stipulated under Para 10 & 11 of the selected approved methodology AMS-I.E. version 03 is not applicable for the proposed project activity.)

#### Baseline Emissions:

The baseline emissions have been calculated in the PDD<sup>/01.k/</sup> by applying following formulas with respect to baseline component.

##### 1. Kerosene component:

Final PDD<sup>/01.k/</sup> is presented the equation for calculation of baseline emissions for the kerosene component. The baseline emissions for kerosene component are calculated based on the amount of kerosene that will be displaced, its density, net calorific value and the emissions factor for stationary combustion of kerosene in the residential category. The applied equation discussed as below:

| Baseline emissions for the kerosene component  |  | Remark  |
|--|--|---|
| $BE_{\text{kerosene}} = F_{\text{kerosene}} * N * \rho_{\text{kerosene}} * NCV_{\text{kerosene}} * EF_{\text{kerosene}} * 10^{-9}$ |  | Equation 01 of PDD <sup>/01.k/</sup>  |
| $BE_{\text{kerosene}}$   | baseline emissions from burning of kerosene for household cooking needs (t CO <sub>2</sub> e/year)                             | Validation team has check the applied equation and confirmed that the applied equation is in according to Para 13 of AMS-I.C version 18 |
| $F_{\text{kerosene}}$  | annual amount of kerosene used for cooking in an average household participating in the Kolar District Biogas Project (l/year) |   |
| N  | Number of devices (biogasifiers)   |   |
| $\rho_{\text{kerosene}}$   | kerosene density (kg/l)  |   |
| $NCV_{\text{kerosene}}$  | net calorific value of kerosene (TJ/Gg)  |   |
| $EF_{\text{kerosene}}$   | emissions factor of kerosene (kg CO <sub>2</sub> /TJ)  |   |

## 2. Non-renewable biomass component:

Final PDD<sup>/01.k/</sup> is presented the equation for calculation of baseline emissions for the non-biomass component. The baseline emissions for non-biomass component are calculated based on the use of the biomass (fuel wood) that is replaced, the fraction of the biomass that is non-renewable biomass, and the emissions factor of kerosene as a projected alternative fuel. The applied equation discussed as below:

| Baseline emissions for the non-renewable biomass component                                 |   | Remark   |
|--|---|--|
| $BE_{NRB} = B_{biomass} * f_{NRB} * NCV_{biomass} * EF_{kerosene}$                         |   | Equation 02 of PDD <sup>/01.k/</sup>   |
| $BE_{NRB}$   | baseline emissions from the combustion of non-renewable part of the fuel wood used for cooking in households (t CO <sub>2</sub> e/year);  | Validation team has check the applied equation and confirmed that the applied equation is in according to Para 06 of AMS-I.E version 03 ( For single unit )            |
| $B_{biomass}$  | quantity of biomass per household that is substituted or replaced in an average household (t/year);   |  |
| $f_{NRB}$  | fraction of biomass used in the absence of project activity that can be established as non-renewable biomass using survey methods;  |  |
| $NCV_{biomass}$  | net calorific value of the non-renewable biomass that is substituted (TJ/tonne). Default value of 0.015 TJ/tonne specified in AMS I.E is used; and  |  |
| $EF_{kerosene}$  | emissions factor for kerosene combustion in households as kerosene is the most reasonable projected fossil fuel in the absence of project activity (kg CO <sub>2</sub> /TJ). Default value 71,500 kg CO <sub>2</sub> /TJ specified in AMS I.E. is used. |  |
| Baseline emissions for the non-renewable biomass component<br>For N number of householders |   |  |
| $BE_{NRB} = B_{biomass} * N * f_{NRB} * NCV_{biomass} * EF_{kerosene} * 10^{-3}$           |   | Equation 03 of PDD <sup>/01.k/</sup>   |
| N  | number of households;   | Validation team has check the applied equation and confirmed that the applied equation is in according to Para 06 of AMS-I.E version 03 ( For N number of households ) |

## 3. Manure component:

The baseline emissions for manure component are calculated based on the amount of manure that would decay anaerobically in the pits. The applied equation discussed as below:

| Baseline emissions for the Manure component |   | Remark  |
|---|---|---|
| $BE_{manure} = \sum(T) (EF_T * N_T) / 10^6$ |   | Equation 04 of PDD <sup>/01.k/</sup>  |
| $BE_{manure}$                               | baseline emissions from methane emissions from anaerobic decay of manure (Gg CH <sub>4</sub> /year);          | Validation team has check the applied equation and confirmed that the applied equation is in according to Para 08 and 09 of AMS-III.R version 01.<br>As the methodology AMS-III.R |
| T   | species/category of livestock;  |   |
| $EF_T$                                      | emissions factor for a defined livestock population (category), (kg CH <sub>4</sub> per animal per year); and |   |

|  |   |   |
|--|---|---|
| $N_T$  | the number of head of livestock species/category T in an average household.   | version 01. does not specified an equation and suggest Tier 2 approach from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for the calculation of emission reductions.<br>Validation team has confirmed that the emission factors for manure of different cattle categories (dairy cows, buffalo and other cattle) are calculated based on nationally published (where available) and IPCC default values (where nationally published values are not available) for volatile solid excreted by each animal category, maximum methane producing capacity for manure of each animal category, methane correction factors for liquid/slurry, liquid/slurry with natural crust cover and solid storage manure management systems in a warm climate with average temperature of 29.7°C and fractions of total manure handled in these manure management systems. |
| <b>Baseline emissions for the Manure component<br/>N number of house holders</b>   |   |   |
| <b><math>BE_{\text{manure}} = \sum_{(T)} (EF_T * N_T) * N * GWP_{CH_4} / 1000</math></b>   |   | Equation 05 of PDD <sup>/01.k/</sup>  |
| N  | number of households  | ( For N number of households )  |
| $GWP_{CH_4}$   | global warming potential for methane  |   |
| <b><math>EF_{(T)}</math> Calculations</b>  |   |   |
| <b><math>EF_{(T)} = VS_{(T)} * 365 * B_{o(T)} * 0.67 \text{ kg/m}^3 * \sum_{(S,k)} ((MCF_{S,k}) / 100 * MS_{(T,S,k)})</math></b> |   | Equation 06 of PDD <sup>/01.k/</sup>  |
| $VS_{(T)}$   | daily volatile solid excreted for livestock category T (kg dry matter per animal per day);  | Please refer remark of Equation 04 of PDD <sup>/01.k/</sup>   |
| 365  | basis for calculating annual VS production (days per year);   |   |
| $B_{o(T)}$   | maximum methane producing capacity for manure produced by livestock category (T/ $\text{m}^3$ $\text{CH}_4$ per kg of VS excreted); |   |
| 0.67   | conversion factor for converting $\text{m}^3$ $\text{CH}_4$ to kg $\text{CH}_4$ ;   |   |
| $MCF_{(S,k)}$  | methane conversion factors for each manure management system S by climate region k (%); and   |   |
| $MS_{(T,S,k)}$   | fraction of livestock category T's manure handled using manure management system S in climate region k (dimensionless).             |   |

| $\sum_{(S,k)} ((MCF_{S,k}) / 100 * MS_{(T,S,k)})$ Calculations   |  |
|--|--|
| $\sum_{(S,k)} ((MCF_{S,k}) / 100 * MS_{(T,S,k)}) =$<br>$MCF_{liquid}/100 * MS_{liquid} + MCF_{liquid\ with\ crust}/100 * MS_{liquid\ with\ crust}$<br>$+ MCF_{solid}/100 * MS_{solid}$ |  |
| MCF <sub>liquid</sub>  | methane conversion factor for the liquid/slurry manure management system [note: liquid/slurry is a type of manure management system] |
| MS <sub>liquid</sub>   | fraction of livestock category T's manure handled using liquid/slurry manure management system                                       |
| MCF <sub>liquid with crust</sub>   | methane conversion factor for the liquid/slurry manure management system with natural crust cover                                    |
| MS <sub>liquid with crust</sub>  | fraction of livestock category T's manure handled using liquid/slurry manure management system with natural crust cover              |
| MCF <sub>solid</sub>   | methane conversion factor for the solid storage manure management system   |
| MS <sub>solid</sub>  | fraction of livestock category T's manure handled using solid storage manure management system                                       |

Equation 07 of PDD<sup>/01.k/</sup>

Validation team has confirmed that the proposed project lies in one climatic region (with high temperatures). This was verified from the temperature data provided by Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office.

### Project Emissions:

Final PDD<sup>/1.k/</sup> is presented the equation for calculation of project emissions due to physical leakage of methane from the biogas unit. The applied equation discussed as below:

| Project emissions due to physical leakage of methane from the biogas unit                            |   | Remark  |
|--|---|---|
| $PE = LF_{AD} * (GWP_{CH_4} * D_{CH_4} * B_{o(T)} * VS_{(T)}) / 1000$                                |   | Equation 08 of PDD <sup>/01.k/</sup>  |
| PE   | annual project emissions from physical leakages in the biogas digesters (t CO <sub>2</sub> e/year);                                   | Validation team has check the applied equation and confirmed that the applied equation is in according to Para 07 of AMS-III.R version 01 |
| LF <sub>AD</sub>   | methane leakages from anaerobic digesters (dimensionless). Default value of 0.1 specified in the AMS-III.R is used;                   |   |
| 0.67   | conversion factor of m <sup>3</sup> CH <sub>4</sub> to kg CH <sub>4</sub> ;   |   |
| B <sub>o</sub>   | maximum methane producing capacity for manure produced by livestock category T (m <sup>3</sup> CH <sub>4</sub> per kg of VS excreted) |   |
| GWP <sub>CH<sub>4</sub></sub>  | Global Warming Potential of CH <sub>4</sub>   |   |
| VS <sub>(T)</sub>  | daily volatile solid excreted for livestock category T (kg dry matter per animal per day).  |   |
| Project emissions due to physical leakage of methane from the biogas unit for 365 days in an year    |   |   |
| $PE = LF_{AD} * \sum_{(T)} (GWP_{CH_4} * 0.67\ kg/m^3 * B_{o(T)} * N_{(T)} * VS_{(T)} * 365) / 1000$ |   | For 365 days in an year   |

### Leakage Emissions:

There is no leakage emission as project activity is green field project, no equipment transferred from another activity as per Para 45 of AMS-I.C. version 18, Para 12 of AMS-I.E. version 03, and Para10 of AMS-III.R. version 01.

| Leakage: There is no ex-ante leakage. | Remark   |
|---------------------------------------|--|
| <b>LE = 0</b>                         | Validation team has confirmed that the project activity does not involve any transfer of equipment from or to the project activity and thus there is no leakage accountable to the project activity which complies the requirement of Para 45 of AMS-I.C. version 18, Para 12 of AMS-I.E. version 03, and Para10 of AMS-III.R. version 01. Also no any biomass residue is used in the proposed project activity; therefore Para 46 of AMS-I.C. version 18 is not applicable.<br>The generated biogas from bio-digester is the renewable biomass for the project activity which displaces the non-renewable biomass fuel wood used by householder, therefore the applicability conditions stipulated under Para 08 & 09 of the selected approved methodology AMS-I.E. version 03 is not applicable for the proposed project activity. |

#### Emission Reduction:

| Emission Reduction Calculation   | Remark               |
|--|----------------------|
| <b>ER= (BE<sub>kerosene</sub> + BE<sub>NRB</sub> + BE<sub>manure</sub>) – PE</b> | PDD <sup>/1.k/</sup> |

The step taken and equations applied to calculate project emission, baseline emissions and leakage emission comply with the requirement of the selected baseline and monitoring methodologies AMS-I.C. version 18, AMS-I.E. version 03 & AMS III.R version 01 in the final PDD<sup>/01.k/</sup>.

The following parameters are described in section B.6.2 of final PDD<sup>/01.k/</sup>:

| Ax-ante parameters as described under section B.6.2 of final PDD <sup>/01.i/</sup> |                               |  |                               | Remark  |
|--|-------------------------------|--|-------------------------------|---|
| Sr. No.  | Parameter                     | Description  | Value applied                 |   |
| 01   | <b>F<sub>kerosene</sub></b>   | Annual amount of kerosene used for cooking and starting fires in an average household            | 24.12 litres                  | Validate from baseline survey report <sup>/48/</sup>  |
| 02   | <b>ρ<sub>kerosene</sub></b>   | Density of kerosene  | 0.817 kg/litres               | Validated from the source <sup>/67/</sup> :<br><a href="http://www.simetric.co.uk/si_liquids.htm">http://www.simetric.co.uk/si_liquids.htm</a>  |
| 03   | <b>NCV<sub>kerosene</sub></b> | Net calorific value of kerosene  | 43.8 TJ/Gg                    | Validated from Table 1.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1. <sup>/66/</sup>  |
| 04   | <b>EF<sub>kerosene</sub></b>  | Emissions factor from burning of kerosene in households for calculating BE <sub>kerosene</sub> . | 71,900 kg CO <sub>2</sub> /TJ | Validated from Table 2.5 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 2 <sup>/66/</sup> .<br>Note: This value is used only for calculating BE <sub>kerosene</sub> .<br>Validate from methodology AMS I.E<br>Note: This value is used only for calculating BE <sub>NRB</sub> . |
|  |                               | Emissions factor for kerosene combustion in households calculating BE <sub>NRB</sub> .           | 71,500 kg CO <sub>2</sub> /TJ |   |

|    |   |   |   |  |
|----|---|---|---|--|
| 05 | <b>B<sub>biomass</sub></b>  | Quantity of biomass that is substituted or replaced in an average household   | 4.74 Tonnes   | Validate from baseline survey report <sup>/48/</sup>   |
| 06 | <b>f<sub>NRB</sub></b>  | Fraction of biomass used in the absence of project activity that can be established as non-renewable biomass using survey methods | 0.78<br>(Dimensionless)   | Validated from "Inventorying, Mapping and Monitoring of Bio-resources Using GIS and Remote Sensing" study <sup>/32/</sup>  |
| 07 | <b>GWP<sub>CH<sub>4</sub></sub></b>   | Global warming potential for methane  | 21t CO <sub>2</sub> / t CH <sub>4</sub>   | Validated from 2006 IPCC Guidelines for National Greenhouse Gas Inventories <sup>/66/</sup>  |
| 08 | <b>N<sub>(T)</sub></b>  | Number of heads per cattle species/category in an average household   | 2.56 for dairy cows, 1.17 for buffalos, 0.55 for other cattle   | Validated from baseline survey report <sup>/48/</sup>  |
| 09 | <b>VS<sub>(T)</sub></b>   | Daily volatile solid excreted for livestock category T  | 3.8 for dairy cow, 3.1 for buffalo, 1.4 for other cattle (in kg dry matter / (head * day)                     | Validated from Tables 10A-4 to 10A-6 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 10) <sup>/66/</sup> , Biogas Technology by B.T. Nijaguna, Table 2.12 p29 <sup>/34/</sup> .   |
| 10 | <b>B<sub>o(T)</sub></b>   | Maximum methane producing capacity for manure produced by livestock category T  | 0.15 for dairy cattle, 0.1 for buffalo and other cattle (in m <sup>3</sup> CH <sub>4</sub> /kg VS)            | Validated from India specific value taken for dairy cows from Biogas Technology by B.T. Nijaguna. <sup>/34/</sup> As nationally published values are not available for other cattle, IPCC default values are used for buffalo and other cattle. Tables 10A-4 to 10A-6 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10. <sup>/66/</sup> |
| 11 | <b>MCF<sub>manure</sub></b><br>( <b>MCF<sub>liquid</sub></b> ,<br><b>MCF<sub>liquid with crust</sub></b> , <b>MCF<sub>solid</sub></b> ) | Methane correction factor for cattle manure for each manure management system S by climate region k                               | 80 % for liquid/slurry manure management system (MCF <sub>liquid</sub> )                                      | Validated from Table 10.17 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10 <sup>/66/</sup> . Validation team has confirmed that the values corresponding to average annual temperature of 29.6°C and temperature data was taken from Natural resources data management system, a   |
|    |   |   | 50 % for liquid/slurry manure management system with natural crust cover (MCF <sub>liquid with crust</sub> ), |  |

|    |  |   |  |  |
|----|--|---|--|--|
|    |  |   | 5 % for solid storage manure management system (MCF <sub>solid</sub> )   | Brach of Department of Science and Technology, Government of India, Kolar District office. <sup>/68/</sup> |
| 12 | MS <sub>manure</sub> (MS <sub>liquid</sub> , MS <sub>liquid with crust</sub> , MS <sub>solid</sub> ) | Fraction of livestock category T's manure handled using manure management system S in climate region k (fraction of livestock manure handled using liquid/slurry manure management system, fraction of livestock manure handled using liquid/slurry with natural crust cover and fraction of livestock manure handled using solid storage manure management system) | 0.32 for liquid/slurry manure management system (MS <sub>liquid</sub> ), 0.20 for liquid/slurry with crust cover manure management system (MS <sub>liquid with crust</sub> ), 0.16 for solid storage manure management system (MS <sub>solid</sub> ) | Validated from baseline survey report <sup>/48/</sup>  |

The description towards the ex-ante parameters available at validation has been checked and found in accordance with the project scenario.

The ex-ante calculation procedure has been checked and found satisfactory with requirement of methodologies.

Based on the values of baseline emissions, project emissions and leakage the **annual average over the crediting period of estimated reductions** have been calculated as **55,147 tCO<sub>2</sub>/year**. The PP has rounded down the value in order to be conservative.

#### Discussion of CARs/CLs:

**CAR#9 ( Point 01) was raised** as the equation applied for calculation of baseline emission in the PDD version 01 was not consistent with the methodology AMS-I.E version 01 and AMS-III.R version 01 , therefore the validation team has requested the project participant to clarify the same.

In response, the project participant has clarified that the baseline emissions for the non-renewable biomass component are calculated based on the use of the biomass (fuel wood) that is replaced, the fraction of the biomass that is non-renewable biomass, and the emissions factor of kerosene as a projected alternative fuel as per AMS-I.E.:

$$BE_{NRB} = B_{biomass} * N * f_{NRB} * NCV_{biomass} * EF_{kerosene} * 10^{-3}$$

and the above equation presented in section B.6.1 of PDD version 3.

The baseline emissions for the manure component needs to be calculated based on the amount of manure that would decay anaerobically in the pits, using the Tier 2 approach from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. PP has used the following formulae (Eq. 10.22) taken from the IPCC Guidelines as suggested by AMS- III R:

$$B_{manure} = \sum(T) (EFT * NT) * N * GWP_{CH4} / 1000$$

Where (Eq. 10.23)

$$EF(T) = VS(T) * 365 * Bo(T) * 0.67 \text{ kg/m}^3 * \sum(S,k) ((MCF_{S,k}) / 100 * MS(T,S,k))$$

and the above equation presented in section B.6.1 of PDD version 3.

The validation team has verified these equations and found that the baseline calculation equation is incorrect due to alteration of equation. Therefore validation team has requested the project participant not to

alter the equations in first step as suggested by Approved Methodology, in case of any customised multiplication factor required as specific requirement of the project activity same can be included as second step along with proper explanation.

In response, the project participant has modified the section B.6.1 of the revised PDD version 04 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) in order not to alter equation in first step. This was verified with the methodological equations and was found to be correct and accepted, hence **CAR#9 (Point 01) was closed.**

**CAR#9 (Point 02) was raised**, the validation team has requested the project participant to provided the objective of scaling of  $2\text{m}^3$  factor for the calculation of baseline emission for avoided methane from cattle manure. In response, project participant has explained that the objective of this scaling factor is to represent, in a conservative manner, the lower proportion of manure going into a  $2\text{m}^3$  unit than into a  $3\text{m}^3$  unit. The  $2\text{m}^3$  unit has a capacity  $2/3$  lower than the  $3\text{m}^3$  unit so the emissions reduction per unit due to the aerobically decayed of the manure will be  $2/3$  lower in the case of the  $2\text{m}^3$  unit. This was checked by the validation team and found to be satisfactory and acceptable, hence the **CAR#9 (Point 02) was closed.**

**CAR#9 (Point 03) was raised** for the value of **Vs** for dairy cow is not matching with the IPCC value, therefore validation team has requested the project participant to clarify the same.

In response, the project participant explained by using the reference of paragraph 8 of the methodology AMS III.R version 01 that the emissions factors for manure of different cattle categories are calculated based on nationally published (where available) and IPCC default values (where nationally published values are not available). Therefore, the project participant have taken the India specific value for dairy cows from Biogas Technology by B.T. Nijaguna and the nationally published values are not available for other cattle, so the project participant has used the IPCC default Indian subcontinent values for buffalo and other cattle.

The validation team has confirmed that the India specific value related to emission factors for manure for dairy cows have been taken from Biogas Technology by B.T. Nijaguna and emission factors for manure of buffalo and other cattle has been considered according to IPCC default Indian subcontinent values. But in the ER spread sheet, it is mentioned that the **Vs** value of Cow has taken from IPCC default value. (Please see the "G-18" in ER spread sheet) but actually value has been taken from Biogas Technology by B.T. Nijaguna. Therefore the validation team has requested to clarify which one is correct.

Project participant has used the correct value of **Vs** and **Bo** for cow from the report Biogas technology by B.T. Nijaguna<sup>/34/</sup> and also **Bo** for cows have been revised in ER spread sheet as  $0.15\text{ m}^3\text{ CH}_4 / \text{kg Vs}$ . This was checked and accepted by the validation team. Hence the **CAR#9 (Point 03) was closed.**

**CAR#9 (Point 04) was raised** for the validation team has requested the project participant to provide the justification that all IPCC default values were taken at  $27^\circ\text{C}$  temperature. In response the project participant has justified that the section B.6.3, of PDD version 3 modified to take account of temperature values obtained from a reputable source. Project participant has used values of  $\text{MCF}_{\text{liquid}}$  and  $\text{MCF}_{\text{liquid}}$  with crust and  $\text{MCF}_{\text{solid}}$  corresponding to average annual temperature of  $29.7^\circ\text{C}$ , temperature data was obtained from Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office. Furthermore, the validation team has requested to provide the temperature data as obtained from IMD (Indian Meteorological Department - <http://www.imd.gov.in/>) , Govt. of India.

Project participant has submitted the annual average temperature data from Karnataka Natural Resources Data Management System (NRDMS), which is an organization initiated by Department of Science and Technology, Govt. of India and Govt. of Karnataka for data management and overall science and technology initiative (<http://kscst.org.in/nrdms.html>)., The data provided mentioned the average monthly temperature for Kolar and same has been used in calculation of the average annual temperature i.e.  $29.7^\circ\text{C}$ . Thus, **CAR#9 (Point 04) was closed.**

**CAR#9 (Point 05) was raised** for the validation team has requested the project participant to justify the schedule for construction and operation of biogas units as mentioned in the section B 6.3 (page no 26) of the PDD version 01. In response, the project participant has provided the planning schedule in section B.6.3 of the PDD version 03.

Project participant has justified that the project participant will install at least 2000 units per quarter in non-rainy season, and 1000 units during a rainy season, when construction sometimes has to be delayed based

on available other staff. Validation team has verified the installation schedule and concluded that the number of units installed, cumulative units installed by the end of each year and average units in operation in the year is consistent with PDD version 04(including PDD version 11 dated 11/04/2011<sup>1.k/</sup>). Hence, **CAR#9 (Point 05) was closed.**

**CAR#9 (Point 06) was raised** requesting the project participant to explained the table mentioned for schedule for construction and operation of biogas units in the section B.6.3 of the PDD version 03. In response, the project participant has explained the table and this was verified and accepted, hence the **CAR#9 (Point 06) was closed.**

**CAR#10 was raised** as the equation used for calculation of project emission in the PDD version 01 was not consistent with the methodology AMS-III.R version 01.

In response, the project participant has clarified that the leakage from anaerobic digester is calculated by using the following equation as suggested by AMS-III. R version 01:

$$PE_{(ly)} = LF_{(AD)} ( GWP * D_{(CH_4)} * B_{(o)} * VS_{m,y}) / 1000$$

Where as the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10, the equation can be written as follows (this is the equation shown in Section B.6.1. of PDD V01):

$$PE = LF_{AD} * f_{collected} * \sum_{(T)} (GWP_{CH_4} * 0.67 \text{ kg/m}^3 * B_{o(T)} * N_{(T)} * VS_{(T)} * 365) / 1000$$

Where:

- PE – annual project emissions from physical leakages in the biogas digesters (t CO<sub>2</sub>e/year);
- f\_collected – fraction of total excreted manure that is collected (dimensionless);
- LF<sub>AD</sub> – methane leakages from anaerobic digesters (dimensionless). Default value of 0.1 specified in the AMS-III.R is used;
- 0.67 – conversion factor of m<sup>3</sup> CH<sub>4</sub> to kg CH<sub>4</sub>;
- B<sub>o</sub> – maximum methane producing capacity for manure produced by livestock category T (m<sup>3</sup> CH<sub>4</sub> per kg of VS excreted);
- N<sub>(T)</sub> - Average number of heads by livestock category T; and
- VS<sub>(T)</sub> – daily volatile solid excreted for livestock category T (kg dry matter per animal per day).

Furthermore, the project participant has explained that there are only two differences between above two equations; i.e. f\_collected and N<sub>(t)</sub>. Thus, the project participant has selected the IPCC formula because of two reasons. Firstly, this was the approach used in CDM project registered using the methodology AMS-III.R, and secondly, the IPCC approach which includes the variable f\_collected for consistency with the approach used to determine the baseline methane emissions from anaerobic decay of manure. The corresponding variable in the baseline is MS<sub>(T,S,K)</sub> shown in equation (4) of section B.6.1 of the PDD Version 03. Project participant has clarified that the N<sub>(t)</sub> is added to leakage from anaerobic digester correctly. The validation team has not satisfied with these justifications towards the usage of IPCC approach as using a different equation apart from what is mentioned in applied approved methodology AMS-III.R version 01. is a case of deviation and the same needs to be approved by UNFCCC.

In response the project participant has revised emission reduction calculation by using the methodological approach as suggested in AMS- III. R version 01 and provided the emission reduction per year comparison for above two approaches (i.e. AMS-III.R version 01 and IPCC formula).

Validation team has checked the calculation and found that ER per unit for IPCC approach is 0.49 which is lesser than that for AMS-III. R. is 0.75. However, the IPCC approach is more conservative then the approach suggest as per AMS-III.R version 01, validation team has accepted the approach which is in compliance with the approved methodology AMS-III.R version 01. Also validation team has confirmed that the fossil fuel or electricity will not be used for the operation of the bio-digesters so there will be no project emissions from such sources. Further, validation team has checked the calculation of project emission in the revised ER spreadsheet and was found to be correct, hence the **CAR#10 was closed.**

**CAR#11was raised** to demonstrate the leakage due to the project activity as estimated as zero in the table B.6.4 of the PDD and is consistence with methodologies AMS-I.E version 01 and AMS-I.C version 13.

In response, the project participant has clarified that there is no activity prior to the project activity, this project will not result in any existing transfer, thus no leakage considered. This has verified with methodologies AMS-I.E and AMS-I.C and was found to be consistence, hence accepted.

Furthermore, the project participant has provided the justification for Para 9 of AMS-I.E version 1. The possible source of leakage may be non-renewable biomass saved by the project activity that is then used by non-project households. The non-project households will be surveyed each year after project implementation to determine change in the use of NRB by the non-project households ( $B_{NRB\_non-project}$ , calculated by applying the  $f_{NRB}$  of 78% to the monitoring parameter  $B_{biomass,non-project}$ ). An increase of NRB used by the non-project households will be attributed to the leakage and subtracted from the baseline for calculating emission reductions at the time of verification of actual emission reductions.

Validation team has examined the justification and confirmed that non-renewable biomass would be saved by the project activity hence the leakage as per Para 9 of AMS I.E has been considered in the PDD version03. However, the validation team has requested the project participant to clarify how the requirement related to Para. 17 & 18 of "General guidance on leakage in biomass project activities", version 03, EB 47 is being fulfilled for the current project activity.

In response, the project participant has clarified that the biomass will not be used during the project activity so the project beneficiaries will not compete for the biomass as is stated in paragraph 17 & 18 of "General guidance on leakage in biomass project activities", version 03, EB 47. Therefore the requirement related to these paragraphs is not applicable to the project activities. Validation team has found that the justification provided by the project participant is satisfactory and accepted. Hence, **CAR#11 was closed.**

**CAR#12 was raised** for following issues:-

1. Validation team has requested project participant to clarify the basis for assumption considered related to ratio of 30:70 for 2 m<sup>3</sup> and 3 m<sup>3</sup> biogas units respectively.

In response, the project participant has changed the ratio to ratio 70:30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas units respectively and clarified that the projected ratio is a forecasted ratio based on SKG Sangha's experience to date of demand from different households in the project area. The rationale behind choosing the size of the bio-digester is to ensure that households will have enough manure to feed the bio-digester and to generate gas. If less than an optimal amount of manure is fed into a bio-digester the bio-degradation is slower and gas generation is not efficient. As a general rule, at least 2 heads of dairy cows are needed for a 2 m<sup>3</sup> digester, and at least 3 heads of dairy cows are needed for a 3 m<sup>3</sup> digester.

Furthermore, during project implementation, project participant will make records of every biogas unit installed and calculations of real emission reductions may be adjusted according to the actual ratio of 2 m<sup>3</sup> and 3 m<sup>3</sup> biogas units if the ratio turns out to be slightly different than as currently planned.

Validation team was not satisfied with this justification and requested further substantiation with appropriate reason for changing the ratio. Project participant has clarified that the earlier ratio calculation were based on Hassan survey. The results in this survey show that in total the heads of cattle per household is higher than the Kolar survey; hence this ratio has been changed. Validation team has examined the explanation given by project participant by cross-checking the survey data which ensure that the revised ratio is 70:30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas units respectively is more accurate and appropriate then pervious one. Hence the **issue is closed.**

2. The thermal equivalent sheet provided by the PP mention the thermal capacity of 10,000 is 29.7 MW; which is calculated based on "calorific value of biogas in a biogas-digester ". Thus, the validation team has requested to clarify that how same was calculated for 2m<sup>3</sup> and 3 m<sup>3</sup> biogas units. Project participant has clarified that the thermal installed capacity of these units depends on the gas burner and not on the capacity of the digester and the burners for both 2 and 3 m<sup>3</sup> units will be the same so the thermal installed capacity will be 2.97 kW for both units. Validation team has requested to further substantiate the reason for thermal capacity of project activity.

Project participant has clarified that the installed capacity of one unit is 2.97 kW irrespective of whether the household has a 2m<sup>3</sup> or 3m<sup>3</sup> bio-digester because it is determined by the technical characteristics of the stove that is being used to burn the bio-gas – specifically the maximum thermal energy that the stove can provide in an hour – and all the households in the project activity will be using the same type of stove. The difference between having a 2m<sup>3</sup> or 3m<sup>3</sup> bio-digester will determine the overall volume of biogas available for each household and hence the total number of hours over which the stove can be used for cooking. Hourly energy generation potential for each stove – that is thermal capacity for each unit – will however be the same for all households, irrespective of size of bio-digester.

Validation team has examined the technical characteristics of the stove and satisfied with the justification and it has further confirmed from guideline stipulated in the indicative simplified baseline and monitoring methodologies for selected small – scale CDM project activity categories, version 12 (Para 7) which says that the “For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MWth is the installed/rated capacity of the thermal application equipment or device/s (e.g. biogas stoves)”. Hence project participant has correctly determined the installed thermal capacity of the equipment (stove) is defined as the maximum thermal energy that the equipment can provide in an hour and it depends on the calorific value of the fuel (energy in the biogas per volume unit) and on the burning stove thermal efficiency. Thus, the **issue was closed**.

3. The thermal equivalent sheet used Net calorific value 21 MJ/m<sup>3</sup> is not matching with the provided published data (i.e. 21.6 MJ/m<sup>3</sup>). Therefore, project participant has been requested to clarify the same. In response project participant has corrected the net calorific value i.e. 21 MJ/m<sup>3</sup> in the revised thermal equivalent sheet and accepted. Thus, the **issue was closed**.
4. Validation team has requested the project participant to clarify the average stove efficiency of 55% presented in thermal equivalent sheet is thermal efficiency or combustion efficiency and if it is combustion efficiency then remaining 45% of un-combusted biogas leads to project emissions.

Project participant has clarified that average stove efficiency is thermal efficiency same has been corrected in the calculation; hence accepted and **issue was closed**.

5. Validation team has requested justification for the schedule for construction and operation of biogas units as mentioned in the Section B.6.3 of the PDD. In response, the project participant has explained the schedule in a tabular format and the validation team has verified and accepted the same. Hence, the **issue was closed**.

Based on the above discussion, **CAR#12 was closed**.

**CAR#13 was raised** to provide the source of data and parameters mentioned in the table mentioned in the section B 6.2. In response the project participant has updated the section B 6.2 by providing the relevant source of data and parameters. Further the validation team has requested the project participant to clarify that correct source of Vs and Bo value of cow. In response the project participant has corrected the emission reduction sheet by mentioning the correct value of the same. Validation team has examined the emission reduction spread sheet and the PDD version 04 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>) with source of information. The validation team has confirmed that the correct Vs and Bo value of cow has been taken from the report Biogas technology by B.T. Nijaguna and also Bo for cows has been revised in ER spread sheet as 0.15 m<sup>3</sup> CH<sub>4</sub> / kg Vs. ER sheet is consistent with the PDD Version 04 (including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>); Hence **CAR#13 was closed out**.

## Opinion

Based on the above discussion and the requirements of paragraphs 88-92 of the VVM version 01.2 (EB 55 Annex 1), the validation team confirms that:

1. All assumptions and data used by the PP are listed in the PDD<sup>/01.k/</sup>, including their references & sources

2. All documentation used by the PP as the basis for assumptions & source of data is correctly quoted & interpreted in the PDD<sup>/01.k/</sup>
3. All values used in the PDD<sup>/01.k/</sup> are reasonable in the context of the proposed CDM project activity
4. The selected methodologies AMS-I.C. version 18 , AMS-I.E. version 03 & AMS III.R version 01 have been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions
5. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD<sup>/01.k/</sup>.

#### **4.9 Application of Monitoring Methodology and Monitoring Plan**

A sampling plan has been provided by the PP in Annex 4 of the PDD<sup>/1.k/</sup> as per requirement stipulated in the General Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities, EB 50, Annex 30, whose implementation was verified by the validation team. In sampling plan, the PP has provided the detail on taluk level monitoring based on annual surveys of a sample of beneficiaries to determine parameters stated in the monitoring plan.

The sampling plan presented in the PDD<sup>/1.k/</sup> is included the clear description of all 8 monitoring parameters of monitoring plan.

##### **Step -01: Sampling Objective:**

The PP has discussed the sampling objective as to determine the mean average annual value of each parameter with a 90/10 confidence/ precision. Following monitoring parameter has been considered under in the sampling plan:

1.  $H_{\text{stove}}$  (hours) - Annual hours of operation of an average system (hours of burner functioning)
2.  $F_{\text{kerosene}}$  (Litres) – Amount of kerosene consumed by household after installation of biogas unit
3.  $B_{\text{biomass}}$  (Tonnes)– Consumption of fuel wood in households participating in project activity
4.  $B_{\text{biomass, non-project}}$  (Tonnes) – Consumption of fuel wood in households not participating in project activity
5.  $N_t$  (dimensionless) – annual average animal population in a household (number of heads of dairy, cow, buffalo and other cattle)
6.  $B_{\text{manure\_generated}}$  (Tonnes) – Average amount of animal manure generated per household per year
7.  $B_{\text{manure, fed}}$  (Tonnes) – Average amount of animal manure fed into a biogas digester per year
8. Application of sludge (qualitative information) – Proper application of the sludge from the biogas unit

##### **Step 02: Field Measurement Objectives and Data to be collected:**

The PP has provided the data collection procedure under the sampling plan , wherein it has been validated that the data on these variables will be collected for at least 30% of project beneficiaries in year 1 (June 2011 to May 2012) and at least 5% of project beneficiaries thereafter. The PP has signed a Project Motivators who will conduct the survey once in a year at village level and will distribute sheets of paper to project beneficiaries (that are able to write) in their village, on which beneficiaries will make records for every day during one week in the year for all above Parameters. This has been checked and found to be appropriate and accepted.

$H_{\text{stove}}$  (hours) will determine based on average annual hours of operation of an average system (hours of burner functioning) which is followed by the monitoring of three variable of cooking start time, cooking end time and whether one or two burners were used. The monitoring of all three variables is included in sampling plan to determine the final hours of operation of an average system.

The parameter  $F_{\text{kerosene}}$  (litres) is kerosene used for cooking is also included in the sampling plan, to distinguishing the kerosene used for cooking from kerosene used for other purposes such as lighting with Project Motivator will meet with each project beneficiaries in their village.

The monitoring parameter consumption of fuel wood in households participating in the project activity  $B_{\text{biomass}}$  (Tonnes) will be determine through discussions with each relevant beneficiary and by weighing wood

consumed on the day of the visit. The Project Motivators will enter findings from their discussions into survey questionnaire sheets which will be completed for each beneficiary.

The consumption of fuel wood in households not participating in the project activity  $B_{\text{biomass, non-project}}$  (Tonnes), the data will be collected by surveying 100 non-project households that use fuel wood. The survey will be carried out once a year by the Taluk level monitoring team from the PP and they will meet with households and determine fuel wood usage through discussions with each relevant household and by weighing wood consumed on the day of the visit.

The annual average animal population in a household  $N_i$  (Dimensionless), the monitoring team from the PP will meet with beneficiaries, count the number of heads of cattle on the day of their visit and will clarify through discussions with each relevant beneficiary whether there were changes in number of heads throughout the year. The survey will be carried out once a year by the Taluk level monitoring team.

The monitoring parameter average amount of animal manure generated per project beneficiary per year  $B_{\text{manure, generated}}$  (Tonnes), the survey will be carried out once a year by the Taluk level monitoring team. The team will meet with the beneficiaries, and will determine the amount of manure generated through discussions with each relevant beneficiary and by weighing manure on the day of their visit.

The average amount of manure fed into a bio-digester per project beneficiary per year  $B_{\text{manure, fed}}$  (Tonnes), the team will meet with the beneficiaries, and will determine the amount of manure fed into the bio-digester through discussions with each relevant household and by weighing manure on the day of their visit.

The use of sludge from the biogas unit (Application of sludge), the team will meet with the beneficiaries, and will determine sludge application through discussions with each relevant beneficiary.

### Step 03: Target Population and Sampling Frame:

Target Population and Sampling Frame of sampling plan is included, the PP has considered a clustered sampling approach wherein 5 geographic clusters each corresponding to one of the 5 regions "Taluks" in the project activity. Since two types of bio-digester will be deployed in the project (a 2M<sup>3</sup> biogas unit and a 3M<sup>3</sup> biogas unit) hence there will also be an element of stratification in the sampling frame, distinguishing beneficiaries by type of biogas unit. All parameters exception of  $B_{\text{biomass, non-project}}$  as the target population is the beneficiaries that will receive the bio-digesters in the project. This is found to be appropriate and acceptable. For  $B_{\text{biomass, non-project}}$  the target population is households that are not involved in the project activities but are located in the same regions in which the project activities take place. The sampling frame for this parameter is 100 households in the project activity regions that are not involved in the project activity.

### Step 04: Sample Method:

The PP has provided the transparent approach for sampling method in sampling plan, sampling objectives have been discussed by the PP and clearly communicated by the Project Communicator and his team to Taluk supervisors, the project motivators and Taluk monitoring team members that will carry out and review the surveys. The PP has also prepared the standard survey sheets to collect the data and copy of same is attached in Annex 6 of PDD. Furthermore, target population for all parameters with the exception of  $B_{\text{biomass, non-project}}$  is the beneficiaries that will receive the bio-digesters in the project. The target population for  $B_{\text{biomass, non-project}}$  is households that are not involved in the project activities but are located in the same regions in which the project activities take place. In next step, sampling frame which is full list of households receiving bio-digesters in the project and have sufficient levels of literacy to track some of the data that will be required. To ensure that the target population accounts for literacy, information on the literacy of project beneficiaries will be recorded by the Project Motivators at the time of installing the bio-digesters and this information will be kept in the central project database that will be managed by the Project Coordinator. For  $B_{\text{biomass, non-project}}$  the sampling frame are households that are not involved in the project activities but are located in the same villages in which the project activities take place. This has been found to be appropriate and consistent with requirement stipulated in EB 50, Annex 30.

#### a) Randomizing cases and drawing sample

The PP has provided the transparent information on drawing of a representative and random sample in the PDD. Project Coordinator and his team will develop the sample list of households. Firstly, the PP will develop a representative sample as when drawing the sample the Project Coordinator and his team will analyze the deployment distribution of operating biogas units to

determine the number of households to be sampled in each Taluk in order to generate a sample population that reflects the distribution of biogas units by region and size. Same has been well explained with example for “Number of biogas units installed by region and size”. Then, based on this information, the Project Coordinator and his team will analyze the distribution (%) of digesters by size and region. In next step, the Project Coordinator and his team will then apply this distribution to the sample population needed to deliver the required level of precision (e.g. 500) to determine the proportion of households in the sample that should be surveyed by region and unit type for the specific year.

#### **b) Randomizing the selection of households in the sample population**

For each category of the population (size of unit by region) the Project Coordinator and his team will use a random number generator function in Excel spread sheet to select the households to be sampled (from the full list of households falling into each category, by region and type of biogas unit). The Project Coordinator and his team will then develop a schedule for biogas visits for each year (reviewed on a monthly basis) with an aim of ensuring that 1/12 of the sample population is surveyed in each month (to try to prevent problems associated with seasonal cycles). This was checked and found to be appropriate.

#### **Selecting the most effective information gathering method**

The PP has explained the most effective information gathering method as the information will be gathered by the Project Motivators and Taluk level monitoring team using a mixture of visual inspections, measurement of parameters during visual inspections, self reporting and discussions with project beneficiaries. In all cases data will be entered into standardized survey forms prepared by the Project Coordinator and his team to be completed by members of the monitoring team/Project Motivators or beneficiaries. The forms will then be transferred, on a monthly basis, upwards through the monitoring team hierarchy (shown above in the “Monitoring Scheme” figure) until finally data is entered into the database kept by the Project Coordinator and his team.

#### **Conducting surveys and measurements**

Procedures will be put in place to ensure that field data collection is performed properly and that any potential intentional errors or unintentional errors are minimized and documented. These will include:

- Preparation of standard survey forms to be completed by the monitoring team and households)
- Training of project monitoring team
- Establishing a clear project monitoring hierarchy, which will enable sample data to be checked at various stages
- Monthly analysis of survey findings by the Project Coordinator and his team to identify outliers and possible errors, which will be documented in the database
- Discussions on possible error and corrective actions taken by project coordinator.

#### **Minimizing non-response**

A core feature of the project is the central role that project motivators play in the monitoring process. With project motivators being members of the communities in which the biogas units are installed they will have existing relationships with the beneficiaries. These relationships should minimize the chance of non-response. Further, project motivators will be involved in the installation of biogas units and will serve as a point of contact and issue resolution in the case that biogas unit do not work as planned and therefore will be continuously exposed to the households that will be surveyed.

Notwithstanding this feature of the project, a number of corrective measures will be employed, including over-sampling. Further, as sampling will be carried out throughout the year, the Project Coordinator will be in a position to review response rates as the year progresses and take action to increase sampling efforts if non-response is an issue.

#### **Step 05: Desired Precision/Expected Variance and Sample Size**

The PDD discussed that the indicative simplified baseline and monitoring methodologies for selected small-scale CDM project categories (I.E/ Version 3) states that a sample size shall be chosen for a 90/10 level of

precision (a 90% confidence interval and 10% margin of error). The proposed sampling approach has been found to meet this requirement. This has been demonstrated as follows:

The formula for determining the minimum sample size of a population that should be used to demonstrate a 90% confidence interval is as  $n = (Z_{\alpha/2} * \sigma/E)^2$  ( where as n = the sample size ;  $Z_{\alpha/2} = 1.65$  for a confidence interval of 90%;  $\sigma$  = the standard deviation and E = the maximum error of estimate – in this case 10% of the average value of the specific parameter)

As neither  $\sigma$  nor E is known for the parameters to be sampled, these values were calculated from an analysis of the results obtained from the baseline survey, the results of have been validated by the validation team and found to be correct and acceptable.

By applying the formulae to the values calculated from the survey findings, the minimum sample size (n) for each parameter was calculated in the table provided in the PDD. The table shows that the sample size required to achieve a confidence interval of 90% of the different factors ranges from 58 to 169. Thus, the PP has concluded as a minimum sample of 169 households is needed to achieve a confidence interval of 90%. Same was found to be correct and acceptable conservatively.

For  $B_{\text{biomass, non-project}}$ , the PP has considered conservatively sample size of a minimum of 100 households compared to a minimum sample size of 58 required for this parameter.

For remaining parameters, the PP has considered sample of a minimum of 30% of households with bio-digesters in first year and 5% thereafter. In each year the Project Coordinator will be responsible for ensuring that an adequate number of households are sampled to deliver the required level of precision and will sample more households (than the 30%, 5% approach detailed) if necessary to ensure a confidence interval of 90%. The anticipated number of households that would be sampled in each year using various sampling approach when applied to the anticipated bio-digester deployment plan and shows that in each case more than 169 beneficiaries (the maximum value of n for all parameters) will be sampled, allowing for the possibility of non-response are provided in tabular form in the PDD . Specifically, 250, 208 and 392 beneficiaries will be surveyed in years 1, 2 and 3, respectively. Thereafter, 500 beneficiaries will be sampled. Same has been checked and analyzed by validation team and found to be appropriate and acceptable.

The baseline survey did not capture information on two of the parameters that will be sampled,  $H_{\text{stove}}$  and Application of sludge.

Neither of these parameters will be used to calculate project activity emissions. They will instead be monitored to check whether the bio-digesters produce enough bio-gas to substitute previous use of non-renewable biomass and kerosene and to check the appropriate use of sludge as a fertilizer. Information for both parameters will be gathered by sampling 30% of households in year 1 and 5% thereafter. For  $H_{\text{stove}}$  sample data gathered during the project activity will be analyzed on a quarterly basis (using the formula shown above) to calculate the minimum sample size required to achieve a confidence interval of 90% and the number of households to be sampled will be amended in subsequent quarters if necessary to achieve this. Information on the application of sludge is qualitative and therefore a minimum sample size is difficult to calculate. However, as the sampling approach has been derived in order to ensure that a 90% confidence interval can be achieved for all other parameters, it is expected that this will ensure that sufficient information is captured for reliably monitoring this parameter. This was checked and found to be acceptable.

The detail calculation of sample size presented in spread sheet named as '90\_10 Precision calcs for Kolar' version 01 dated 11/04/2011<sup>07.AV</sup>, this has been checked and found to be corrected and consistent with the guideline stipulated under EB 50, Annex 30 and hence accepted.

## **Step 06: Procedures for Administering Data Collection and Minimizing Non-Sampling Errors**

### **Procedures for data collection**

Sampling will be carried out by the village level Project Motivators or the Taluk level monitoring teams, with review of findings carried out at the Taluk level and overall project level. Sampling will be carried out on a monthly basis, with the aim of collating information for 1/12 of the sample population in each month. This will overcome any issues associated with seasonality. To promote effective data collection, project motivators and monitoring team members will use standardized forms developed by SKG Sangha and will also receive training from SKG Sangha. The Project Motivator or the Taluk level monitoring teams will

collect the survey sheets for all beneficiaries and households surveyed in each village. In each case the individuals conducting the survey will keep copies of survey findings on file. Copies will also be sent to the relevant Taluk level supervisor. The Taluk level supervisors will collate all survey sheets for their Taluk, keeping copies on file and sending copies to the Project Coordinator and the team. The Project Coordinator (and the team) has responsibility to enter all survey data into a database and to use the survey information to analyze sample findings. This was checked and found to be acceptable.

#### Quality assurance

The results from sample findings will be reviewed once a month by the Project Coordinator and his team to identify response rates, check that sampling is on track to achieve the 90/10 precision and to identify any values that appear to deviate significantly from what was expected. This will enable the Project Coordinator to adjust sample sizes in subsequent months and to discuss unexpected results with the relevant Taluk level supervisors, Project Motivators or monitoring team members to check whether results can be justified or are the result of errors in data capture/ entry. If results appear to be the result of errors, this will be documented in the database and the household will be re-surveyed or excluded from the sample.

Response rates will be maximized by the involvement of project motivators in sampling. Project motivators will be individuals selected from the local communities in which the bio-digesters are implemented. As such project motivators are likely to have good relationships with project beneficiaries that should maximize response rates. In addition, response rates will be maximized by use of a sufficiently large sample that allows room for non-response. Further, the Project Coordinator and his team will review response rates on a monthly basis and adjust target sample numbers for subsequent periods, if response rates are lower than anticipated. This was checked and found to be acceptable.

#### Step 07: Implementation

The schedule for implementing the sampling effort should be defined as well as indication of who will conduct the actual data collection and the analyses; include qualifications, experience and any potential conflicts of interest of those involved in the data collection and analyses.

The Project Coordinator will have responsibility for determining and implementing the sampling schedule for the year. At the start of each year, The Project Coordinator will be aware of the target number of beneficiaries and households to be surveyed in the period (30% in year 1, 5% thereafter and 100 non-project households). The Project Coordinator will, however, need to develop monthly sampling schedules that not only take account of these overall aims, but also reflect actual deployment rates by area and type of digester. The Project Coordinator will receive information on the number of units installed and operating in each month from the Taluk level monitoring team (who, in turn, will receive this information from project motivators).

The Project Coordinator will then develop a schedule for the operating units to be sampled in the subsequent month. This will be done, using the sample method (described in Step 4) and with a view to sampling the total number of beneficiaries required to achieve a 90% confidence interval (described in Step 5). The Project Coordinator will then issue the list of beneficiaries to be surveyed in each month to the Taluk level monitoring team, who in turn, will distribute lists to the project motivators. At the end of each month, sample findings will be relayed to the Project Coordinator and his team for analysis and the Project Coordinator will use these findings to finalise the list of households to be surveyed in the subsequent month. This will be done with reference to possible errors, non-response rates and verification that sampling is on track to deliver the 90/10 level of precision. The "Monitoring Scheme" diagram mentioned in the PDD summarises the individuals that will be responsible for the actual data collection and analyses. The qualifications and experience of the Project Coordinator and other team member who have responsibility for managing the sampling and analysis are provided in the PDD. This has been checked and found to be acceptable.

The Project Proponent has provided following data and parameters required to be monitored at the ex-post scenario in the final PDD<sup>01.k/</sup> as per monitoring methodologies:-

| Parameter in section B.7.1 of final PDD |           |             | Remark                 |                  |
|---|-----------|-------------|------------------------|------------------|
| Sr. No.                                 | Parameter | Description | Monitoring Requirement | QA/QC procedures |

|    |                              |  |   |   |
|----|------------------------------|--|---|---|
| 01 | <b>N<sub>operating</sub></b> | Number of systems (biogas units) operating                                   | Validation team has confirmed that the PDD <sup>/01.i/</sup> gives the transparent description towards the monitoring requirement of this parameter is complies the monitoring plan as project participant employ the trains a local person (the motivator) which will main contacting person between the SKG Sangha and all biogas unit beneficiaries in the village. The responsibility and role of motivator clearly mentioned in the PDD. According to that him responsible to maintain and repair biogas systems, and to monitor and report the operation of systems. They report any faults to the motivator and normally any faults with the bio-digesters are resolved by this person on the same day as the complaint is lodged. The motivator records any periods of non-functioning (in days). In addition, the motivator visits the beneficiaries at least once per month to check whether bio-digesters and burners are functioning properly. All records are made by the motivator by hand in two paper copies of a monitoring journal. One copy is sent at the end of the month to the taluk level, and another copy is kept at the village level. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the methodology. | Final PDD <sup>/01.k/</sup> is described the level of uncertainty of recording this parameter is low. The recording of this parameter will be done monthly, and any periods of non-functioning will be recorded. Beneficiaries are not likely not to report faults, as any non-functioning means non availability of clean and simple cooking. The monitoring team from the project level will do random checks to check whether the data recorded by the motivator is correct. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the methodology and also is in compliance the QA/QC requirement. |
| 02 | <b>H<sub>stove</sub></b>     | Annual hours of operation of an average system (hours of burner functioning) | The monitoring of parameter' Annual hours of operation of an average system (hours of burner functioning)' is transparently describe in the PDD <sup>/01.k/</sup> . As per this description that a sample of beneficiaries (only those who can write will be selected) will be given a sheet where they will make records for a week writing down each day hours when a burner is functioning. i.e. each day a beneficiary will write down the time of starting cooking and finishing cooking, and note whether one or two burners were used. The motivator will distribute the sheets and collect the answers. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements monitoring.   | This parameter is not used for calculating emission reductions. It is used for checking whether the bio-digester produced enough biogas to substitute previous use of non-renewable biomass and kerosene. The taluk level monitoring team will be checked whether recorded hours are reasonable during the household visits. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement.   |

|    |   |   |   |   |
|----|---|---|---|---|
| 03 | <b>F<sub>kerosene</sub></b>             | Amount of kerosene consumed by household after installation of biogas unit          | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample of beneficiaries. The taluk level monitoring team will carry out the survey once in a year. Annex 6 of PDD contains the survey sheet. The amount will be determined from discussions with the beneficiaries during the visit. The average amount of kerosene still used for cooking will be subtracted from the baseline level of 24.12 l per household per year. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring.  | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement. |
| 04 | <b>B<sub>biomass</sub></b>              | Consumption of fuel wood in households participating in the project activities      | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample (at least 5%) of beneficiaries. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD contains the survey sheet. Information will be sought on the quantity of biomass consumed after implementation of the project activity (determined during discussions and by weighing wood consumed on the day of the visit). The difference between the total fuel wood consumption in the baseline (7.9 t) and the total fuel wood consumption after project implementation (monitored value) will be used for calculating emission reductions from saved biomass, after applying the fraction of non-renewable biomass. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring. | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement. |
| 05 | <b>B<sub>biomass, non-project</sub></b> | Consumption of fuel wood in households not participating in the project activities. | PDD describe the monitoring of this parameter based on the survey of 100 non-project households that use fuel wood. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD contains the survey sheet. Information will be sought on the quantity of biomass consumed (from discussions and by weighing wood consumed on the day of the visit). This information will be used to calculate <b>B<sub>NRB_non_project</sub></b> (consumption of non-renewable biogas by households not participating in the project activities) by applying <b>F<sub>NRB</sub></b> of 78% to the monitoring parameter. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring.   | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement. |

|    |                                      |   |   |  |
|----|--------------------------------------|---|---|--|
| 06 | <b>N<sub>T</sub></b>                 | Annual average animal population in a household (number of heads of dairy cow, buffalo and other cattle). | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample of beneficiaries. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD contains the survey sheet. The team will count the number of heads of cattle and will clarify with the household people during a discussion whether there were any changes in number of heads throughout a year. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring. | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement.  |
| 07 | <b>B<sub>manure, generated</sub></b> | Average amount of animal manure generated per household per year.   | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample of beneficiaries. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD contains the survey sheet. The amount will be determined by during discussions with the beneficiaries. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring.   | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Additionally the parameter will be cross-checked with calculated amount of generated manure by multiplying heads of different types of cattle by typical amount of manure generated by these cattle types. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement. |
| 08 | <b>B<sub>manure, fed</sub></b>       | Average amount of animal manure fed into a biogas digester per year.                                      | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample of beneficiaries. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD contains the survey sheet. The amount will be determined from discussions with the beneficiaries and by weighing manure fed into the bio-digester at the day of the visit. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring.                                       | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement.  |
| 09 | <b>Application of sludge</b>         | Proper application of the sludge from the biogas unit.  | The monitoring plan as describe in the final PDD says that monitoring of this parameter is based on survey of a representative sample of beneficiaries. The taluk level monitoring team will be carried out the survey once in a year. Annex 6 of PDD   | The Monitoring team from the project level will do random checks to check whether the data recorded by the taluk level team is   |

|  |  |  |   |  |
|--|--|--|---|--|
|  |  |  | contains the survey sheet. Application of the sludge will be determined from discussions with the beneficiaries on where, how and when the sludge is used. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance with the requirements of the monitoring. | reasonable. Thus the validation team has confirmed that monitoring plan towards this parameter is in compliance the QA/QC requirement. |
|--|--|--|---|--|

As describe in above table; the validation team has confirmed that the organizational structure and the responsibilities at each level for the monitoring of the proposed CDM project activity have been clearly mentioned in the PDD<sup>01.k/</sup>. The quality assurance and inspection procedures have also been covered in section B.7.2 of the PDD<sup>01.k/</sup>. The data management system has been clearly defined in the PDD<sup>01.k/</sup>. The data will be stored and archived for two years beyond the crediting period in both, electronic and paper form.

### Discussion of CARs/CLs:

**CAR#14 was raised** for following issue:

1. Parameter for monitoring of leakage in the production of renewable biomass as required by AMS I.E version 01 has not been included in the monitoring plan. The sample population of the survey method required for monitoring of the project GHG indicators has not been mentioned.

In response, the project participant has clarified that the possible source of leakage may be non-renewable biomass saved by the project activity that is then used by non-project households. The non-project households will be surveyed each year after project implementation to determine the change in the use of NRB by the non-project households ( $B_{NRB\_non-project}$ , calculated by applying the  $f_{NRB}$  of 78% to the monitoring parameter  $B_{biomass,non-project}$ ). An increase of NRB use by the non-project households will be attributed to the leakage and subtracted from the baseline for calculating emission reductions. It is suggested to have a sample size of 100 households for this purpose. Validation team has examined the justification given by project participant and found satisfactory and project participant has also revised the section B.7.1 accordingly, hence **this issue is closed**.

2. The frequency of the survey to be conducted for data monitoring is not clear.

In response the project participant has clarified that  $N_{operating}$  (the number of bio-digester systems operating) will be monitored monthly and project participant has also revised the section B.7.1 accordingly, hence **this issue is closed**.

3. The detail description regarding data capturing, handling and archiving procedures are absent.

In response the project participant has modified the section B.7.1 to provide a detailed description of data capturing, handling and archiving procedures and accepted by validation team, hence **this issue is closed**.

4. The monitoring plan of the PDD version 01 does not clearly mention the quality control and quality assurance procedures to be followed to mitigate data uncertainty and to ensure delivery of high quality data.

In response the project participant has modified the section B.7.1 to provide more information on quality control and quality assurance procedures and validation team has found it to be satisfactory, hence **this issue is closed**

Based on the above discussion, all the issue raised under **CAR#14 were closed**.

**CL#15 was raised** for the following issues:

1. The validation team has requested to clarify the overall responsibility/ authority for project activity operations and monitoring.

In response the project participant has provided the hierarchy in section B 7.2 of the PDD version 03 (including PDD version 11 dated 11/04/2011<sup>1.k/</sup>) which shows the responsibility and functions at different project levels, validation team has verified the same and found it as satisfactory, hence **issue was closed**.

2. The validation team has requested to provide the further information on overall responsibility for data monitoring, reporting, reviewing and maintenance. Project participant has revised the section B 7.2 with required information, validation has found satisfactory and accepted. Hence **issue was closed**.

3. The PDD version 01 does not provide any information regarding internal audit procedures required to be executed for GHG project compliance with operational requirements.

In response project participant has clarified that the internal audit of village level monitoring will be performed by the project level monitoring team by doing random checks and project participant has revised monitoring plan in section B.7.2 of the PDD version 03 (including PDD version 11 dated 11/04/2011<sup>1.k/</sup>) accordingly. The validation team has checked the section B.7.2 and found it to be satisfactory and accepted. Hence **issue was closed**.

4. The PDD version 01 does not mention any information regarding project performance reviews prior to submission of data for verification.

In response, the project participant has discussed the approach in section B.7.2 of the revised PDD, as per this approach, the check of the monitoring data will be performed by the project level monitoring team. They will carry out desk-based review of monitored data to check for consistency and to identify any questionable data. The team will then do targeted visits to the village level to check pre-identified inconsistencies or questionable data entries, as well as do random visit of households to check village-level monitoring data. Validation team has found it to be satisfactory and accepted the correction in section B.7.2 of the revised PDD (including PDD version 11 dated 11/04/2011<sup>1.k/</sup>). Hence **issue was closed**.

Based on the above discussion, all the issue raised under **CL#15 were closed**.

**CL#16 was raised** to substantiate the consideration of project operational life time as 20 years.

In response, the project participant has clarified that life time of the project activity has been taking conservatively 20 year on the basis of past experience. Furthermore, the validation team requested to provide the supportive evidence for same. Project participant has provided the reference of a book on biogas technology in India which mentions the 20 years as an operating period of an average biogas plant (Nijaguna, B.T, *Biogas Technology* (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002); page 232). Validation team has verified the information towards the life time of the project activity and found that the project participant has considered 20 years as project life time conservatively. This was verified from a copy of relevant page of Nijaguna, B.T, *Biogas Technology*. Hence **CL#16 was closed out**.

**FAR#19 was raised** for following issue:

1. Actual implementation schedule of bio-digester units needs to be confirmed during verification
2. As per the final PDD<sup>1.k/</sup>, 70:30 ratios have been considered for installation of 2m<sup>3</sup> units and 3m<sup>3</sup>. Estimated emission reduction has been calculated based on proposed ratio of 2m<sup>3</sup> units and 3m<sup>3</sup> units installed. Since, this ratio influences the emission reduction, same needs to be checked during verification.

## Opinion

Based on the above discussion and the requirements of paragraphs 120-124 of the VVM version 01.2 (EB 55 Annex 1)<sup>56/</sup>, the validation team confirms that:

1. The monitoring plan included in the PDD is based on the approved methodologies AMS-I.C. version 18, AMS-I.E. version 03 & AMS III.R version 01 which have been applied to the proposed CDM project activity
2. The monitoring plan is in compliance with the applied methodologies AMS-I.C. version 18, AMS-I.E. version 03 & AMS III.R version 01
3. The monitoring arrangements described in the monitoring plan are feasible within the project design
4. A sampling plan provided by the PP in Annex 4 of the PDD<sup>1.k/</sup> is meeting the requirement stipulated in the General Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities, EB 50, Annex 30.

5. The PP has the ability to implement the monitoring plan as per the PDD<sup>/01.k/</sup>

#### 4.10 Environmental Impacts

The project participant has not carried out an EIA for the proposed CDM project. The schedule of the notification S.O. 1533 published by the Ministry of Environment and Forests (MoEF), Government of India gives a list of the project activities that require a prior environmental clearance<sup>/29/</sup>. According to this schedule this project does not require a prior environmental clearance and hence an EIA need not be carried out.

It was found that the project impact is positive on the local and national environment as a whole, which has been physically verified during the site visit.

#### Opinion

The Validation team is of the opinion that the project complies with environmental regulations in India.

#### 4.11 Local Stakeholder Comments

The local stakeholder consultation process has been described in detail, by the project participant, in section E of the PDD<sup>/01.k/</sup>. The project participant has identified the representatives of the local government (Zilla Panchayath, Taluk Panchayath and Gram Panchayath), people from households that could potentially be project beneficiaries, farmers, women from local self-groups, NGOs, as well as village representatives as the stakeholders. Based on the observations of the validation team during the site visit and as per the definition of 'stakeholder' in the Glossary of CDM terms version 5, the identification of stakeholders for consultation was found to be appropriate. Thus, the validation team is of the opinion that the relevant stakeholders have been consulted. The details of the local stakeholder consultation are as follows:

| Meeting location                              | Date of meeting | Mode of invitation   |
|---|-----------------|--|
| Lions Club building, Antharagange Road, Kolar | 29/12/2008.     | Individual invitation letters with a non-technical summary of the project, announcement & personally met with people and invited |

The project participant has clearly detailed the stakeholder consultation process and the meeting agenda in the PDD<sup>/01.i/</sup>. After sharing information with the local stakeholder on the details of the proposed project activity and the concept of CDM, comments were invited from the local stakeholders. The queries raised by the stakeholders and the satisfactory responses to the same have been mentioned by the project participant in a table in section E of the PDD<sup>/01.k/</sup>. No adverse comments have been raised by the stakeholders.

The MoM and the attendance sheet have been submitted by the project participant. During the site visit the validation team interviewed some of the stakeholders. Based on their replies, the validation team was convinced that the process of stakeholder consultation was carried out as described in the PDD<sup>/01.k/</sup>. The stakeholders also confirmed that they were invited for the meeting through individual invitation letters. This was found to be consistent with the invitation process mentioned in the PDD<sup>/01.k/</sup>.

#### Discussion of CARs/CLs:

**CAR#17 was raised** as the PDD version 01, does not mention about the local stakeholders identified and consulted for the project activity.

In response, the project participant has provided the requested information in the revised PDD(including PDD version 11 dated 11/04/2011<sup>/1.k/</sup>). The revised PDD was verified by the validation team and found that the stakeholder consultation meeting was held on 18 the December, 2008 in the rotary club hall, Kolar. This was checked with the copy of invitation letter, photograph of stakeholder meeting and conducting on-site interview with some of stakeholder which was attended this meeting. The attendance sheet was checked and feedback forms also checked and were found to be satisfactory and acceptable; hence **CAR 17 closed out**.

#### Opinion

According to the requirements of the paragraphs 126-128 of the VVM version 01.2 (EB 55 Annex 1)<sup>/56/</sup>, the validation team is of the opinion that the local stakeholder consultation process has been satisfactorily carried out.

## 5. Comments by Parties, Stakeholders and NGOs

In accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures, the project design document of a proposed CDM project activity shall be made publicly available and the DOE shall invite comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organizations and make them publicly available. This chapter describes this process for this project.

### 5.1 Description of How and When the PDD was Made Publicly Available

The Project Design Document for this project was made available on the UNFCCC website <http://cdm.unfccc.int/Projects/Validation/DB/GESN4KXQZPSAIGANRNCR124WUY5RHE/view.html> and was open for comments from 16<sup>th</sup> September 2008 until 15<sup>th</sup> October 2008. Comments were invited through the UNFCCC CDM homepage

### 5.2 Compilation of all Comments Received

| Comment Number          | Date Received | Submitter | Comment |
|-------------------------|---------------|-----------|---------|
| No comment was received |               |           |         |

### 5.3 Explanation of How Comments Have Been Taken into Account

No comment was received.

## 6. List of Persons Interviewed

| Date       | Name               | Position   | Short Description of Subject Discussed   |
|------------|--------------------|--|--|
| 06/01/2009 | Mr. D. Vidya Sagar | President, SKG Sangha                                | Baseline selection, Applicability of methodology, Additionality and monitoring procedure   |
|            | Mr. K.Kiran Kumar  | Secretary, SKG Sangha                                | Baseline selection, Applicability of methodology, Additionality and monitoring procedure   |
|            | Mr. Dick Jones     | Director Sustainability Project, CarbonAided Limited | Prior knowledge of CDM, parallel actions taken to secure CDM revenue for project activity, Barrier Analysis, Monitoring procedure, monitoring parameters, operation maintenance, calibration and data recording. |

## 7. Document References

Category 1 Documents (documents provided by the Client that relate directly to the GHG components of the project, (i.e. the CDM Project Design Document, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the designated national authority):

- /01/
  - a. PDD version 01 dated 12.09.2008 (Published for international stakeholder consultation)
  - b. PDD version 02 dated 09.03.2009
  - c. PDD version 03 dated 28.04.2009
  - d. PDD version 04 dated 17.06.2009
  - e. PDD version 05 dated 04.08.2009
  - f. PDD version 06 dated 15.12.2009
  - g. PDD version 07 dated 24.03.2010
  - h. PDD version 08 dated 11.04.2010
  - i. PDD version 09 dated 16.07.2010
  - j. PDD version 10 dated 04.03.2011
  - k. PDD version 11 dated 11.04.2011 (Final Version)
- /02/
  - a. ER Spreadsheet Kolar Project version 01 dated 12.09.2008
  - b. ER Spreadsheet Kolar Project version 02 dated 09.03.2008
  - c. ER Spreadsheet Kolar Project version 03 dated 28.04.2009
  - d. ER Spreadsheet Kolar Project version 04 dated 17.06.2009 (Final Version)
- /03/
  - a. Kolar Investment Analysis version 01 dated 12.09.2008
  - b. Kolar Investment Analysis version 02 dated 09.03.2008
  - c. Kolar Investment Analysis version 03 dated 28.04.2009
  - d. Kolar Investment Analysis version 04 dated 17.06.2009
  - e. Financial Analysis Alternative Scenarios version 01 dated 17.06.2009
  - f. Financial Analysis Alternative Scenarios version 02 dated 04.08.2009
  - g. Investment analysis version 01 dated 11.04.2010 (Final Version)
- /04/ HCA (India) SKG Sangha Ref No 4/9/2009-CCC dated 12.11.2009
- /05/ LoA (UK) CarbonAided Limited Ref No CrbnAid/02/2009 dated 15.12.2009
- /06/ LoA (UK) CH4NGE Limited Ref No CH4NGE/02/2009 dated 15.12.2009
- /07/ Modalities of Communication dated 19.08.2009
- /07.A/ 90\_10 Precision calcs for Kolar version 01 dated 11/04/2011

Category 2 Documents (background documents used to check project assumptions and confirm the validity of information given in the Category 1 documents and in validation interviews):

- /08/ 'Service agreement' dated 19 May 2009 between CH4NGE and CarbonAided
- /09/ 'Agreement for monetizing greenhouse gas emissions savings' dated 08 May 2009 between CH4NGE and S K G Sangha
- /10/ India has ratified the Kyoto protocol on 26<sup>th</sup> August 2002  
<http://maindb.unfccc.int/public/country.pl?country=IN>
- /11/ United Kingdom of Great Britain has ratified the Kyoto protocol on 31<sup>st</sup> May 2002  
<http://maindb.unfccc.int/public/country.pl?country=GB>
- /12/ The proposed CDM project has been web hosted from 16/09/2008 to 15/10/2008.  
<http://cdm.unfccc.int/Projects/Validation/DB/GESN4KXQZPSAIGANRNCR124WUY5RHE/view.html>
- /13/ Self declaration dated 10/06/2009 towards the present technology at project site would not be substituted by any other efficient technologies during crediting period
- /14/ Approved small scale baseline methodologies:  
<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>
- /15/
  - a. Glossary of CDM terms version 5  
[http://cdm.unfccc.int/Reference/Guidclarif/glos\\_CDM.pdf](http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf)
  - b. Definition of start date as per Para 67 of EB 41 report.

- /16/ AMS I.C (version 18 , valid from 01 October 2010 to 16 June 2011 (Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ))
- /17/ AMS I.E (version 03, valid from 01 October 2010 to 28 April 2011 (Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ))
- /18/ AMS III.R (version 01, valid from 19 October 2007 to 03 March 2011 (Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ))
- /19/ Inventorying, Mapping and Monitoring of Bio-resources Using GIS and Remote Sensing [http://www.ces.iisc.ernet.in/energy/paper/Biores\\_using\\_RS\\_GIS/index.htm](http://www.ces.iisc.ernet.in/energy/paper/Biores_using_RS_GIS/index.htm)
- /20/ The average annual temperature in the region is 29.7° C as mentioned in the NRDMS data provided by PP
- /21/ [http://www.cdmgoldstandard.org/fileadmin/editors/files/6\\_GS\\_technical\\_docs/manuals\\_and\\_methodologies/GS\\_Methodology\\_Biodigester.pdf](http://www.cdmgoldstandard.org/fileadmin/editors/files/6_GS_technical_docs/manuals_and_methodologies/GS_Methodology_Biodigester.pdf)
- /22/ "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10)
- /23/ "Non-binding best practice examples to demonstrate additionality" for SSC project activities" stipulated in the Annex 34 of EB 35 report.
- /24/ General guidance to SSC methodologies (EB 59 Annex 9, Version 16)
- /25/ Guidance on the demonstration and assessment of prior consideration of the CDM version 04 (EB 62 Annex 13)
- /26/ Guidelines on the Assessment of Investment Analysis version 05 (EB 62 Annex 05)
- /27/ An article written by Preeti Malhotra entitled 'Environmental implications of the energy ladder in rural India <http://www.hedon.info/EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia>
- /28/ "Evaluation Study On National Project on Biogas Development" (Page 70, Distribution by Income [http://planningcommission.gov.in/reports/peoreport/peoevalu/peo\\_npbdbd.pdf](http://planningcommission.gov.in/reports/peoreport/peoevalu/peo_npbdbd.pdf)
- /29/ The schedule of the notification S.O. 1533 published by the Ministry of Environment and Forests (MoEF), Government of India <http://envfor.nic.in/legis/eia/so1533.pdf>
- /30/ Kumargoud, V, Report on Manure Management Systems by Regional Biogas Development and Training Centre, University of Agricultural Sciences, Bangalore.
- /31/ Ramachandra, T.V. et al, *Bioresource Status in Karnataka*, Renewable and Sustainable Energy Reviews, Volume 8, Issue 1, February 2004, pages 1-47.
- /32/ Ramachandra T.V. and Rao, G.R, Inventorying, Mapping and Monitoring of Bioresources Using GIS and Remote Sensing (Kolar District) (2005). [http://www.ces.iisc.ernet.in/energy/paper/Biores\\_using\\_RS\\_GIS/index.htm](http://www.ces.iisc.ernet.in/energy/paper/Biores_using_RS_GIS/index.htm)
- /33/ Ramachandra, T.V. and Kamakshi, G, *Bioresource Potential of Karnataka: Technical Report No: 109*, Energy and Wetlands Research Group, Indian Institute of Science, Bangalore, 560012 (November 2005).
- /34/ A report titled as "*Biogas Technology*" by Nijaguna, B.T, (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002).
- /35/ D'Sa, A and Narasimha Murthy, K.V, *Report on the use of LPG as a domestic cooking fuel option in India*, International Energy Initiative (2004) <http://www.iei-asia.org/IEIBLR-LPG-IndianhomesReport.pdf>
- Annex 3: A comparison of the annualized costs of cook-stoves (in India))
- /36/ Malhotra, P, *Environmental implications of the energy ladder in rural India*, Boiling Point Issue 42 (1999) <http://www.hedon.info/EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia>
- /37/ Gangopadhyay, S, Ramaswami, B and Wadhwa, W, Reducing subsidies on household fuels in India: how will it affect the poor?, *Energy Policy* 33 (2005). <http://www.idfresearch.org/pdf/fuel%20subsidy.pdf>
- /38/ Thiagu, I et al, *Kerosene and Gas Stoves in Nagercoil, South India*, Boiling Point, Issue 20 (1989) <http://www.hedon.info/BP20:KeroseneAndGasStovesInNagercoil>
- /39/ *Study on biomass management for sustainable soil fertility in Hassan district*, University of Agricultural Sciences Bangalore
- /40/ *Evaluation Study On National Project on Biogas Development*, Programme Evaluation Organization, Planning Commission, Government of India, New Delhi (2002) [http://planningcommission.gov.in/reports/peoreport/peoevalu/peo\\_npbdbd.pdf](http://planningcommission.gov.in/reports/peoreport/peoevalu/peo_npbdbd.pdf)

- /41/ Self declaration dated 10/06/2009 towards non involvement of Public Funding/ ODA in project investment.
- /42/ Circular regarding the quantum of Kerosene given to each family in rural areas and number of LPG connection in town areas of taluks issued jointly by the chief Executive officer, Zilla Panchayat and Deputy Director, Food and Civil supplies Dt. 07 11 2008 bearing Number PDS:KL-3-8:08-09.
- /43/ Circular bearing No. PDS:K.L-4-8:08-09 Dt. 07 11 2008 issued by the Deputy Commissioner regarding the quantum of Kerosene to be issued to each eligible family and the number of LPG connection in urban area.
- /44/ List of beneficiary villages where Kolar Biogas project will be implemented
- /45/ English translation of the CEO, ZP, regarding the kerosene distribution in rural areas.
- /46/ English translation of the circular of the DC, Kolar regarding the Kerosene distribution in urban area.
- /47/ Copies of the survey sheet of Kolar Survey-20 Nos.  
Local Stakeholder Consultation Procedure :
  - 1. Media of communication (Public notice and individual invitation letter) for Local Stakeholder Consultation process.
  - 2. Minutes of Local Stakeholder Consultation Meeting (with attendance sheet).
  - 3. Summary of comments of the Local Stakeholders, towards the project activity.
- /48/ Baseline Survey Report
- /49/ Energy provided by the biodigester vs Current energy used by the households.doc & Energy provided by the bio vs current energy used.xls
- /50/ Calculation of Thermal Equivalent.xls
- /51/ "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 04"
- /52/ Contract signed with DOE dated 08/09/2008
- /53/ Self declaration by PP dated 10/06/2009 that the proposed project activity is not saving the non-renewable biomass accounted for by another registered project activity.
- /54/ Signed agreement between SKG Sangha and CH4NGE Ltd dated 18/12/2008
- /55/ Statewide allotment of biogas units letter
- /56/ Validation & Verification Manual version 1.2 (EB 55 Annex 1)
- /57/ Clarifications on determining the occurrence of de-bundling (EB30, Para 37)
- /58/ Official subsidised LPG cost and bio-digester cost provided by SKG Sangha
- /59/ Purchase order for pipes dated 01/06/2009
- /60/ A letter "to whom it may concern" signed by CH4NGE Ltd.
- /61/ <http://timesofindia.indiatimes.com/Cities/Kolkata /LPG switch catalyst for gas racket /article/show/3730124.cms>
- /62/ Cost brake-up for 2m<sup>3</sup> & 3 m<sup>3</sup> biogas- digester .
- /63/ Detail of Income and Expenditure Account of SKG Sangha for the year 2008-09
- /64/ The Letter Ref. No Gen/JAY/irep/2008-09/3 from the local government (Zila Panchayath , Kolar) dated 29.11.2008 discussing about number of biogas units installed in the project area using government funds under the "rashtriya jaivarila yojane".
- /65/ The letter Ref. No. Gen/JAY/irep/2008-09/2 from the local government (Zila Panchayath , Kolar) dated 29.11.2008 for "no other organisation rather than SKG Sangha has implemented the biogas project".
- /66/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- /67/ Density of kerosene : Source : [http://www.simetric.co.uk/si\\_liquids.htm](http://www.simetric.co.uk/si_liquids.htm)
- /68/ Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office
- /69/ Annex 13 of EB 50 report: 'Guidelines for Objective Demonstration and Assessment of Barriers  
[http://cdm.unfccc.int/EB/050/eb50\\_repan13.pdf](http://cdm.unfccc.int/EB/050/eb50_repan13.pdf)
- /70/ Quotation from "suppliers of building material about the cost" and "Deenbadu Manual by Anil Dhussa and others" for the quantity.
- /71/ Certificate of incorporation for SKG Sangha, Registration number 768/92-93 dated 25/10/2006

issued by Karnataka Societies Registration Act 1960.

/72/ Authenticity of LoA from Indian DNA has been cross checked with the online document available on CDM India website: <http://cdmindia.nic.in/cdmindia/projectList.jsp?search=search>

/73/ Authenticities of two LoAs have been cross checked with the online document available on Department of Energy & Climate Change website: List of projects with UK approval of participation.  
[http://www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tackling%20climate%20change/intl\\_strategy/mechanisms/clean\\_dev/1\\_20100527094605\\_e\\_@@\\_cdmukapprovedprojects.pdf](http://www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tackling%20climate%20change/intl_strategy/mechanisms/clean_dev/1_20100527094605_e_@@_cdmukapprovedprojects.pdf)

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## A.1 Annex 1: Local Assessment

This checklist is designed to provide confirmation of in-country data and information provided in the Project Design Document for **Kolar Biogas Project**.

It serves as a “**reality check**” on the project that is completed by a local assessor from SGS India

| Issue   | Findings  | Source/Mean of Verification  | Further Action / Clarification / Information Required?           |
|---|---|------------------------------|--|
| The appropriate Modalities of Communication for the project activity have to be submitted by the Project participant before submitting a request for registration.                              | CAR#2 was raised<br>MoC dated 19/08/2009 was checked and found consistence with CDM requirement stipulated under EB 45 annex 60.<br>CAR#2 was closed  | MoC dated 19/08/2009         | CAR#2 was raised<br>CAR#2 was closed<br>Appropriate and accepted |
| The appropriate project ownership and requisite approval/ license required for establishment of the project activity at the mentioned geographical location needs to be checked.                | The project participants have the ownership and requisite approval as the project activity is well within the premises of the project boundary indicated and same verified during onsite visit. | Site Visit                   | Appropriate and accepted   |
| The Purchase Orders along with technical specification of the respective project equipments installed/ to be procured for this proposed project activity needs to be checked during site visit. | Purchase order for project activity has been checked  | Purchase order               | Appropriate and accepted   |
| Proper documentation for the technology will not be changed during the project period needs to be checked during site visit.  | Undertaking dated 10/06/2009 for no change in technology submitted  | Undertaking dated 10/06/2009 | Appropriate and accepted   |
| Detail documentary description and record of initial extensive training programmer conducted for the project participant needs to be checked during site visit.                                 | Record of initial extensive training programmer conducted for the project participant was discussed during site visit; same was found appropriate and accepted.                                 | Site Visit                   | Appropriate and accepted   |

| Issue   | Findings  | Source/Mean of Verification                               | Further Action / Clarification / Information Required?                                   |
|---|---|---|--|
| Implementation schedule for project activity and the related risk due to delay in project implementation with respect to the selected crediting period needs to be checked during site visit. | CAR#9 (Point 05) was raised.<br><br>Implementation schedule for project activity provided by project participant has been checked and found satisfactory and also related risk due to delay in project implementation with respect to the selected crediting period has been discussed with project participant and found appropriate and accepted.<br><br>CAR#9 (Point 05) was closed. | Implementation schedule for project activity & Site Visit | CAR#9 (Point 05) was raised.<br><br>CAR#9 (Point 05) was closed.Appropriate and accepted |
| Actual situation or planning for the project activity needs to be cross checked.<br><br>Project's spatial boundaries and the system boundaries needs to be cross checked.                     | Project activity yet not commissioned, this was checked and also planning for project activity was discussed with project participant and found satisfactory and accepted. Project's spatial boundaries and the system boundaries was checked during site visit and found appropriate and accepted.   | Site Visit  | Appropriate and accepted   |
| The information on public funding involvement for the project activity financing needs to be checked during the site visit and PP should provide proper substantiation for the same.          | Project participant has provided the self declaration dated 10/06/2009 towards non involvement of Public Funding/ ODA in project investment. Same was checked and found appropriate and accepted  | Declaration dated 10/06/2009                              | Appropriate and accepted   |

| Issue  | Findings   | Source/Mean of Verification                      | Further Action / Clarification / Information Required?               |
|--|--|--|--|
| Whether the project activity is a de-bundled component of a larger project activity needs to be verified during the validation site visit.                                 | CL#5 was raised<br><br>Proposed project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB 30, Para 37); this was accepted with the written declaration dated 10 June 2009 submitted by proponent towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling".<br><br>CL#5 was closed | Site Visit & declaration letter dated 10/06/2009 | CL#5 was raised<br><br>CL#5 was closed<br>Appropriate and accepted   |
| The baseline survey procedure, documentation related to same and the data used for the project activity calculation needs to be checked during site visit.                 | The baseline survey report & procedure, documentation related to same and the data used for the project activity calculation was checked during site visit and found appropriate and acceptable.   | Baseline survey report & related documents.      | Appropriate and accepted   |
| Emission reduction calculation worksheet, application of equations, data used and appropriateness of emission reduction calculation needs to be checked during site visit. | CAR#9 was raised<br><br>Project participant has provided the ER spread sheet, application of equations, data used and appropriateness of emission reduction calculation was checked and found appropriate and accepted.<br><br>CAR#9 was closed  | Emission reduction spread sheet                  | CAR#9 was raised<br><br>CAR#9 was closed<br>Appropriate and accepted |

| Issue  | Findings   | Source/Mean of Verification  | Further Action / Clarification / Information Required?                     |
|--|--|--|--|
| The environmental impact of the project activity and the compliance with Host Country environmental legislative requirements needs to be checked during site visit.                                  | The project complies with environmental regulations in India.  | The schedule of the notification S.O. 1533 published by the Ministry of Environment and Forests (MoEF), Government of India. | Appropriate and accepted   |
| The modalities followed for Local Stakeholder Consultation procedure needs to be checked.  | CAR#17 was raised<br><br>The stakeholder consultation meeting was held on 18 the December, 2008 in the rotary club hall, Kolar. This was checked with the copy of invitation letter, photograph of stakeholder meeting and conducting on-site interview with some of stakeholder which was attended this meeting. The attendance sheet was checked and feedback forms also checked and found satisfactory and acceptable.<br><br>CAR#17 was closed | Copy of invitation letter, photograph of stakeholder meeting and conducting on-site interview.                               | CAR#17 was raised<br><br>CAR#17 was closed<br><br>Appropriate and accepted |
| Identified local stakeholders needs to be interviewed during the site visit.<br><br>The local stakeholders' feedback regarding the project activity needs to be cross checked during the site visit. | During the site visit the validation team interviewed some of the stakeholders. Based on their replies, the validation team was convinced that the process of stakeholder consultation was carried out as described in the PDD. The stakeholders also confirmed that they were invited for the meeting through individual invitation letters.  | Interview during site visit  | Appropriate and accepted   |

## A.2 Annex 2: Validation Checklist

**Table 1 Participation Requirements for Clean Development Mechanism (CDM) Project Activities (Ref PDD, Letters of Approval and UNFCCC website)**

| Requirement   | Reference  | Comments  | Conclusion/C ARs/ CLs |
|---|--|---|-----------------------|
| <p>1. All Parties involved have approved the project activity</p> <p>10.1 Has the DNA of each Party involved in the proposed CDM project activity in section A.3 of the PDD provided a written letter of approval which confirms</p> <p>10.1.1 The country is a Party to the Kyoto Protocol</p> <p>10.1.2 Participation is Voluntary</p> <p>10.1.3 The Host Party confirming that the proposed CDM project activity contributes to sustainable development of the country</p> <p>Non-Annex 1 Party shall submit a letter of approval</p> <p>10.1.4 It refers to the precise proposed CDM project activity title in the PDD being submitted for registration</p> | <p>Annex 3, Clean Development Mechanism, Validation and Verification Manual, Version 01.1 (from this point forwarded referenced as VVM) - 49a-d /54a-b/125</p> <p>Paragraph 37 CDM Modalities and procedures</p> | <p>Project is bilateral involving United Kingdom of Great Britain as the Annex I investor country which have ratified the protocol on 31 May 2002 and India as non-Annex I host country, which has ratified the Kyoto protocol on 26<sup>th</sup> August 2002 and is allowed to participate.</p> <p>United Kingdom of Great Britain:<br/><a href="http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php">http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php</a></p> <p><a href="http://maindb.unfccc.int/public/country.pl?country=GB">http://maindb.unfccc.int/public/country.pl?country=GB</a></p> <p>India:<br/><a href="http://unfccc.int/parties_and_observers/parties/items/2109.php">http://unfccc.int/parties_and_observers/parties/items/2109.php</a><br/><a href="http://maindb.unfccc.int/public/country.pl?country=GB">http://maindb.unfccc.int/public/country.pl?country=GB</a></p> | Y                     |

| Requirement  | Reference       | Comments   | Conclusion/C ARs/ CLs   |
|--|-----------------|--|---|
|  |                 | <u>y=IN</u>  |   |
| 1.1. If the project participant(s) listed in the PDD published at international stakeholder <sup>1</sup> consultation are not included in the PDD submitted with request for registration, a letter should be obtained from the withdrawn project participant(s) confirming its voluntary withdrawal from the proposed project activity. | EB 30 Para. 41. | Not applicable as all the participants listed in the PDD published at international stakeholder consultation are included in the PDD.  | Y   |
| 1.2. The letter/s of approval are unconditional with respect to 10.1.1 to 10.1.4 above   | VVM Para. 49/54 | <p>Letter of approvals from Investor Country (UK) and Host Country (India) Designated National Authority (DNA) to be submitted by the project participants.</p> <p>Thus the CAR#1 was raised, In response , PP has submitted a copy of the same and each Letter of Approval is unconditional with respect to (a) to (d) mentioned above. It is confirmed that therefore <b>CAR #1 was closed out.</b></p> <p>Please clarify the roles and responsibility of CH4NGE Ltd. in current project activity. In the scope of project participant, appropriate Letter of Approval from Annex I country needs to be submitted against the participation of CH4NGE Ltd. Thus, CL#18 was raised. In response project participant has provided the requested information and also submitted two Letter of Approval from UK DNA , validation team has verified these letters and confirmed that UK</p> | <p>CAR#1 was raised</p> <p><b>CAR #1 was closed</b></p> <p>CL#18 was raised</p> <p>CL#18 was closed</p> <p><b>Y</b></p> |

<sup>1</sup> Stakeholders mean the public, including individuals, groups or communities affected, or likely to be affected, by the proposed CDM project activity or actions leading to the implementation of such an

| Requirement  | Reference   | Comments  | Conclusion/C ARs/ CLs |
|--|---|---|-----------------------|
|  |   | DNA have approved the participation of CarbonAided Limited and CH4NGE Limited, hence <b>CL#18 was closed.</b>   |                       |
| 2. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for a minimum of 30 days, and the project design document and comments have been made publicly available | VVM Para. 128<br><br>Marrakech Accords, CDM Modalities, §40                     | The project has listed on UNFCCC website as a procedure towards Global Stakeholder Consultation Process.<br>Website:<br><br><a href="http://cdm.unfccc.int/Projects/Validation/DB/GESN4KXQZPSAIGANRNCR124WUY5RHE/view.html">http://cdm.unfccc.int/Projects/Validation/DB/GESN4KXQZPSAIGANRNCR124WUY5RHE/view.html</a><br><br>Starting date and closing date:<br>16/09/2008 to 15/10/2008.<br>Number of comments received: Nil | Y                     |
| 3. The project design document is in accordance with the applicable CDM requirements for completing PDDs.  | VVM Para. 57<br><br>Marrakech Accords, CDM Modalities, Appendix B, EB Decisions | The project has used version 3 of CDM-SSC-PDD format correctly.   | Y                     |

| Requirement   | Reference               | Comments  | Conclusion/CARs/CLs  |
|---|-------------------------|---|--|
| 4. The project participants shall submit a letter on the modalities of communication (MoC) before submitting a request for registration | EB-09<br>F_CDM_REG form | <b>CAR#2 was raised</b> to ask the project participant to submit the Modalities of Communication in accordance with EB 45 annex 60. Project participant has submitted the Modalities of Communication dated 19/08/2009. Validation team has confirmed that the MOC letter dated 19/08/2009 <sup>/07/</sup> was duly verified against the project title and information mentioned in Annex 1 and found to be consistent with the requirement stipulated under EB 45 annex 60. Hence <b>CAR#2 was closed.</b> | <b>CAR#2 was raised</b><br><b>CAR#2 was closed</b><br><b>Y</b> |

| Checklist Question   | Ref. ID  | MoV* | Comments   | Conclusion/<br>CARs/CLs |
|--|--|------|--|-------------------------|
| <b>A. General Description of Project Activity</b>  |  |      |  |                         |
| <b>A.1. Project Title</b>  |  |      |  |                         |
| 3.2.1 Does the used project title clearly enable the reader to identify the unique CDM activity?   | VVM Para.56<br>Guidelines for completing a CDM-PDD (PDD) section A.1 | DR   | The project title “Kolar Biogas Project” used in the PDD version 11 (Section A.1) is clearly enabling to identify the unique CDM project activity.   | Y                       |
| 3.2.2 Is there an indication of a revision number and the date of the revision?  | VVM Para.56<br>PDD section A.1                                       | DR   | The Final PDD indicates the version number “11” and dated 11/04/2011 under section A.1.  | Y                       |
| <b>A.2. Description of the Project Activity</b>  |  |      |  |                         |
| 3.2.3 Does the description of the proposed CDM project activity as contained in the PDD sufficiently cover all relevant elements accurately? | VVM Para.59<br>PDD section A.2<br>see also A.4, A.4.3 and B.3        | DR   | The proposed project activity is community based project activity which will provide biogas units to households in rural areas of Kolar District in Karnataka State in India. The project covers 10,000 households in five Taluks in Kolar District Karnataka State in India namely Srinivasapur, Kolar, Mulbagal, Malur and Bangarapet. The biogas unit will be of either 2m <sup>3</sup> or 3m <sup>3</sup> capacity depending on the number and type of cattle owned by the household and the number of people in the household. The project activity will reduce the amount of fuel wood and kerosene used for cooking and heating water and will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project activity will also reduce methane emissions from cattle manure and will contribute to the sustainable development of the rural households involved in this project activity. The project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.<br><br>The project is likely to take care of the sustainable development issues. | Y                       |
| A.2.1. Does the information provide the reader with a clear understanding  | VVM Para.60<br>PDD section A.2                                       | DR   | Descriptions and information provided in the final PDD version 11 dated 11/04/2011 is consistence and transparent towards the proposed project activity.   | Y                       |

| Checklist Question  | Ref. ID   | MoV*    | Comments  | Conclusion/<br>CARs/CLs |
|---|---|---------|---|-------------------------|
| of the proposed CDM activity?   | see also A.4, A.4.3 and B.3                                   |         |   |                         |
| A.2.2. Is all information provided consistent and in compliance with the actual situation or planning?  | VVM Para.64<br>PDD section A.2<br>see also A.4, A.4.2 and B.3 | DR & SV | The actual situation of the project activity has checked during site visit and found consistence with planning and accepted.  | Y                       |
| A.2.3. Is all information provided consistent with details provided in further chapters of the PDD?   | VVM Para.64<br>PDD section A.2                                | DR      | All information towards description of project activity, provided consistent with details provided in further chapters of the final version of the PDD.   | Y                       |
| <b>A.3. Project Participants</b>  |   |         |   |                         |
| A.3.1. Is the table required for the indication of project participants correctly applied?  | VVM Para. 51<br>PDD section A.3                               | DR      | The table A.3 mentioned in the final PDD is correctly applied.  | Y                       |
| A.3.2. Is all information provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?   | VVM Para. 51<br>PDD section A.3                               | DR      | The contact details of project participants mention in Annex 01 of the final PDD version 08 (including PDD version 11 dated 11/04/2011 <sup>/1.k/</sup> ).<br>The name of project participant mention in the table A.3 is match with name Annex 01.   | Y                       |
| <b>A.4. Technical Description of the Project Activity</b>   |   |         |   |                         |
| A.4.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)?<br>Are the latitude and longitude of the site | VVM Para.64<br>PDD section A.4                                | DR      | <b>CAR#3 was raised</b> requesting the project participant to provide appropriate coordinates of the proposed project activity location as per the guidance stipulated under EB 34 Annex 09. In the response of that project participant has provided the revised PDD. Validation team has confirmed that the final PDD version 07 dated 11/04/2010 (including PDD version 11 dated 11/04/2011 <sup>/1.k/</sup> ) is in compliance with the guidelines for completing the simplified project design document (CDM-SSC-PDD) Version 05 (EB 34 Annex 09). Hence <b>CAR#3 was closed</b> . | Y                       |

| Checklist Question  | Ref. ID  | MoV*  | Comments  | Conclusion/<br>CARs/CLs  |
|---|--|-------|---|--|
| indicated (decimal points)  |  |       |   |  |
| A.4.2. Does the proposed CDM project activity involve the alteration of existing installations or process?                                      | VVM Para.64<br>PDD section A.4                   | DR    | Not applicable, as proposed project activity is green field project activity.   | Y  |
| A.4.3. Do the project participants possess ownership or licenses which will allow the implementation of the project at that site / those sites? | VVM Para.64<br>PDD section A.4                   | SV/DR | The project participants have the ownership and requisite approval as the project activity is well within the premises of the project boundary indicated and same verified during onsite visit.   | Y  |
| A.4.4. Is the category(ies) of the project activity correctly identified?   | VVM Para.64<br>PDD section A.4                   | DR    | The project correctly applies the category of the project activity as Scope 1 – Energy Industries (renewable / Non Renewable), and Scope 15 – Agriculture.  | Y  |
| A.4.5. Is all information provided in compliance with actual situation or planning as available by the project participants?                    | VVM Para.64<br>PDD section A.4<br>EB 52 Para. 13 | DR    | <p>The information provided by project participant in the final PDD is in compliance with actual situation and planning, project activity yet not commissioned. Project participant has also provided the schedule d for biogas installation; this was checked and found satisfactory and acceptable.</p> <p>CAR#9 (Point 05) was raised. Implementation schedule for project activity provided by project participant has been checked and found satisfactory and also related risk due to delay in project implementation with respect to the selected crediting period has been discussed with project participant and found appropriate and accepted.</p> <p>CAR#9 (Point 05) was closed.</p> | <p>CAR#9 (Point 05) was raised.</p> <p>CAR#9 (Point 05) was closed.</p> <p>Y</p> |
| 3.2.4 Is the table required for the indication of projected emission reductions correctly applied?  | VVM Para.64<br>PDD section A.4                   | DR    | <p>The table under Section A.4.3 of the final PDD required for indication of the projected emission reductions has been correctly applied.</p> <p><b>CL#4 (point 01) was as</b> estimated annual average amount of emission reductions for the year 2011 to year 2018 in section A 4.3 of PDD Version 01 is exceeding the threshold limit of 60ktCO<sub>2</sub> per annum for Type-III small scale project activity; hence the validation team has requested to project participant to clarifying the same. In the</p>  | <p>CL#4 (point 01) was raised</p> <p>CL#4 (Point 01) was closed</p> <p>Y</p>     |

| Checklist Question   | Ref. ID                         | MoV*       | Comments   | Conclusion/<br>CARs/CLs   |
|--|---------------------------------|------------|--|---|
|  |                                 |            | response project proponent has clarified that estimated average amount of emission reductions in the revised PDD version 03 is decreased from the value mentioned in PDD version 01 and with in the threshold limit of 60ktCO <sub>2</sub> per annum. Furthermore, project participant has justified that the reduction in PDD version 03, in comparison with the webhosted PDD version 01, reflects the application of the 95% confidence level to the emission reduction calculations. Validation team has examined the section A.4.3 of the PDD version 03 dated 28/04/2009 that has mentioned the aggregated annual estimated emission reductions due to project activity which is less then threshold limit of 60ktCO <sub>2e</sub> and is in compliance with the Para 5 of AMS III R version 01. This was verified from estimated emission reduction calculation spread sheet version 03 dated 23/04/2009 ( including ER spread sheet <sup>/2.d/</sup> ) provided by project participant. Validation team has confirmed that project participant has correctly applied 95% confidence level for adjustment of input baseline survey values used in the estimation of emission reduction. Hence, the validation team has satisfactorily <b>closed CL#4 (point 01)</b> |   |
| <b>A.5. Debundling</b>   |                                 |            |  |   |
| A.5.1. Is the small-scale project activity a debundled component of a large scale project activity | VVM Para. 134c<br>EB47 Annex 32 | DR &<br>SV | <p><b>CL#05 was raised</b> to justify the non debundled status of the Kolar Biogas project activity, as another similar project activity (Hassan Biogas project) situated at similar region with the same project participants, in the same project category and technology/measure is currently undergoing CDM validation.</p> <p>In response, project participant has justified that the similar project activity (Hassan Biogas project) is more than 100km away from the location of the Kolar Biogas project activity as shown in section A.4.5, pages 10-11 of PDD version 03. Thus both the project's boundaries do not come within 1 km radius of each others.</p> <p>Validation team has confirmed that the proposed project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB 30, Para 37); this was accepted with the written declaration dated 10 June 2009 submitted by proponent towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling". Hence, <b>CL#5 was closed.</b></p>   | <p><b>CL#05 was raised</b><br/><b>CL#5 was closed</b><br/>Y</p> |

| Checklist Question  | Ref. ID           | MoV*    | Comments  | Conclusion/<br>CARs/CLs     |
|---|-------------------|---------|---|-----------------------------|
| A.5.2. If the project is a debundled component of a larger project, does the larger project fall within the limits for small-scale CDM project activities | VVM Para. 134c    | DR & SV | Not applicable as proposed project activity is not debundled component of a larger project.<br>Pending CL#5 is closed   | Pending CL#5 is closed<br>Y |
| <b>A.6. Public Funding</b>  |                   |         |   |                             |
| A.6.1. Does the information on public funding provided conform to the actual situation or planning as presented by the project participants?              | PDD section A.4.4 | DR & SV | The PDD mentions that no ODA was used for the project activity. Project participant has provided the self declaration dated 10/06/2009 towards non involvement of Public Funding/ ODA in project investment. This also was cross-checked with 'Service agreement' dated 19 May 2009 between CH4NGE and CarbonAided and Agreement for monetizing greenhouse gas emissions savings' dated 08 May 2009 between CH4NGE and S K G Sangha . Therefore it was confirmed that no public funding involve in the proposed project activity. | Y                           |
| A.6.2. Is all information provided consistent with details provided by further chapters of the PDD (in particular annex 2)?                               | PDD section A.4.4 | DR & SV | All information regarding Public Funding provided under PDD is consistent with details provided by further chapters of the PDD. Annex 2 of PDD says that no public funding has been used in the project activity. PP has submitted a declaration for no ODA diversion for the project activity. The same was checked during the site visit.   | Y                           |
| A.6.3. In case of public funding from Annex I Parties is it confirmed that such funding does not result in a diversion of official development assistance | PDD section A.4.4 | DR & SV | There is no public funding used in the project activity. PP has submitted a declaration for no ODA diversion for the project activity. This was checked during the site visit.  | Y                           |

| Checklist Question   | Ref. ID                                | MoV*    | Comments   | Conclusion/<br>CARs/CLs       |
|--|--|---------|--|-------------------------------|
| <b>B. Baseline and Monitoring Methodology</b>  |  |         |  |                               |
| <b>B.1. Choice and Applicability</b>   |  |         |  |                               |
| 3.2.5 Is the baseline methodology previously approved by the CDM Methodology Panel?  | VVM Para.68<br>PDD section B.1         | DR      | The final PDD under the section B.1 refers to the Approved small scale methodologies <ul style="list-style-type: none"> <li>AMS-I.C, version 18 (valid from 01 October 2010 to 16 June 2011 (Requests for registration can be submitted until 17 February 2012 23:59:59 GMT ))</li> <li>AMS-I.E, version 03 (Valid from 01 October 2010 to 28 April 2011 (Requests for registration can be submitted until 29 December 2011 23:59:59 GMT ))</li> <li>AMS-III.R, version 01.( Valid from 19 Oct 07 to 03 March 2011 (Requests for registration can be submitted until 04 November 2011 23:59:59 GMT ))</li> </ul> | Y                             |
| B.1.1. Has the methodology (incl. the tools) been altered from the original version as referenced in the PDD?  | VVM Para.69<br>PDD section B (B.1-B.2) | DR      | The PDD available on the UNFCCC website refers Approved small scale methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01. Approved methodologies are correctly quoted.   | Y                             |
| B.1.2. Does the project activity qualify as small scale project?   | VVM Para. 134a                         | DR & SV | The project activity meets all the applicability conditions as specified in the small scale methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01. It is further clarified that the project activity will remain under the limits small-scale Project activity types during each year of the crediting period.<br><br>Pending CL#4 was closed.  | Pending CL#4 was closed.<br>Y |
| B.1.3. Is the category(ies) of the project activity correctly identified in accordance with Appendix B to the simplified modalities and procedures for |  | DR      | The project activity meets the eligibility criteria as stipulated in paragraph 04 of AMS-I.C Version 18 & paragraph 05 of AMS-III.R Version 01. Also, the project activity conforms to type-I and type-III and category C, category E & category R as per appendix B of the simplified modalities & procedures (Decision 4/CMP.1, annex II).   | Y                             |

| Checklist Question  | Ref. ID  | MoV*    | Comments  | Conclusion/<br>CARs/CLs |
|---|--|---------|---|-------------------------|
| small-scale CDM project activities?   |  |         |   |                         |
| B.1.4. Is the selected simplified methodology applicable to the project activity in the PDD?  | VVM Para.75/66a/68/73<br>PDD section B (B.1-B.2) | DR      | Final PDD, section B.2. Justifies the applicability of the simplified methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01.                       | Y                       |
| B.1.5. Does the project activity conform to one of the approved small-scale categories?   | VVM Para. 134b                                   | DR      | Project activity conforms to the approved small-scale methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01.                                       | Y                       |
| B.1.6. Is the project activity a bundle of several small scale activities and if so does it contain any sub-bundles?  |  | DR & SV | As per the PDD, the project activity is an independent project and not a bundle of several small scale project activities. This was further verified during the site visit. | Y                       |
| B.1.7. If the project activity is a bundle of several small scale activities, does the sum of the total bundle (including any subbundles) fall within the limits for small scale projects |  | DR & SV | Not applicable as the project is not a bundle of several small scale activities. This was verified during the site visit.   | Y                       |

| Checklist Question   | Ref. ID   | MoV*    | Comments  | Conclusion/<br>CARs/CLs |
|--|---|---------|---|-------------------------|
| B.1.8. If the project activity is a bundle of several small scale activities, has the form with information related to the bundle been submitted and is it correctly used  |   | DR & SV | Not applicable as the project is not a bundle of several small scale activities. This was verified during the site visit.   | Y                       |
| B.1.9. Is the discussion in the PDD in conformance with all applicability criteria of the applied methodology?   | VVM<br>Para.75/66b/68<br>PDD section B<br>(B.1-B.2) | DR & SV | Section B.2 of the final PDD mentions the applicability of the applied methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01 to the proposed CDM project activity. The same was checked during the site visit. | Y                       |
| <b>B.2. Project Boundary</b>   |   |         |   |                         |
| B.2.1. Are all emission sources and gases related to the baseline scenario, project scenario and leakage clearly identified and described in a complete and transparent manner? Is there information on GHG emissions in proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which are expected to contribute more than 1% of the overall expected average | VVM Para.79/76<br>/67a<br>PDD section B.3           | DR & SV | Delineation of the project boundary in the PDD is correct and meets the requirements of the selected baseline methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01. This was verified during the site visit.  | Y                       |

| Checklist Question  | Ref. ID   | MoV*    | Comments   | Conclusion/<br>CARs/CLs |
|---|---|---------|--|-------------------------|
| annual emissions reductions, which are not addressed by the applied methodology.  |   |         |  |                         |
| B.2.2. In case of grid connected electricity projects: Is the relevant grid correctly identified in accordance with the tool to calculate emission factor of electricity system (wherever applicable) and the underlying methodology? | VVM Para.79<br>PDD section B.3                              | DR & SV | Not applicable   | Y                       |
| B.2.3. Does the project boundary include the physical delineation of the proposed CDM project activity?   | VVM Para.78/79<br>PDD section B.3<br>also see section A.4.2 | DR      | Delineation of the project boundary in the PDD is correct and meets the requirements of the selected baseline methodology  | Y                       |
| B.2.4. Are the project's geographical boundaries and the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?   | VVM Para.76/79<br>PDD section B.3<br>also see section A.4.2 | DR & SV | The project boundary has been described clearly as per the selected methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01. This was verified during the site visit. | Y                       |
| <b>B.3. Identification of the Baseline Scenario</b>   |   |         |  |                         |

|   |  |           |   |  |
|---|--|-----------|---|--|
| <p>B.3.1. Does the PDD discuss the identification of the most likely baseline scenario? Does the PDD follow the steps to determine the baseline scenario required by the methodology and is the application of the methodology and the discussion and determination of the chosen baseline transparent?</p> | <p>VVM<br/>Para.67b.80/82/86<br/>PDD Section<br/>B.4/B.5</p> | <p>DR</p> | <p><b>CL#6 (Point 01)</b> was raised to justify the appropriateness of the baseline study which was conducted outside of the current project boundary. It was also requested to substantiate with objective evidences how the baseline survey conducted at Hassan Taluk of Hassan District should be considered as the most appropriate for Kolar Biogas project occurring at Kolar district.</p> <p>In response project participant has informed that they conducted the survey in Kolar District during the December 2008, to identified baseline for proposed project activity in the Kolar district. The total 361 households were surveyed: 75 in Bangarapet Taluk, 69 in Kolar Taluk, 69 in Malur Taluk, 68 in Mulbagal Taluk and 80 in Srinivasapur Taluk. Project participant has provided the survey sheets were completed for every household surveyed. The weighted averages (according to different Taluks) for parameters were calculated using survey data and were used to determine emission reductions. Project participant has also provided the summary survey results in Annex 3 of revised PDD version 03 (including PDD version 11 dated 11/04/2011<sup>1.k/</sup>). Project participant has used all quantitative data attained from the survey results in the calculation of emission reduction. This was verified with the survey sheets provided by project participant and found satisfactory and accepted, hence <b>CL#6 (Point 01) was closed.</b></p> <p><b>CL#6 (Point 02)</b> was raised for the baseline survey results related to average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area needs to be substantiated through survey documents/reports. In response project participant provided the survey result conducted in Kolar district during December 2008 and validation team has examined the value of average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area which are found consistence with survey results. Furthermore, the value of baseline parameter for kerosene consumption used in PDD is 24.12 l/year; where as the surveyed value saying the same as 2.00 l/month i.e. 24 l/year, therefore validation team has requested project participant to clarify the same. Project participant has clarified that the value for F<sub>kerosene</sub> is 24.12 litres which is the average value surveyed for kerosene consumption. For cooking purpose consumption of kerosene is 1.6911 l/month and for starting fire in traditional stove is 0.3154 l/month, this leads to a total kerosene consumption of 2.0065 l/month. Same was crossed - checked with submitted survey data and found to be correct. Hence <b>CL#6 (Point 02) was closed.</b></p> <p>PP has substantiated all the alternatives with proper supporting documents.</p> | <p><b>CL#6 (Point 01 &amp; 02) was rased.</b><br/><b>CL#6 (Point 01 &amp; 02) was closed.</b></p> <p>Y</p> |
| <p>B.3.2. Are all tools/procedures in the methodology</p>   | <p>VVM<br/>Para.81/82/86a-</p>                               | <p>DR</p> | <p>Pending Closure of CL#6.<br/>Final PDD has described transparently all the baseline scenario applicable for</p>  | <p>CL#6 was closed</p>   |

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|        | correctly applied to identify the most reasonable baseline scenario? This includes all potential realistic and credible baseline scenarios in the discussion taking into account relevant national and/or sectoral policies, macro-economic trends and political aspirations? | d/83/84<br>PDD Section B.4/B.5           |    | proposed activity.   | Y                    |
| B.3.3. | Is the choice of the baseline compatible with the available data?   | VVM Para.86b-c/95<br>PDD Section B.4/B.5 | DR | Pending Closure of CL #6<br>The conservative approach towards selection of most appropriate baseline scenario is satisfactory and is compatible with available data.   | CL#6 was closed<br>Y |
| B.3.4. | Is conservativeness addressed in the way of identifying the baseline?   | VVM Para.90<br>PDD Section B.4/B.5       | DR | Pending Closure of CL #6<br>The baseline has been identified for proposed project activity as per the methodologies AMS I C version 18, AMS I E version 03, and AMS III R version 01 and mentioned clearly in the final PDD. | CL#6 was closed<br>Y |
| B.3.5. | Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?  | VVM Para.90/91<br>PDD Section B.4/B.5    | DR | Pending Closure of CL #6<br>The selected baseline represents the most likely scenario among the other possible identified scenarios.   | CL#6 was closed<br>Y |
| B.3.6. | Is there a verifiable description of the baseline scenario? Does this include a description of the technology that would be employed and/or the activities that would take place in the absence of the  | VVM Para.86e/85<br>PDD Section B.4/B.5   | DR | Pending Closure of CL #6   | CL#6 was closed<br>Y |

proposed CDM project activity?

#### B.4. Additionality

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| B.4.1. Does the PDD clearly demonstrate the additionality using the approach as specified in the methodology and by following all the required steps?   | VVM Para.67d/95<br>PDD Section B.1/B.4/B.5 | DR      | Pending closure of CAR#7 & CAR#8<br><br>The Project Activity is applying AMS I C version 18, AMS I E version 03, and AMS III R version 01, version 03. PP has used <i>"Tool for the demonstration and assessment of additionality"</i> Version 05.2 (EB39 Annex 10). In step 3; project participant has also referred to specific guidance for establishing the additionality of small scale CDM (SSC) projects <i>"Non-binding best practice examples to demonstrate additionality" for SSC project activities</i> stipulated in the Annex 34 of EB 35 report. This is in accordance with general guidance to SSC methodologies (EB 59 Annex 9, Version 16). | CAR#7 & CAR#8 was closed<br>Y |
| B.4.2. In case of using the additionality tool:<br>Is the 'Additionality Tool' used in the PDD latest version? If an earlier version has been used, do the changes impact the discussion in the PDD?<br>Are all steps followed in a transparent manner? | PDD Section B.1/B.4/B.5                    | DR      | Pending closure of CAR#7 & CAR#8<br>PP has used latest version 05.2 of <i>"Tool for the demonstration and assessment of additionality"</i> and latest specific guidance for establishing the additionality of small scale CDM (SSC) projects <i>"Non-binding best practice examples to demonstrate additionality" for SSC project activities</i> stipulated in the Annex 34 of EB 35 report. This is in accordance with general guidance to SSC methodologies (EB 59 Annex 9, Version 16).  | CAR#7 & CAR#8 was closed<br>Y |
| B.4.3. Has all information been backed up with references, sources and certification? Is the data presented credible and reliable with complete transparency to all available data and documentation?   | VVM Para.93/91<br>PDD Section B            | DR & SV | This needs to be discussed during the site visit. Responses to CAR#7 & CAR#8 was provided & accepted.   | CAR#7 & CAR#8 was closed<br>Y |
| B.4.4. Is the discussion on additionality and the evidence provided consistent with the   | VVM Para.102b<br>PDD Section B.5           | DR      | 1. The CDM project start date as described in the Section C.1.1 of PDD, v01 is not representing the complete transparency, as it as an assumed timeline. The specific start date of the proposed CDM project activity needs to be further substantiated in accordance with the definition of "Starting date of a CDM project activity" EB   | CAR#7 was raised<br><br>CAR#7 |

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| <p>starting date of the project?<br/>If the project activity start date is prior to the validation is it discussed how the CDM was taken into account in the decision to go ahead with the project activity</p>                                  |  |           | <p>41Meeting Report para 67.</p> <p>2. The project activity would have not occurred due to the described project barriers and how the CDM revenue has been seriously considered by the PP to revive the project acceptability needs to be explained further along with the requirement of EB 41 Annex 46 Guideline.</p> <p>Thus CAR#7 was raised. Responses to CAR#7 was provided &amp; accepted , hence CAR#7 was closed.</p> <p>The start date of the proposed CDM project activity has been mentioned in the PDD as 18/12/2008. This is the date of the signed agreement between SKG Sangha and CH4NGE Ltd. The start date was found to be in line with the definition of start date mentioned in the Glossary of CDM terms version 5 and paragraph 67 of EB 41.</p> <p>The first version of the PDD (PDD V01) was published for global stakeholder consultation at the commencement of the validation of the PDD on 16 September 2008, i.e. before the start of the project activity, and hence it is a new project activity and in line with the requirement of guideline stipulate under Para 02 of EB 49 Annex 22 entitled "Guidance on the demonstration and assessment of prior consideration of the CDM"(now EB62 Annex 13).</p>   | <p>was closed</p> <p>Y</p>                              |
| <p>B.4.5. If an investment analysis has been used, has it been demonstrated that the proposed project activity is economically or financially less attractive than at least one other alternative without the revenue from the sale of CERs?</p> | <p>VVM Para. 106, 107, 108, 109 112a-c<br/>PDD Section B.5</p> | <p>DR</p> | <p>Project participant has uses the Step 2 (Investment analysis) of additionality tool (EB39 Annex 10) to demonstrate that the proposed CDM project activity is more costly than at least one alternative.</p> <ol style="list-style-type: none"> <li>1. Project additionality has not been described as per the requirements of EB35_repan34, Non-binding best practice examples to demonstrate additionality for SSC project activities.</li> <li>2. Project proponent needs to substantiate the facts and figures as discussed under financial/investment analysis for identified baseline alternatives regarding the following - <ul style="list-style-type: none"> <li>– Cost of kerosene and use of kerosene,</li> <li>– Cost of LFG systems and use of LPG systems in rural India,</li> <li>– Use of sustainable agriculture residues,</li> <li>– Availability of government subsidies for biogas systems in rural India,</li> <li>– Average annual household income in project region and</li> <li>– Installation cost of biogas units (2m3 and 3m3 variety).</li> </ul> </li> <li>3. Project proponent is requested to provide proper traceable statistics regarding the numbers of biogas plants already installed in the project region and initiatives under which the biogas plants have been implemented.</li> <li>4. Project proponent is requested to provide proper substantiation for the claim</li> </ol> | <p>CAR#8 was rased</p> <p>CAR#8 was closed</p> <p>Y</p> |

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|  |   |    | regarding no initiatives for installation of biogas units supported by other NGOs or public agencies are available at the project boundary.<br>Thus CAR#8 was raised. Project participant has provided the response along with supportive evidence and same was checked and found satisfactory, hence CAR#8 was closed.   |                              |
| B.4.6. If a benchmark is used, is it ensured that it is selected in accordance with the requirements of the tool /methodology and it represents standard returns in the market (not linked to the subjective profitability expectation or risk profile of a particular project developer). | VVM Para. 110<br>PDD Section B.5                  | DR | Not applicable as project participant has uses the Step 2 (Investment analysis) and Step 3 (Barrier analysis) of additionality tool (EB39 Annex 10) to demonstrate that the proposed CDM project activity is more costly than at least one alternative.   | Y                            |
| B.4.7. If a barrier analysis has been used, has it been shown that the proposed project activity faces barriers that prevent the implementation of this type of proposed project activity but would not have prevented the implementation of at least one of the alternatives?             | VVM Para.<br>114<br>115a-b/116<br>PDD Section B.5 | DR | Project participant has uses the Step 2 (Investment analysis) and Step 3 (Barrier analysis) of additionality tool (EB39 Annex 10) to demonstrate that the proposed CDM project activity is more costly than at least one alternative.<br><br>Project participant has presented the demonstration of additionality by using 'Access to finance barrier 'under 'Investment barrier' guidelines stipulated Step 3 .a (Para 01 (a)) in "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10). Project participant also refers the guidelines stipulated in Non-binding best practice examples to demonstrate additionality for SSC project activities (Annex 34 of EB 35 report) for demonstration additionality under 'Access to finance barrier ' .<br><br>Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted. | CAR#8<br>was closed<br><br>Y |
| B.4.8. Is the discussion on additionality consistent with the identification of all plausible and credible baseline scenarios?   | VVM Para.<br>105<br>PDD Section B.5               | DR | Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted.  | CAR#8<br>was closed<br><br>Y |

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| B.4.9. If a barrier analysis has been used have the 'guidelines for objective demonstration and assessment of barriers' been followed? Have all applicable steps been considered and substantiated with objective evidence?          | VVM Para 113 EB 50 Annex 13              | DR | Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted.   | CAR#8 was closed<br><br>Y |
| B.4.10. Do the identified baseline scenarios include technologies and practices that include outputs or services comparable with the proposed CDM project activity. Do they also abide by the same applicable laws and legislations? | VVM Para. 105<br>PDD Section A.4.2/B.5   | DR | Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted.<br>The alternatives identified are consistent with current laws and regulations and there are no legal and/or regulatory requirements that prevent the alternatives from occurring. This has been validated through the knowledge of local laws and regulation.   | CAR#8 was closed<br><br>Y |
| B.4.11. Has it been shown that the project is not common practice?   | VVM Para. 119a/b<br>PDD Section B.5      | DR | Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted.<br>Project participant has presented the common practice analysis in the final PDD as per the "Tool for the demonstration and assessment of additionality" Version 05.2 (EB39 Annex 10).  | CAR#8 was closed<br><br>Y |
| B.4.12. What are they key distinctions between the project activity and any similar projects that are widely used as common practice?  | VVM Para. 118, 119c/d<br>PDD Section B.5 | DR | Pending closure of CAR#8<br>Response to CAR#8 was provided and accepted.<br>As project activity is located in Karnataka region, which is considered as appropriate region for the assessment of the common practice analysis through local and sectoral expertise. It is observed that there is no similar project activity which is widely observed and commonly carried out in the region. Thus proposed project activity is not common practice as per Para 118 of VVM version 1.1 (EB51 Annex 03). | CAR#8 was closed<br><br>Y |

## B.5. Application of the Simplified Methodology

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| 3.2.6  | Has the simplified methodology been applied correctly for determining <b>baseline emissions</b> ? | VVM Para. 91d<br>PDD Section B (B.6.1 -B.71)   | DR | <ol style="list-style-type: none"> <li>Equation for baseline emission calculated in PDD version 01 is not consistent with the methodology AMS-I.E and AMS-III.R</li> <li>In baseline emission calculation for avoided methane from cattle manure, scaling factor has been used for 2m<sup>3</sup> units. Objective of this scaling factor needs to be explained</li> <li>Vs for dairy cow is not matching with the IPCC values</li> <li>All the IPCC default values were taken at 27°C. Please justify</li> <li>The schedule for construction and operation of biogas units as mentioned in the section B 6.3 (page no 26) of PDD version 01, needs to be further justified.</li> <li>Table mentioned in the B 6.3 needs to be explained clearly</li> </ol> <p>Thus, CAR#9 was raised. Response to CAR#9 was provided and accepted, hence CAR#9 was closed.</p> <p>The simplified baseline methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01 has been applied correctly for determining baseline emissions for kerosene component, non-renewable biomass component and animal waste component.</p> | CAR#9 was raised<br>CAR#9 was closed<br>Y   |
| B.5.1. | Has the simplified methodology been applied correctly for determining <b>project emissions</b> ?  | VVM Para. 90/91d<br>PDD Section B (B.6.2-B.71) | DR | <p>Equation for project Emission calculated in PDD version 01 is not consistent with the methodology AMS-III.R .Thus, CAR#10 was raised. Response to CAR#10 was provided and accepted, hence CAR#10 was closed.</p> <p>Simplified baseline methodology AMS-III.R. ver. 01 has been applied correctly for determining Project emissions due to proposed activity.</p>  | CAR#10 was raised<br>CAR#10 was closed<br>Y |
| B.5.2. | Has the simplified methodology been applied correctly for determining <b>leakage</b> ?            | VVM Para. 91d<br>PDD Section B (B.6.2 -B.71)   | DR | <ol style="list-style-type: none"> <li>Leakage due to the project activity as per the methodology AMS-I.E and AMS-I.C need to be demonstrated.</li> <li>In table B. 6.4, estimation of leakage was mentioned as zero. This needs to be justified.</li> </ol> <p>Thus, CAR#11 was raised. Response to CAR#11 was provided and accepted, hence CAR#11 was closed.</p> <p>Simplified baseline methodology AMS-I.E. ver.01 has been applied correctly for determining Project emissions due to proposed activity.</p>   | CAR#11 was raised<br>CAR#11 was closed<br>Y |
| B.5.3. | Where applicable, has the simplified methodology been   | VVM Para 88/91d<br>PDD Section B               | DR | Pending closure of CAR#09, CAR#10 & CAR#11. Response to CAR#09, CAR#10 & CAR#11 was provided and accepted   | CAR#09, CAR#10 & CAR#11                     |

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| applied correctly for the <b>direct calculation of emission reductions?</b>   | (B.6.2 -B.71)  |    |   | was closed<br>Y                                   |
| B.5.4. Where there is an option between different equations or parameters, has the methodological choices for the project been explained, have they been properly justified and are they correct? | VVM<br>Para.89/90/91<br>PDD Section B<br>(B.6.2 -B.71) | DR | Pending closure of CAR#09, CAR #10, & CAR#11. Response to CAR#09, CAR#10 & CAR#11 was provided and accepted<br>The PDD explains all the methodological choices clearly. The steps and formulas mentioned in methodology are used correctly.   | CAR#09,<br>CAR#10 &<br>CAR#11<br>was closed<br>Y  |
| B.5.5. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?  | PDD Sections<br>B.5-C                                  | DR | Pending closure of CAR#09, CAR#10 & CAR#11. Response to CAR#09, CAR#10 & CAR#11 was provided and accepted.<br>The uncertainties in the GHG emissions estimates are properly addressed in the documentation in accordance with applied simplified methodology AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01.  | CAR#09,<br>CAR#10 &<br>CAR#11<br>was closed<br>Y  |
| <b>B.6. Ex-ante Data and Parameters Used</b>  |  |    |   |   |
| B.6.1. Are the data provided in compliance with the methodology?  | VVM Para.<br>91/67c<br>PDD Section<br>B.6.3B.6.4       | DR | <ol style="list-style-type: none"> <li>1. The basis for assumption considered related to ratio of 30:70 for 2 m<sup>3</sup> and 3 m<sup>3</sup> biogas units respectively needs to be clarified further.</li> <li>2. The thermal equivalent sheet provided by PP mention the thermal capacity of 10,000 is 28.9 MW; which is calculated based on "calorific value of biogas in a biogas-digester ".Please clarify that how same was calculated for 2m<sup>3</sup> and 3 m<sup>3</sup> biogas units?</li> <li>3. The thermal equivalent sheet used Net calorific value 21 MJ/m<sup>3</sup> is not matching with the provided published data (i.e. 21.6 MJ/m<sup>3</sup>).Please clarify?</li> <li>4. Please clarify the Average stove efficiency (i.e. 55% in thermal equivalent sheet) is thermal efficiency or combustion efficiency? If it is combustion efficiency then</li> </ol> | CAR#12<br>was raised<br>CAR#12<br>was closed<br>Y |

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|   |  |    | <p>remaining 45% of un-combusted biogas leads to project emissions.</p> <p>The schedule for construction and operation of biogas units as mentioned in the Section B.6.3 of the PDD needs to be further justified.</p> <p>Thus, CAR#12 was raised. Response to CAR#12 was provided and accepted, hence CAR#12 was closed.</p> <p>The data provided in the excel spreadsheet &amp; the final PDD are in compliance with the approved methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01.</p>   |   |
| B.6.2. Is all the data derived from official data sources or replicable records and have these been correctly quoted? | VVM Para. 91a/b<br>PDD Section B.6.3/B.6.4 | DR | <p>Source of data and parameters mentioned in Section B 6.2 should be clearly mentioned (Page number/table no/volume of the reference document, if web link is available provide the link)</p> <p>Thus, CAR#13 was raised. Response to CAR#13 was provided and accepted, hence CAR#13 was closed.</p> <p>All data in the excel spreadsheet have been quoted from official data sources (technology suppliers) or from replicable records like the IPCC database and have been correctly quoted.</p> <p>The data provided and their sources are authentic and transparent. Documentary evidences have been provided by PP for all the data used in calculation and also for all the baseline data.</p> | CAR#13 was raised<br>CAR#13 was closed<br>Y |
| B.6.3. Is the vintage of the baseline data correct?   | PDD Section B.6.3/B.6.4                    | DR | <p>Pending closure of CAR#12 &amp; CAR#13. Response to CAR#12 &amp; CAR#13 was provided and accepted,</p> <p>The vintage of the baseline data is correct as PP has used the latest version of the documents which was available at the time of PDD submission</p>   | CAR#12 & CAR#13 was closed<br>Y             |
| B.6.4. Is all the data appropriate and correctly applied to the CDM project activity?                                 | VVM Para. 91c<br>PDD Section B.6.3/B.6.4   | DR | <p>Pending closure of CAR#12 &amp; CAR#13. Response to CAR#12 &amp; CAR#13 was provided and accepted,</p> <p>PP has applied all the data appropriately and correctly to the CDM project activity.</p>   | CAR#12 & CAR#13 was closed<br>Y             |
| B.6.5. Are data and parameters that are not being monitored and remained fixed  | VVM Para. 90<br>PDD Section B.6.3/B.6.4    | DR | <p>Pending closure of CAR#12 &amp; CAR#13. Response to CAR#12 &amp; CAR#13 was provided and accepted,</p> <p>The data from the official data or the IPCC date which have been used by the PP are appropriate and will result in conservative estimates throughout the crediting period.</p>   | CAR#12 & CAR#13 was closed<br>Y             |

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|   | throughout the crediting period appropriately assessed, correct, and will they result in conservative estimates? |  |    |  |                        |
| B.6.6.  | If the project activity uses the PLF does it follow the guidance provided in EB48 annex 11?                      | EB48 Annex 11.                         | DR | Not Applicable   | Y                      |
| <b>B.7. Calculation of Emissions Reductions</b> |  |  |    |  |                        |
| B.7.1.  | Has the simplified methodology been applied correctly for determining <b>emission reductions</b> ?               | VVM Para. 91d<br>PDD Section A.4.3/B.6 | DR | Pending closure of CAR#12. Response to CAR#12 was provided and accepted, Excel sheet submitted for CERs calculation to ascertain that the emission reductions are in accordance with the methodology described.  | CAR#12 was closed<br>Y |
| B.7.2.  | Are the emission reduction calculations documented in a complete and transparent manner?                         | VVM Para. 91e<br>PDD Section B.6       | DR | Pending closure of CAR#12. Response to CAR#12 was provided and accepted, The emission reductions calculation has been described in the final PDD. Reference & basis for all data mentioned in the excel sheet have been provided.  | CAR#12 was closed<br>Y |
| B.7.3.  | Is the projection based on same procedures as used for later monitoring or acceptable alternative models?        | PDD Section B.6                        | DR | Pending closure of CAR#12. Response to CAR#12 was provided and accepted, Project participant has provided a transparent <i>ex ante</i> calculation of baseline emissions expected during the crediting period, applying all relevant equations provided in the approved methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01 | CAR#12 was closed<br>Y |
| B.7.4.  | Is the calculation of the emission reduction correct?  | VVM Para. 91e<br>PDD Section B.6       | DR | Pending closure of CAR#12. Response to CAR#12 was provided and accepted,   | CAR#12 was closed<br>Y |
| <b>B.8. Emission Reductions</b>                 |  |  |    |  |                        |
| B.8.1.  | Is the form/table required for the   | PDD Section A.4.3/<br>Section B.6      | DR | The form/table for the projected emission reductions is correctly applied.   | Y                      |

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|------------------------------------|---|---|----|---|---------------------------|
|                                    | indication of projected emission reductions correctly applied?  |   |    |   |                           |
| B.8.2.                             | Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?  | PDD Section A.4.3/<br>Section B.6                               | DR | Projection is in line with the envisioned time schedule for the project's implementation and the indicated crediting period   | Y                         |
| <b>B.9. Monitoring Methodology</b> |   |   |    |   |                           |
| B.9.1.                             | Does the monitoring methodology provide a consistent approach in the context of all parameters to be monitored and further information provided by the PDD?<br><br>Are all parameters and data that are available at validation consistent with the simplified methodology. Has this data been interpreted and applied correctly? | VVM Para.<br>67e<br>PDD Section B.7-<br>B.8 see also<br>Annex 4 | DR | The monitoring plan of the PDD has followed the applied methodology in the context of the parameter to be monitored.<br>Pending closure CAR#14 .Response to CAR#14 was provided and accepted, | CAR#14<br>was closed<br>Y |
| B.9.2.                             | Does the monitoring methodology apply consistently the choice of the option selected for monitoring both of project and baseline emissions?   | PDD Sections B<br>and C   | DR | The monitoring plan has been applied correctly for monitoring of both project and baseline emission.<br>Pending closure CAR#14 .Response to CAR#14 was provided and accepted,                 | CAR#14<br>was closed<br>Y |

## B.10. Data and Parameters Monitored

|  |   |    |  |   |
|--|---|----|--|---|
| B.10.1. Does the monitoring plan in the PDD comply with the simplified methodology? Provide for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period? | VVM Para. 91a/91d/121/79<br>PDD Section B.7-B.7.2 | DR | <ol style="list-style-type: none"> <li>1. Parameter for monitoring of leakage in the production of renewable biomass as required by AMS I.E has not been included in the monitoring plan. The sample population of the survey method required for monitoring of the project GHG indicators has not been mentioned.</li> <li>2. The frequency of the survey to be conducted for data monitoring is not clear</li> <li>3. The detail description regarding data capturing, handling and archiving procedures are absent</li> <li>4. The Monitoring Plan of the PDD does not clearly mention the quality control and quality assurance procedures to be followed to mitigate data uncertainty and to ensure delivery of high quality data.</li> </ol> <p>Thus CAR#14 was raised, response to CAR#14 was provided and accepted, and hence CAR #14 was closed.</p> <p>The Monitoring plan contains all necessary parameters and means of monitoring described in the plan complies with the requirements of the methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01.</p> | CAR#14 was raised<br>CAR#14 was closed<br>Y |
| B.10.2. Are the choices of project GHG indicators reasonable and in conformance with the requirements set by the simplified methodology applied?   | PDD Section B.7-B.7.2/B.6.2                       | DR | Choices of project GHG indicators are not required as per methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01.  | Y   |
| B.10.3. Will it be possible to determine the specified project GHG indicators?   | PDD Section B.6.2-B.8                             | DR | Choices of project GHG indicators are not required as per methodologies AMS-I.C. ver. 18, AMS-I.E. ver.03 and AMS-III.R. ver. 01.  | Y   |
| B.10.4. Is the information given for each monitoring variable by the presented table sufficient to ensure the verification of a proper   | PDD Section B.6.2-B.7.1                           | DR | <p>Pending closure of CAR#14</p> <p>Response to CAR#14 was received; reviewed and accepted.</p> <p>The information given for each monitoring variable by the presented table is sufficient to ensure the verification of a proper implementation of the monitoring plan</p>  | CAR#14 Was closed<br>Y                      |

|   |  |    |   |                           |
|---|--|----|---|---------------------------|
| implementation of the monitoring plan?  |  |    |   |                           |
| B.10.5. Is the information given for each monitoring variable by the presented table sufficient to ensure the delivery of high quality data free of potential for biases or intended or unintended changes in data records? | PDD Section B.6.2-B.7.1  | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.<br>The information given for each monitoring variable by the presented table is sufficient to ensure the delivery of high quality data free of potential for biases or intended or unintended changes in data records. | CAR#14<br>Was closed<br>Y |
| B.10.6. Is the monitoring approach in line with current good practice, i.e. will it deliver data in a reliable and reasonably acceptable accuracy?  | PDD Section B.5-B.7.2  | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.<br>The monitoring approach will deliver data in a reliable and reasonably acceptable accuracy.   | CAR#14<br>Was closed<br>Y |
| B.10.7. Are all formulae used to determine project emission clearly indicated and in compliance with the monitoring methodology.  | PDD Section B.6.2-B.7.1  | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.  | CAR#14<br>Was closed<br>Y |
| <b>B.11. Quality Control (QC) and Quality Assurance (QA) Procedures</b>   |  |    |   |                           |
| B.11.1. Is the selection of data undergoing quality control and quality assurance procedures complete?  | VVM Para. 121<br>Refer to all data within the PDD Inc. B.6.2-B.7.1 | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.  | CAR#14<br>Was closed<br>Y |
| B.11.2. Is the belonging determination of uncertainty levels done correctly for each ID in a correct and reliable   | Refer to all data within the PDD Inc. B.4/B.7.2/Annex 4            | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.  | CAR#14<br>Was closed<br>Y |

|  |                         |    |  |   |
|--|-------------------------|----|--|---|
| manner?  |                         |    |  |   |
| B.11.3. Are quality control procedures and quality assurance procedures sufficiently described to ensure the delivery of high quality data?                | VVM Para 121            | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.   | CAR#14<br>Was closed<br>Y                 |
| B.11.4. Is it ensured that data will be bound to national or internal reference standards?   | VVM Para. 86d           | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted.<br>The data provided will be bound by national references and this was cross-checked during the site visit.   | CAR#14<br>Was closed<br>Y                 |
| B.11.5. Is it ensured that data provisions will be free of potential conflicts of interests resulting in a tendency of overestimating emission reductions? | VVM Para. 19            | DR | Pending closure of CAR#14<br>Response to CAR#14 was received; reviewed and accepted. Hence CAR#14 was closed.  | CAR#14<br>Was closed<br>Y                 |
| <b>B.12. Operational and Management Structure</b>  |                         |    |  |   |
| B.12.1. Is the authority and responsibility of project management clearly described?   | PDD Section B.8/Annex 1 | DR | <ol style="list-style-type: none"> <li>1. The overall responsibility/ authority for project activity operations and monitoring needs to be clarified further.</li> <li>2. Further information on overall responsibility for data monitoring, reporting, reviewing and maintenance needs to be provided by the project participant.</li> <li>3. PDD version 01 does not provide any information regarding internal audit procedures required to be executed for GHG project compliance with operational requirements.</li> <li>4. PDD v01 does not mention any information regarding project performance reviews prior to submission of data for verification.</li> </ol> <p>Thus, CL#15 was raised. Response to CL#14 was received; reviewed and accepted. Hence CL#15 was closed.</p> | CL#15 was raised<br>CL#15 was closed<br>Y |
| B.12.2. Is the authority and responsibility for registration, monitoring,  | PDD Section B.8/Annex 1 | DR | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.  | CL#15 was closed                          |

|  |                         |    |  |                                 |
|--|-------------------------|----|--|---------------------------------|
| measurement and reporting clearly described?   |                         |    |  | Y                               |
| B.12.3. Are procedures identified for training of monitoring personnel?  | PDD Section B.8/Annex 1 | DR | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.  | CL#15 was closed<br>Y           |
| <b>B.13. Monitoring Plan (Annex 4)</b>   |                         |    |  |                                 |
| B.13.1. Is the monitoring plan developed in a project specific manner clearly addressing the unique features of the CDM activity?  | VVM Para. 122a          | DR | Pending closure of CAR#14 & CL#15.<br>Response to CAR#14 & CL#15 were received; reviewed and accepted.<br>The monitoring plan has been developed specifically for this project activity and is mentioned in Section B.7.2 of the PDD.                                      | CAR#14 & CL#15 were closed<br>Y |
| B.13.2. Does the monitoring plan completely describe all measures to be implemented for monitoring all parameter required, including measures to be implemented for ensuring data quality? | VVM Para. 122b          | DR | Pending closure of CAR#14 & CL#15.<br>Response to CAR#14 & CL#15 were received; reviewed and accepted.<br>Section B.7.2 of the PDD describes all measures to be implemented for monitoring all parameters, including measures to be implemented for ensuring data quality. | CAR#14 & CL#15 were closed<br>Y |
| B.13.3. Does the monitoring plan provide information on monitoring equipment and respective positioning in order to safeguard a proper installation?                                       | VVM Para. 122b          | DR | No such mechanical, electrical, or electronically monitoring instruments will be involved for the project monitoring.  | Y                               |
| B.13.4. Are procedures identified for calibration of monitoring equipment?   | VVM Para. 122a-c        | DR | No such mechanical, electrical, or electronically monitoring instruments will be involved for the project monitoring.  | Y                               |
| B.13.5. Are procedures identified for  | VVM Para.               | DR | No such mechanical, electrical, or electronically monitoring instruments will be involved for the project monitoring.  | Y                               |

|  |                  |          |   |                             |
|--|------------------|----------|---|-----------------------------|
| maintenance of monitoring equipment and installations?   | 122a-c           |          |   |                             |
| B.13.6. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)           | VVM Para. 122a-c | DR<br>SV | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.<br>Procedures for the data management system have been mentioned in section B.7.2 of the PDD.   | CL#15<br>was<br>closed<br>Y |
| B.13.7. Are procedures identified for dealing with possible monitoring data adjustments and missing data allowing redundant reconstruction of data in case of monitoring problems? | VVM Para. 122a-c | DR<br>SV | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.<br>PP has mentioned the required details in section B.7.2 of the PDD  | CL#15<br>was<br>closed<br>Y |
| B.13.8. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?  | VVM Para.122a-c  | DR<br>SV | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.<br>PP has provided the QA/QC procedure for the project activity. The operational and Management Structure was cross-checked during the site visit. Internal audits have been addressed as a part of the quality assurance and inspection in section B.7.2 of the PDD. | CL#15<br>was<br>closed<br>Y |
| B.13.9. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?   | VVM Para. 122a-c | DR<br>SV | Pending closure of CL#15.<br>Response to CL#15 was received; reviewed and accepted.<br>PP has provided the QA/QC procedure for the project activity. Project performance reviews have been addressed as a part of the quality assurance and inspection in section B.7.2 of the PDD.   | CL#15<br>was<br>closed<br>Y |
| B.13.10. Describe the ability of the project participants to implement the   | VVM Para. 122c   | DR<br>SV | FAR#19<br>1. Actual implementation schedule needs to be confirmed during verification<br>2. As per PDD version 03, 70:30 ratios have been considered for installation of  | FAR#19                      |

monitoring plan.

2m<sup>3</sup> units and 3m<sup>3</sup>. Estimated emission reduction has been calculated based on proposed ratio of 2m<sup>3</sup> units and 3m<sup>3</sup> units installed. Since, this ratio influences the emission reduction, same needs to be checked during verification.

Y

#### B.14. Baseline Details

B.14.1. Is there any indication of a date when determining the baseline?

PDD Section B.8/Annex 3

DR

The Final PDD version 11 dated 11/04/2011 the date of completion of the application of the baseline study is 17/06/2009 mentioned under the section B.8. The baseline study has been done by one of project participant CarbonAided Ltd.

Y

B.14.2. Is this consistent with the time line of the PDD history?

Also see revision history of the PDD

DR

It seems to be consistent with the time line of the PDD history as completion date for baseline study and PDD Version 11 is 17/06/2009.

Y

B.14.3. Is all data required provided in a complete manner by annex 3 of the PDD?

PDD Annex 3

DR

The baseline information regarding kerosene fuel, non-renewable biomass consumption for thermal application and animal waste management has been mentioned in the annex 3 of the PDD.  
  
All the information related to baseline information and baseline survey has cross checked during site visit, found appropriate, and accepted.

Y

#### C. Duration of the Project / Crediting Period

C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?

VVM Para. 102a-c  
PDD Section C.1.1/C.1.2

DR

The project activity will be commission in June 2010 and expected operational life time of the project activity is 20 years.  
Consideration of project operational life time as 20 years needs to be further substantiated. Thus CL#16 was raised, response to CL#15 was received; reviewed and accepted. Hence CL#16 was closed.

CL#16 was raised  
CL#16 was closed  
Y

C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max.

VVM Para. 102a  
PDD Section C.2/C.2.1/C.2.2

DR

The PDD, version 11 states that the crediting period will start on 01/06/2010, or on the date that the CDM project activity is registered with the CDM Executive Board, whichever is later.  
The length of the first crediting period is 10 years 0 months which is fixed and the same is acceptable to DOE.

Y

|  |   |    |   |   |
|--|---|----|---|---|
| 10 years)?   |   |    |   |   |
| C.1.3. Does the project's operational lifetime exceed the crediting period   | VVM Para. 102a<br>PDD Section C.1.2/C.2.1.1/C.2.1.2 | DR | The project operational life is expected to be 20 years which exceed the crediting period of 10 years.  | Y |
| C.1.4. Does the start date indicate whether this is a new project activity or a pre-existing project activity?             | VVM Para. 102a/ 98<br>PDD Section C.1.1/C.2.1.1     | DR | Start date of project activity is 18 December 2008 which is later on 2 <sup>nd</sup> August 2008 and thus it is a new project activity .  | Y |
| <b>D. Environmental Impacts</b>  |   |    |   |   |
| D.1.1. Does the project comply with environmental legislation in the host country?   | VVM Para. 131/134d<br>PDD section D                 | DR | The project activity does not fall under the purview of Environment Impact Assessment (EIA) notification S.O. 1533, dated 14 <sup>th</sup> September 2006, Ministry of Environment & Forests (MoEF), Govt. of India and hence no EIA study is required to be conducted.   | Y |
| D.1.2. Has an analysis of the environmental impacts of the project activity been sufficiently described?                   | VVM Para. 131<br>PDD section D                      | DR | Not Applicable  | Y |
| D.1.3. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? | VVM Para. 131<br>PDD section D                      | DR | As per the notification dated 14th September 2006 by Ministry of Environment & Forests (MoEF), Govt. of India, the proposed project activity is not included in the list of projects that have to get Prior Environmental Clearance either from State or Central Govt. authorities and hence no EIA study required to be conducted. | Y |
| D.1.4. Will the project create any adverse environmental effects?  | VVM Para. 131<br>PDD section D                      | DR | The project activity involves the replacement of a GHG emitting blowing agent with a on-GHG blowing agent and hence no adverse environmental effects.   | Y |
| D.1.5. Are trans-boundary environmental impacts considered in the  | VVM Para. 131                                       | DR | Not applicable since an EIA is not required for the project activity.   | Y |

|  |                                      |         |  |  |
|--|--------------------------------------|---------|--|--|
| analysis?  | PDD section D                        |         |  |  |
| D.1.6. Have identified environmental impacts been addressed in the project design?           | VVM Para.<br>131<br>PDD section D    | DR      | Not applicable since an EIA is not required for the project activity.  | Y  |
| <b>E. Stakeholder Comments</b>   |                                      |         |  |  |
| E.1.1. Have relevant stakeholders been consulted?  | VVM Para.<br>128a<br>PDD Section E.1 | DR<br>I | PDD version 01, does not mention about the local stakeholders identified and consulted for the project activity. Thus, CAR#17 was raised. Response to CAR#17 was received; reviewed and accepted. Hence CAR#17 was closed.   | CAR#17 was raised<br>CAR#17 was closed.<br>Y |
| E.1.2. Have appropriate media been used to invite comments by local stakeholders?            | VVM Para.<br>128a<br>PDD Section E.1 | DR<br>I | Pending closure of CAR#17, response to CAR#17 was received; reviewed and accepted.<br><br>PP has provided the copies of invitation letters of stakeholder's consultation meeting that was held on 29/12/2008.at Lions Club building, Antharagange Road, Kolar.   | CAR#17 was closed.<br>Y                      |
| E.1.3. Is the undertaken stakeholder process described in a complete and transparent manner? | VVM Para.<br>128b<br>PDD Section E.1 | DR      | Pending closure of CAR#17, response to CAR#17 was received; reviewed and accepted.<br><br>The description of the stakeholder process has been mentioned in the PDD. PP has mentioned the meeting agenda in the PDD.  | CAR#17 was closed.<br>Y                      |
| E.1.4. Is a summary of the stakeholder comments received provided?                           | VVM Para.<br>128b<br>PDD Section E.2 | DR      | Pending closure of CAR#17, response to CAR#17 was received; reviewed and accepted.<br><br>The MoM & the attendance sheet have been submitted by the project participant. During the site visit the validation team interviewed some of the stakeholders. Based on their replies, the validation team was convinced that the process of stakeholder consultation was carried out as described in the PDD. The stakeholders also confirmed that they were invited for the meeting through individual invitation letters. This was found to be consistent with the invitation process mentioned in the PDD. | CAR#17 was closed.<br>Y                      |
| E.1.5. Has due account been taken of any stakeholder comments                                | VVM Para.<br>128b                    | DR      | Pending closure of CAR#17, response to CAR#17 was received; reviewed and accepted.<br><br>The queries raised by the stakeholders and the satisfactory responses to the same  | CAR#17 was closed.                           |

received?

PDD Section E.3

have been mentioned by the project participant in a table in section E of the PDD. No adverse comments have been raised by the stakeholders.

Y

### A.3 Annex 3: Overview of Findings

#### Findings Overview Summary

|                            | CARs | CLs | FARs |
|----------------------------|------|-----|------|
| <b>Total Number raised</b> | 12   | 06  | 01   |

|  |            |            |                         |            |                  |
|--|------------|------------|-------------------------|------------|------------------|
| Date:  | 07/04/2009 | Raised by: | Vivek Kumar Ahirwar     |            |                  |
| Type:  | CAR        | Number:    | 01                      | Reference: | Table 1, point 2 |
| <b>Lead Assessor Comment:</b>  |            |            | <b>Date:</b> 07/04/2009 |            |                  |
| Letter of approvals from Investor Country (UK) and Host Country (India) Designated National Authority (DNA) to be submitted by the project participants.   |            |            |                         |            |                  |
| <b>Project Participant Response:</b>   |            |            | <b>Date:</b> 27/04/2009 |            |                  |
| Letter of approval is awaited from Host Country (India) DNA. This letter is required for application to Investor Country (UK)  |            |            |                         |            |                  |
| <b>Documentation Provided by Project Participant:</b>  |            |            |                         |            |                  |
| Copies of letters of Approval will be provided once available  |            |            |                         |            |                  |
| <b>Information Verified by Lead Assessor:</b>  |            |            |                         |            |                  |
| Copies of HCA from DNA of Annex- I and Non- Annex country not received.  |            |            |                         |            |                  |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |            |            |                         |            |                  |
| CAR 01 is open. This will be closed once the HCA and the letter of approval received from project participants   |            |            |                         |            |                  |
| <b>Acceptance and Close out by Lead Assessor: Open</b>   |            |            | <b>Date:</b> 20/05/2009 |            |                  |
| <b>Project Participant Response:</b>   |            |            | <b>Date:</b> 18/06/2009 |            |                  |
| A presentation was made to the host country (India) DNA on 14 May. The letter of approval is awaited.  |            |            |                         |            |                  |
| <b>Documentation Provided by Project Participant:</b>  |            |            |                         |            |                  |
| HCA-Kolar.   |            |            |                         |            |                  |
| <b>Information Verified by Lead Assessor:</b>  |            |            |                         |            |                  |
| PP has been submitted the copy of Letter of Approval from Host Country (India) DNA to DOE. The name of project participant and project title has been checked from HCA letter from host country DNA.   |            |            |                         |            |                  |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |            |            | <b>Date:</b> 27/11/2009 |            |                  |
| Project participant has submitted the Host Country Approval from Designated National Authority, MoEF for the proposed project activity. The reference number for the same is 4/9/2009-CCC dated 12/11/2009. The name of the project activity and name of project participant mentioned in HCA is the same as in the section A.1 of the revised PDD.<br>Thus CAR 01 was closed out. |            |            |                         |            |                  |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>   |            |            | <b>Date:</b> 27/11/2009 |            |                  |

|  |            |         |            |                         |                  |  |
|--|------------|---------|------------|-------------------------|------------------|--|
| Date:  | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar     |                  |  |
| Type:  | CAR        | Number: | 02         | Reference:              | Table 1, point 4 |  |
| <b>Lead Assessor Comment:</b>  |            |         |            | <b>Date:</b> 07/04/2009 |                  |  |
| Modalities of Communication needs to be provided in accordance with EB 45 annex 60                     |            |         |            |                         |                  |  |
| <b>Project Participant Response:</b>   |            |         |            | <b>Date:</b> 27/04/2009 |                  |  |
| Draft Modalities of Communication was forwarded to SGS   |            |         |            |                         |                  |  |
| <b>Documentation Provided by Project Participant:</b>  |            |         |            |                         |                  |  |
| The draft was attached to e-mail dated 09.03.2009 addressed to Vivek Kumar Ahirwar                     |            |         |            |                         |                  |  |
| <b>Information Verified by Lead Assessor:</b>  |            |         |            | <b>Date:</b> 16/05/2009 |                  |  |
| Draft Modalities of Communication has been submitted by proponent .Please refer below comment (Not Ok) |            |         |            |                         |                  |  |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>                                       |            |         |            |                         |                  |  |

|   |                         |
|---|-------------------------|
| MoC has incomplete due to following missing points:-  |                         |
| 1. Date of submission   |                         |
| 2. Signature in relevant section  |                         |
| Hence CAR 02 is open.   |                         |
| <b>Acceptance and Close out by Lead Assessor: Open</b>  | <b>Date:</b> 20/05/2009 |
| <b>Project Participant Response:</b>  | <b>Date:</b> 18/06/2009 |
| The signed and dated MOC will be provided to SGS once completed   |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| Kolar-MoC (PDF file)  |                         |
| <b>Information Verified by Lead Assessor:</b>   |                         |
| PP has been submitted the MoC dated 19 <sup>th</sup> August 2009. The MoC was not found acceptable due to comments in below section.  |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  | <b>Date:</b> 27/11/2009 |
| MoC dated 19 <sup>th</sup> August 2009 ;please correct :-   |                         |
| 1. Page No 01:- Fax number for Carbon Aided Ltd not matching with Annex-1 of PDD version 05.  |                         |
| 2. Page No 02:- Email & Fax number for CH4NGE Ltd not matches with Annex-1 of PDD version 05.   |                         |
| 3. Page No 04:- Section 3: Statement of Agreement; please provide the full name of authorised signatory of SKG Sangha as mentioned in section 2: Nomination of focal points of MoC dated 19/08/2009.  |                         |
| 4. Page No 05:- Date of Submission for F-CM-MOC Form: ANNEX 1 is missing.   |                         |
| 5. Page No 06:- Specimen Signature of Mr. Richard Jones is not in relevant space.   |                         |
| 6. It is advisable to remove the irrelevant Annex of MoC (e.g. F-CM-MOC Form : Annex 2 )  |                         |
| PDD version 5; please correct:-   |                         |
| The template of Annex 1: contact information on participants in the project activity of PDD version 5 is found incorrect as per EB28 Annex 34. (e.g. <b>Represented by</b> & <b>Salutation</b> is missing for SKG Sangha). Please correct the same. |                         |
| CAR#2 is open.  |                         |
| <b>Acceptance and Close out by Lead Assessor: Open</b>  | <b>Date:</b> 27/11/2009 |
| <b>Project Participant Response:</b>  | <b>Date:</b> 20/12/2009 |
| 1. The fax number in the MoC is correct, Annex 1 in the PDD V05 has been corrected in PDD V06.  |                         |
| 2. The Email and fax number in the MoC is correct, Annex 1 in the PDD V05 has been corrected in PDD V06.  |                         |
| 3. Instead of D we should have written Devabhaktuni. Page No 04 of the MoC has been corrected   |                         |
| 4. The date has been added to corrected Page No 05 in the MoC   |                         |
| 5. A signature has been placed in the correct space in the corrected Page No 06 in the MoC  |                         |
| 6. We have discarded Annex 2 in the copies held by the participants. SGS is requested to discard the annex in the copies held by them.  |                         |
| The templates of Annex 1 in PDD Version 5 has been corrected to accord with PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD) Version 03   |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| PDD V06   |                         |
| Corrected Page No 04 of the MoC   |                         |
| Corrected Page No 05 of the MoC   |                         |
| Corrected Page No 06 of the MoC   |                         |
| <b>Information Verified by Lead Assessor:</b>   |                         |
| PP has been provided corrected page 04 to 06 of MoC.  |                         |

|   |                         |
|---|-------------------------|
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  | <b>Date:</b> 09/03/2010 |
| Please provide a single document of MoC (a single PDF file content page from 01 to 06) , as single document can be upload to UN.<br>Open CAR#02 |                         |
| <b>Acceptance and Close out by Lead Assessor: Open</b>  | <b>Date:</b> 09/03/2010 |
| <b>Project Participant Response:</b>  | <b>Date:</b> 24/03/2010 |
| A single pdf file is provided   |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| MoC as a single pdf document  |                         |
| <b>Information Verified by Lead Assessor:</b>   |                         |
| MoC dated 19/08/2009 has been received.   |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  | <b>Date:</b> 30/03/2010 |
| MoC dated 19/08/2009 was checked and found consistence with CDM requirement stipulated under EB 45 annex 60. Thus CAR#02 has been closed out.   |                         |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  | <b>Date:</b> 30/03/2010 |

|   |            |         |            |                     |            |               |
|---|------------|---------|------------|---------------------|------------|---------------|
| Date:   | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |            |               |
| Type:   | CAR        | Number: | 03         |                     | Reference: | Section A.4.1 |
| Lead Assessor Comment:  |            |         |            | Date: 07/04/2009    |            |               |
| The information provided regarding the location of the project activity is not clear. As per the UNFCCC requirement project participant is required to provide appropriate coordinates of the project location. |            |         |            |                     |            |               |
| Project Participant Response:   |            |         |            | Date: 27/04/2009    |            |               |

As the proposed project activity is going to be implemented in 10,000 households distributed throughout 5 Taluks in the Kolar district of Karnataka it is impractical to give geographic coordinates of 10,000 points. The geographical coordinates of the district centre - Kolar - are 13°09' N, 78°11' E. The following table provides the ranges of geographic coordinates of the Kolar district of Karnataka within which the project activity will take place.

| Area               | Latitude, ° N | Longitude, ° E |
|--------------------|---------------|----------------|
| Kolar District     | 12.46 - 13.58 | 77.21 - 78.35  |
| Bangarapet Taluk   | 12.78 - 13.02 | 78.10 - 78.45  |
| Kolar Taluk        | 13.04 - 13.29 | 77.94 - 78.26  |
| Malur Taluk        | 12.83 - 13.10 | 77.90 - 78.26  |
| Mulbagal Taluk     | 13.01 - 13.16 | 78.24 - 78.42  |
| Srinivasapur Taluk | 13.21 - 13.58 | 78.13 - 78.38  |

During the project implementation, SKG Sangha will keep records of every single biogas unit installed, each of which will have a unique identification number. Once biogas units are installed, the list of units and their locations will be available for verification.

The information provided above has now been incorporated into section A.4.1.4, pages 6-8 of PDD V03.

**(Note that all page numbers provided in this response refer to Kolar PDD V03 as submitted in track changes format)**

In support of our approach we have consulted the latest version of the Guidelines for completing the simplified project design document (CDM-SSC-PDD) (Version 05) which does not specify that exact coordinates must be given.

Also a further reference we note that the exact location is not provided in the following registered small scale CDM project activities:

- Project 0218 : CDM SOLAR COOKER PROJECT Aceh 1
- Project 0414 : Solar steam for cooking and other applications
- Project 0160 : Moldova Biomass Heating in Rural Communities (Project Design Document No. 2)
- Project 0136 : Biogas Support Program - Nepal (BSP-Nepal) Activity-1

#### Documentation Provided by Project Participant:

In addition to the district and Taluk map and the coordinates shown above which are all now provided in section A.4.1.4. of PDDV03, detailed maps and lists of villages were showed to the assessor during the site visit 5<sup>th</sup> to 8<sup>th</sup> January 2009. Further, a list of beneficiary villages was included in Appendix 1, which was attached to an e-mail dated 03.03.2009 addressed to Ajoy Gupta.

**Information Verified by Lead Assessor:** **Date:** 16/05/2009

Proponent has been provided the geo-graphical coordinates for proposed project activity location at 6 villages of Karnataka in section A.4.1 of the PDD version 03 dated 28/04/2009. Please refer below section. (Not Ok)

#### Reasoning for not Acceptance or Acceptance and Close Out:

Since it is community based project, geographical co ordinates of the taluks were mentioned in the project. Please indicate the geo-graphical coordinates in XX°YY'ZZ format  
As per UNFCCC-CDM-PDD guidelines version 5, Section A.4.1.4 of PDD version 03 should not be more than one page. Please try to be short & crisp.  
Hence CAR 03 is open.

**Acceptance and Close out by Lead Assessor: Open** **Date:** 20/05/2009

**Project Participant Response:** **Date:** 18/06/2009

Please the coordinates in XX°YY'ZZ'' format are:

The geographical coordinates of the district centre - Kolar - are 13°09'00'' N, 78°11'00'' E. The following table provides the ranges of geographic coordinates of the Kolar district of Karnataka within which the project activity will take place.

| Area               | Latitude ° N  | Longitude, ° E |
|--------------------|---------------|----------------|
| Kolar District     | 12°46'02''    | 77°21'09.57''  |
|                    | 13°58'06''    | 78°35'07.37''  |
| Bangarapet Taluk   | 12°78'33.41'' | 78°10'14.22''  |
|                    | 13°02'26.32'' | 78°45'17.32''  |
| Kolar Taluk        | 13°04'01''    | 77°94'52.57''  |
|                    | 13°29'42.14'' | 78°26'22.16''  |
| Malur Taluk        | 12°83'18.53'' | 77°90'18.17''  |
|                    | 13°10'19.41'' | 78°26'16.57''  |
| Mulbagal Taluk     | 13°01'23.46'' | 78°24'47.18''  |
|                    | 13°16'22.21'' | 78°42'44.27''  |
| Srinivasapur Taluk | 13°21'27.25'' | 78°13'13''     |
|                    | 13°58'03''    | 78°38'36.22''  |

Section A.4.1.4 of PDD v04 has been summarized and it is not more than one page.

**Documentation Provided by Project Participant:**

Revised PDD version 04.

**Information Verified by Lead Assessor:**

**Date:** 28/06/2009

1. Proponent has been revised the PDD by mentioning the specific geographical coordinates of all taluk of kolar district of Karnataka state of India where the project activity is located. Please refer below comment. (Not Ok)
2. Section A.4.1.4 of the PDD has been summarized in single page to meet the UNFCCC-CDM-PDD guidelines version 5. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

Conversion of co-ordinates is not correct. Please correct.  
Hence CAR03 is open.

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 28/06/2009

**Project Participant Response:**

**Date:** 04/08/2009

Ranges of geographic coordinates are provided for the taluks where the project will be implemented (see table below). The section A.4.1.1 of the PDD has been up-dated in order to fulfil the UNFCCC-CDM-PDD guidelines requirements.

| Taluk           | East longitude |         | North latitude |         |
|-----------------|----------------|---------|----------------|---------|
|                 | from           | to      | from           | to      |
| Bangarapet      | 78° 06'        | 78° 27' | 12° 47'        | 13° 01' |
| Kolar           | 77° 56'        | 78° 16' | 13° 02'        | 13° 17' |
| Malur           | 77° 54'        | 78° 16' | 12° 50'        | 13° 06' |
| Mulbagal        | 78° 14'        | 78° 25' | 13° 01'        | 13° 10' |
| Srinivasapur    | 78° 08'        | 78° 23' | 13° 13'        | 13° 35' |
|                 |                |         |                |         |
| India           | 68° 42'        | 97° 15' | 08° 24'        | 37° 36' |
| Karnataka state | 74° 00'        | 78° 18' | 11° 22'        | 18° 18' |
| Kolar District  | 77° 13'        | 78° 21' | 12° 28'        | 13° 35' |

Also the geographical coordinates of the taluk centre are given below:

| Centre             | Latitude ° N  | Longitude, ° E |
|--------------------|---------------|----------------|
| Kolar Taluk        | 13°08'12.04'' | 78°08'20.44''  |
| Bangarapet Taluk   | 12°59'04.97'' | 78°10'42.40''  |
| Malur Taluk        | 12°59'20.71'' | 77°55'42.12''  |
| Mulbagal Taluk     | 13°09'39.22'' | 78°23'19.11''  |
| Srinivasapur Taluk | 13°20'19.13'' | 78°12'38.15''  |

#### Documentation Provided by Project Participant:

PDD version 05

#### Information Verified by Lead Assessor:

Conversion of co-ordinates is found correctly reported in PDD version 05.

**Reasoning for not Acceptance or Acceptance and Close Out:** **Date:** 09/03/2010

Please refer comments in section A.4.1.4, A.4.2 and A.4.3 of the PDD version 06. Please provide corrected PDD

**Acceptance and Close out by Lead Assessor: Open** **Date:** 09/03/2010

**Project Participant Response:** **Date:** 24/03/2010

Comments in Section A4.1.4, A4.2 and A4.3 of PDD Version 06 have been incorporated in PDD V07

#### Documentation Provided by Project Participant:

PDD V07

#### Information Verified by Lead Assessor:

PP has submitted the revised PDD version 07 dated 24.03.2010

**Reasoning for not Acceptance or Acceptance and Close Out:** **Date:** 30/03/2010

The section A.4.1.4, A.4.2 and A.4.3 of the PDD version 07 has been corrected by PP and corrections was found consistence with the requirements. Thus CAR#03 has been closed out.

**Acceptance and Close out by Lead Assessor: Closed** **Date:** 30/03/2010

|       |            |         |            |                     |            |               |
|-------|------------|---------|------------|---------------------|------------|---------------|
| Date: | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |            |               |
| Type: | CL         | Number: | 04         |                     | Reference: | Section A.4.4 |

| <b>Lead Assessor Comment:</b>   | <b>Date:</b> 07/04/2009 |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
|---|-------------------------|---|---|--|--|-----------|-------|------|------------------------|--------------------|--------|-------------------------|-----------------------|-----------------|------|---|-----------------------|-----------------------------------|-----|--|--|-------------------|--------|--------------------|--|--|------|-------------------|--|--------------------|------|-------|--|----------------------------------|-----|--|--------------------|---------------|------|-------|--|---|--|--|--|-----------|-------|------|------------------------|---|------|---|-----------------|--------------------------------|-------|------|------|--------------------|------|-------|--|---|----|--|---|---------------|-----|-------|--|
| <p>5. In Section A 4.3 of PDD Version 01, from year 2011 to 2018 the estimated amount of emission reduction is exceeding the 60,000 CERs. As per the small scale methodology, the emission reduction should not exceed 60,000 CER at any year. Please justify.</p> <p>6. As per the methodology AMS-III.R, the project activity shall satisfy the following conditions</p> <ul style="list-style-type: none"><li>a. The sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures that ensure that there are no methane emissions must be ensured</li><li>b. Measure shall be used to ensure that all the methane collected by the recovery system is destroyed</li></ul> <p>7. PDD version 01, doesn't discussed about the above conditions</p> <p>8. PP has to demonstrate that the amount of waste or raw materials that would decay an-aerobically in the absence of the project activity is determined by survey of a sample group of households with a confidence level of 95%.</p>  |                         |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| <b>Project Participant Response:</b>  | <b>Date:</b> 27/04/2009 |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| <p>1. The emission reductions created by the project activity are now below 60,000 tCO<sub>2</sub>e in each year as is shown in the table in section A.4.3, p10 of PDD V03 and emission reduction spreadsheet entitled ER_Spreadsheet_Kolar_Project_v03. The reduction in PDD V03, in comparison with the original PDDV01, reflects the application of the 95% confidence level to the emission reduction calculations.</p> <p>2. The methodology AMS-III.R is suitable for the project activity because, among others, the following conditions are satisfied:</p> <p>i. <i>The sludge must be handled aerobically. In case of soil application of the final sludge the proper conditions and procedures that ensure that there are no methane emissions must be ensured:</i></p> <p>The sludge from the biodigesters will be used as a fertiliser by spreading thinly and directly on the ground, resulting in <u>aerobic</u> decomposition of the sludge. Training for biogas system users will include training on the proper handling of sludge. Note that PDD V01 had stated that the sludge may be fed into an anaerobic vermi-composter. This will no longer happen as there are no funds available to pay for the investment in the vermi-composter.</p> <p>ii. <i>Measure shall be used to ensure that all the methane collected by the recovery system is destroyed:</i></p> <p>The methane that builds up in the bio-digester is "destroyed" on a daily basis as it will be burnt by bio-digester users to meet household cooking requirements and in some cases water heating needs. The bio-digesters will not create any surplus gas beyond the requirements of the households. This is because calculations, based on the baseline data, demonstrate that the bio-digester will provide a maximum energy to the household of 4.1 GJ per year, which is lower than the actual household requirement of 5.7 GJ per year (please see calculations provided in Appendix 12).</p> <table><tr><th colspan="4">Energy provided by the biodigester</th></tr><tr><th>Parameter</th><th>Value</th><th>Unit</th><th>Source, where relevant</th></tr><tr><td>Methane production</td><td>115.95</td><td>kgCH<sub>4</sub>/year</td><td>Baseline calculations</td></tr><tr><td>Methane density</td><td>0.67</td><td>kgCH<sub>4</sub>/m<sup>3</sup>CH<sub>4</sub></td><td>Methodology AMS III-R</td></tr><tr><td>Quantity of methane in the biogas</td><td>50%</td><td></td><td></td></tr><tr><td>Biogas production</td><td>346.13</td><td>m<sup>3</sup>/yr</td><td></td></tr><tr><td>Calorific value of biogas in a biodigester</td><td>21.6</td><td>MJ/m<sup>3</sup></td><td>Nijaguna, B.T, Biogas Technology (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002).</td></tr><tr><td>Energy consumption</td><td>7.48</td><td>GJ/yr</td><td></td></tr><tr><td>Average stove thermal efficiency</td><td>55%</td><td></td><td>Stove manufacturer</td></tr><tr><td>Energy output</td><td>4.11</td><td>GJ/yr</td><td></td></tr></table> <table><tr><th colspan="4">Current energy used by the households (three stones stoves)</th></tr><tr><th>Parameter</th><th>Value</th><th>Unit</th><th>Source, where relevant</th></tr><tr><td>Quantity of biomass substituted per unit per year</td><td>4.74</td><td>t</td><td>Baseline survey</td></tr><tr><td>Net calorific value of biomass</td><td>0.015</td><td>TJ/t</td><td>IPCC</td></tr><tr><td>Energy consumption</td><td>71.1</td><td>GJ/yr</td><td></td></tr><tr><td>Average wood - stove thermal efficiency</td><td>8%</td><td></td><td><a href="http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf">http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf</a></td></tr><tr><td>Energy output</td><td>5.7</td><td>GJ/yr</td><td></td></tr></table> |                         | Energy provided by the biodigester                |   |  |  | Parameter | Value | Unit | Source, where relevant | Methane production | 115.95 | kgCH <sub>4</sub> /year | Baseline calculations | Methane density | 0.67 | kgCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub> | Methodology AMS III-R | Quantity of methane in the biogas | 50% |  |  | Biogas production | 346.13 | m <sup>3</sup> /yr |  | Calorific value of biogas in a biodigester | 21.6 | MJ/m <sup>3</sup> | Nijaguna, B.T, Biogas Technology (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002). | Energy consumption | 7.48 | GJ/yr |  | Average stove thermal efficiency | 55% |  | Stove manufacturer | Energy output | 4.11 | GJ/yr |  | Current energy used by the households (three stones stoves) |  |  |  | Parameter | Value | Unit | Source, where relevant | Quantity of biomass substituted per unit per year | 4.74 | t | Baseline survey | Net calorific value of biomass | 0.015 | TJ/t | IPCC | Energy consumption | 71.1 | GJ/yr |  | Average wood - stove thermal efficiency | 8% |  | <a href="http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf">http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf</a> | Energy output | 5.7 | GJ/yr |  |
| Energy provided by the biodigester  |                         |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Parameter   | Value                   | Unit  | Source, where relevant  |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Methane production  | 115.95                  | kgCH <sub>4</sub> /year                           | Baseline calculations   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Methane density   | 0.67                    | kgCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub> | Methodology AMS III-R   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Quantity of methane in the biogas   | 50%                     |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Biogas production   | 346.13                  | m <sup>3</sup> /yr                                |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Calorific value of biogas in a biodigester  | 21.6                    | MJ/m <sup>3</sup>                                 | Nijaguna, B.T, Biogas Technology (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002).  |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Energy consumption  | 7.48                    | GJ/yr   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Average stove thermal efficiency  | 55%                     |   | Stove manufacturer  |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Energy output   | 4.11                    | GJ/yr   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Current energy used by the households (three stones stoves)   |                         |   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Parameter   | Value                   | Unit  | Source, where relevant  |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Quantity of biomass substituted per unit per year   | 4.74                    | t   | Baseline survey   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Net calorific value of biomass  | 0.015                   | TJ/t  | IPCC  |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Energy consumption  | 71.1                    | GJ/yr   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Average wood - stove thermal efficiency   | 8%                      |   | <a href="http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf">http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf</a> |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |
| Energy output   | 5.7                     | GJ/yr   |   |  |  |           |       |      |                        |                    |        |                         |                       |                 |      |   |                       |                                   |     |  |  |                   |        |                    |  |  |      |                   |  |                    |      |       |  |                                  |     |  |                    |               |      |       |  |   |  |  |  |           |       |      |                        |   |      |   |                 |                                |       |      |      |                    |      |       |  |   |    |  |   |               |     |       |  |

3. Section B2.iii, p 16 of PDD V03 now discusses the above conditions described under point 2.

4. A survey of a sample group of households has now been carried out to determine the amount of waste that would decay an-aerobically in the absence of the project activity in the Kolar district. Calculations have also been performed to the 95% confidence level. The survey was carried out by SKG Sangha during December 2008. In total 361 households were surveyed: 75 in Bangarapet Taluk, 69 in Kolar Taluk, 69 in Malur Taluk, 68 in Mulbagal Taluk, and 80 in Srinivasapur Taluk. The emissions from all the parameters of the manure that would decay an-aerobically in the absence of the project activity have been adjusted in a conservative manner in order to ensure a precision at 95% confidence level according to the following equation:

$$BE = n_{hh,y} \left( \mu_{BE} - z \cdot \frac{\sigma_{BE}}{\sqrt{n_{bl}}} \right)$$

Where:

|                   |   |   |
|-------------------|---|---|
| BE                | = | The total amount of CO <sub>2</sub> emission in the pre-project situation             |
| n <sub>hh,y</sub> | = | Total number of households participating in the program for the monitoring interval y |
| σ <sub>BE</sub>   | = | Standard deviation of CO <sub>2</sub> emission in the baseline situation              |
| μ <sub>BE</sub>   | = | Mean of CO <sub>2</sub> emission of households included in the baseline sample group  |
| n <sub>bl</sub>   | = | Total number of households included in the baseline sample group                      |
| z                 | = | Standard normal for a confidence level of 95% (1.96)                                  |

A copy of the survey form and final survey findings are provided in Annex 3 of PDD V03 . The revised emission reductions that have been calculated to the 95% confidence level arising from avoided anaerobic waste decomposition in comparison with original calculations in PDD V01 are summarised in the table below (full calculations can be seen in the revised emission reduction spreadsheet entitled ER\_Spreadsheet\_Kolar\_project\_V03). Note that full survey responses are too lengthy to include in an Appendix to PDD V03 but have been supplied to the validator (see "Documentation Provided by Project Participant" below).

**Summary of avoided emissions associated with the anaerobic decomposition of manure and waste**

| Year        | Avoided emissions from anaerobic decomposition of manure and waste 95% confidence level (PDDV03) | Avoided emissions from anaerobic decomposition of manure and waste in PDD v01 |
|-------------|--|---|
| ER/per unit | 2.435  | 3.467   |
| 2010        | 10,148   | 14,447  |
| 2011        | 19,077   | 27,157  |
| 2012        | 24,354   | 34,670  |
| 2013        | 24,354   | 34,670  |
| 2014        | 24,354   | 34,670  |
| 2015        | 24,354   | 34,670  |
| 2016        | 24,354   | 34,670  |
| 2017        | 24,354   | 34,670  |
| 2018        | 24,354   | 34,670  |
| 2019        | 24,354   | 34,670  |

**Documentation Provided by Project Participant:**

**Documentation relevant to point 1:**

Revised emission reduction calculations are shown in ER\_Spreadsheet\_Kolar\_Project\_V03

**Documentation relevant to point 2:**

Calculations of energy provided by the bio-digester in comparison with current energy use are provided in Appendix 12

**Documentation relevant to point 3:**

N/A

**Documentation relevant to point 4:**

**Full survey findings**

SKG Sangha provided all the relevant survey data to the assessor during the site visit 5<sup>th</sup> to 8<sup>th</sup> January 2009. The relevant copies of the survey forms along with survey data sheets were also sent to SGS as attachments to the e-mail dated 17.2.2009 addressed to Mr Vivek Kumar Ahirwar.

**Copy of survey form**

A copy of the survey form and survey results are provided in Annex 3 of PDD V03

**Survey findings**

Full quantitative survey findings can be seen in ER Spreadsheet Kolar Project V03 which is provided with this submission.

**Information Verified by Lead Assessor:**

**Date:** 16/05/2009

1. Section A.4.3 of the PDD version 03 dated 28/04/2009 has mentioned aggregated annual estimated emission reductions due to project activity which is less than threshold 60ktCO<sub>2e</sub> as per Para 5 of AMS III R version 01. This was verified from estimated emission reduction calculation spread sheet version 03 dated 23/04/2009 provided by proponent. (Ok)
2. The sludge from the bio-digesters will be used to better the quality of soil by spreading thinly and directly on the ground, resulting in aerobic decomposition of the sludge and methane that builds up in the bio-digester is "destroyed" on a daily basis as it will be burnt by bio-digester users to meet household cooking requirements. This was verified from calculation spread sheet based on baseline data provided by proponent that shows the bio-digester will provide a maximum energy to the household of 4.1 GJ per year, which is lower than the actual household requirement of 5.7 GJ per year. Please refer below point 1. Please refer below clarification number 4. (Not Ok)
3. Source and reference of formula used for the 95% confidence level has not been provided by proponent. Please refer below clarification number 5. (Not Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

**Applicability criteria as per AMS I C version 13 ( Vs PDD version 3 ) :-**

1. Please refer PDD version 03 mentioned as installed thermal capacity of one unit is 2.97 kW; which has been calculated in separate spread sheet "Calculation of Thermal Equivalent V 2"; please clarify that which installed unit has capacity of 2.97 kW among the 2m<sup>3</sup> unit or 3m<sup>3</sup> unit. The thermal energy generation due to single biogas unit depends on methane generated by that biogas unit but the thermal equivalent as mentioned does not reflected the same. Please clarify.
2. Justification on the Para 3 and Para 4 of AMS IC version 13 has been missing in the PDD version 03 ; if those Para's of AMS I C has not applicable to project activity then the same needs to be mentioned in the PDD as not applicable .

**Applicability criteria as per AMS I E version 01 ( Vs PDD version 3 ) :-**

2. Project proponent needs to submit the undertaking regarding the proposed project activity is not saving the non-renewable biomass accounted for by the other registered project activities for justify Para 2 of AMS I E version 1.

**Applicability criteria as per AMS III R version 01 ( Vs PDD version 3 ) :-**

5. The justification related to the Applicability criteria according to para. 01 of AMS-III. R. version 01 has not been appropriately discussed in the PDD. Please justify the point that the animal manure is an aerobically decaying in the pit in the baseline scenario and also include the point such as depth of pit, retention time of animal manure & ambient temperature of the region in your discussion.
6. Please refer applicability criteria on page no 15 of PDD version 03 to justify the situation for methane emission avoidance in case (a) or (b) as per Para 1 of AMS III R version 01; and how the project scenario (b) of Para 1 of AMS III R version 1 is applicable as project activity involves installation methane recovery system (domestic biogas digester) instead of conventional pit.
7. Please refer applicability criteria on page no 14 of PDD version 03 mentioned that a single biogas system would be achieved an annual emission reduction of 2.12 tCO<sub>2e</sub>. Please clarify that which biogas system (i.e. 2 m<sup>3</sup> or 3 m<sup>3</sup>) would be achieving an annual emission reduction of 2.12 tCO<sub>2e</sub> .
8. Regarding justification of Para 4 (ii) as per AMS III R; proponent has compared maximum energy required to household in a year ; following clarification needs to provided by proponent:-
  - a. Please provide the calculation of Appendix 12 (Energy provided by the bio digester vs. current energy used by the households) in spread sheet so it can be easy to check the formula and calculation by reader.
  - b. Please clarify how the methane production (115.95 kgCH<sub>4</sub> / year) in the biogas digester has been calculated as reference source given for this data has not been traceable by reader in baseline calculation. Also reference source for "Quantity of methane in the biogas" as 50% has been missing in the Appendix 12. Since the calorific value of the biogas has been calculated considering 60% CH<sub>4</sub> concentration in the biogas, then the same also needs to be adopted for this calculation as well.
9. Please provide the source and reference of formula used for the 95% confidence level.

CL 04 is open.

**Acceptance and Close out by Lead Assessor: Open**

**Date: 20/05/2009**

**Project Participant Response:**

**Date: 18/06/2009**

**Applicability criteria as per AMS I C version 13 ( Vs PDD version 3 )**

1. The installed capacity of one unit is 2.97 kW irrespective of whether the household has a 2M3 or 3M3 bio-digester. This is because the installed capacity is determined by the technical characteristics of the stove that is being used to burn the bio-gas – specifically the maximum thermal energy that the stove can provide in an hour – and all the households in the project activity will be using the same type of stove. The difference between having a 2M3 or 3M3 bio-digester will determine the overall volume of biogas available for each household and hence the total number of hours over which the stove can be used for cooking. Hourly energy generation potential for each stove – that is thermal capacity for each unit - will however be the same for all households, irrespective of size of bio-digester.

This is clarified in the indicative simplified baseline and monitoring methodologies for selected small – scale CDM project activity categories, version 12:

[http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid06\\_v12.pdf](http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid06_v12.pdf)

The paragraph 7 states the definition of the output capacity of renewable equipment:

*“For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MWth is the installed/rated capacity of the thermal application equipment or device/s (e.g. biogas stoves)”.*

As the above definition shows, installed/rated capacity is determined by the equipment that transforms fuel into thermal energy by burning it – in this case the stove. The installed thermal capacity of the equipment (stove) is defined as the maximum thermal energy that the equipment can provide in an hour and it depends on the calorific value of the fuel (energy in the biogas per volume unit) and on the burning stove thermal efficiency.

## 2. AMS I.C version 13:

- a. Paragraph 3: For co-fired systems the aggregate installed capacity (specified for fossil fuel use) of all systems affected by the project activity shall not exceed 45 MWth. Cogeneration projects that displace/ avoid fossil fuel consumption in the production of thermal energy (e.g. steam or process heat) and/or electricity shall use this methodology. The capacity of the project in this case shall be the thermal energy production capacity i.e., 45 MWth.

Answer: Co – fired system uses both fossil and renewable fuels. In the proposed project activity, after introducing a biogas unit, fossil fuel will not be used; the biogas stove will burn only biogas for cooking purpose.

- b. Paragraph 4: In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should be lower than 45 MWth and should be physically distinct from the existing units.

Answer: The proposed project activity will replace inefficient traditional cooking stoves with cleaner biogas stoves. The project will reduce the amount of fuel wood and kerosene used for cooking stoves with cleaner biogas stoves, there are no existing renewable energy facilities.

### Applicability criteria as per AMS I E version 01 ( Vs PDD version 3 ) :-

A declaration confirming that the proposed project activity is not saving the non – renewable biomass accounted for by the other registered project activities is attached to this submission as Appendix 18.

### Applicability criteria as per AMS III R version 01 ( Vs PDD version 3 ) :-

1. In the proposed project activity, animal manure is currently dumped in pits. Each household has a pit in the ground which is at least 1 m deep, where waste from the cattle shed – cow dung, straw, green fodder and urine – is dumped. Waste from the cattle shed is dumped in the pit along with some crop waste, any food waste, and sometimes toilet waste. The waste is not turned or mixed during the year. Cow urine, wastewater from the kitchen and other liquids are added to keep the mass in the pits wet or liquid and during the rainy season the pits also get filled with rainwater. The pits are cleaned out once a year. Additionally the average annual temperature in the region is 29.7° C. The animal waste is therefore decaying anaerobically in the pit and emits methane.
2. After a discussion with SGS we both agree that this point does not need further clarifications.
3. The 2.12 tCO<sub>2</sub>e figure is a typing error the correct figure is 2.43 tCO<sub>2</sub>e. The calculation of 2.43 tCO<sub>2</sub>e was a weighted average annual reduction per bio-digester used in the project activity as a whole. The weights used to calculate this figure reflect the 70%:30% split of 2m<sup>3</sup> units and 3m<sup>3</sup> units that will be used in the project activity. Please note that this figure has been up – dated in order to fulfil CAR 13. In order to demonstrate that both the 3 m<sup>3</sup> unit and the 2 m<sup>3</sup> generates less than the 5 tCO<sub>2</sub>e annual amount from methane recovery permitted under the methodology AMS – III.R, both figures are now presented in the PDD version 04 section B.2 iii.
- 4.

- a. The up – dated spread sheet (with 60% CH<sub>4</sub> concentration in the biogas and the up – dated biogas generation) is attached in this submissions as Appendix 12.

**Energy provided by the biodigester**

| Parameter                                  | Value  | Unit  | Source, where relevant   |
|--|--------|---|--|
| Methane production                         | 93.81  | kgCH <sub>4</sub> /year                           | Baseline calculations  |
| Methane density                            | 0.67   | kgCH <sub>4</sub> /m <sup>3</sup> CH <sub>4</sub> | Methodology AMS III-R  |
| Quantity of methane in the biogas          | 60%    |   |  |
| Biogas production                          | 233.36 | m <sup>3</sup> /yr                                |  |
| Calorific value of biogas in a biodigester | 21.6   | MJ/m <sup>3</sup>                                 | Nijaguna, B.T, Biogas Technology (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002). |
| Energy consumption                         | 5.04   | GJ/yr   |  |
| Average stove thermal efficiency           | 55%    |   | Stove manufacturer   |
| Energy output                              | 2.77   | GJ/yr   |  |

**Current energy used by the households (three stones stoves)**

| Parameter   | Value | Unit  | Source, where relevant  |
|---|-------|-------|---|
| Quantity of biomass substituted per unit per year | 4.74  | t     | Baseline survey   |
| Net calorific value of biomass                    | 0.015 | TJ/t  | IPCC  |
| Energy consumption                                | 71.1  | GJ/yr |   |
| Average wood - stove thermal efficiency           | 8%    |       | <a href="http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf">http://www.nri.org/projects/biomass/conference_papers/household_energy.pdf</a> |
| Energy output                                     | 5.7   | GJ/yr |   |

- b. The annual methane production per unit has been calculated by: firstly, determining the weighted average annual methane emission reduction of each unit in the project activity (with weights reflecting the 70%:30% split of 2m<sup>3</sup> and 3 m<sup>3</sup> biogas units - that is, baseline methane emissions – project emissions = 1.964 tCO<sub>2</sub>e); and, secondly, dividing the weighted average annual methane emission reduction per unit by the global warming potential of methane (GWP = 21 tCO<sub>2</sub>e / tCH<sub>4</sub>), resulting in the amount of methane that is generated by the biogas unit and that is burnt in the stove (93.81 kgCH<sub>4</sub>/year).

The reference source for “Quantity of methane in the biogas” as 50%, is the default value for the fraction of methane in the SWDS published in the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site version 04”  
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v4.pdf>

However, in order to be consistent with the calorific value of the biogas calculation, a 60% CH<sub>4</sub> concentration in the biogas will be considered.

The 60% CH<sub>4</sub> concentration in the biogas figure is used to estimate the amount of biogas produced by the bio-digester; knowing the amount of CH<sub>4</sub> produced per year and the ratio methane / biogas (0.6), we can easily conclude that amount of biogas per year is CH<sub>4</sub> per year / 0.6.

5. The formula used for the 95% confidence level is based on statistical methods. In the EB 47, a draft general guideline on sampling and surveys has been published.

[http://cdm.unfccc.int/EB/047/eb47\\_repan27.pdf](http://cdm.unfccc.int/EB/047/eb47_repan27.pdf)

In Annex 1 of the above document, sampling formulas show the theoretical approach to estimate the 95% confidence level (see paragraph 5, annex 1), including the equation to calculate the standard deviation and the mean of a sample group used in the Kolar baseline calculations.

In the other hand, the Voluntary Gold Standard has developed a methodology called “Indicative program, baseline, and monitoring methodology for small scale biodigester projects”.

<http://www.cdmgoldstandard.org/Gold-Standard-Methodologies.347.0.html>

This methodology shows in page number 6 & 7 the equation that should be used to calculate the total amount of CO<sub>2</sub> emissions in the pre – project situation with a 95% confidence level. All the equations are based on the same statistical methods:

$$\sigma_{BE,th} = \sqrt{\frac{\sum (BE_{th,i} - \mu_{BE_{th}})^2}{n_{bi} - 1}}$$

|                  |   |   |
|------------------|---|---|
| $\sigma_{BE,th}$ | = | Standard deviation of CO <sub>2</sub> emission in the baseline situation  |
| $\mu_{BE,th}$    | = | Mean of CO <sub>2</sub> emission of households included in the baseline sample group                                  |
| $BE_{th,h}$      | = | The amount of CO <sub>2</sub> emission in household h included in the baseline sample group in the baseline situation |
| $n_{bl}$         | = | Total number of households included in the baseline sample group  |

$$BE = n_{hh,y} \left( \mu_{BE} - z \cdot \frac{\sigma_{BE}}{\sqrt{n_{bl}}} \right)$$

|               |   |   |
|---------------|---|---|
| BE            | = | The total amount of CO <sub>2</sub> emission in the pre-project situation             |
| $n_{hh,y}$    | = | Total number of households participating in the program for the monitoring interval y |
| $\sigma_{BE}$ | = | Standard deviation of CO <sub>2</sub> emission in the baseline situation              |
| $\mu_{BE}$    | = | Mean of CO <sub>2</sub> emission of households included in the baseline sample group  |
| $n_{bl}$      | = | Total number of households included in the baseline sample group                      |
| z             | = | Standard normal for a confidence level of 95% (1.96)                                  |

Where:

$$\frac{\sigma_{BE}}{\sqrt{n_{bl}}}$$

It is the standard error of the baseline emissions per households and  $z = 1.96$  is the 0.975 quartile of the standard normal distribution.

In a conservative way we have deducted from the mean of CO<sub>2</sub> baseline emissions, the maximum error in the baseline emissions calculations.

#### Documentation Provided by Project Participant:

Applicability AMS I.E

A declaration regarding the proposed project activity is not saving the non – renewable biomass accounted by the other registered project activities is attached in this submission as Appendix 18.

Applicability AMS III.R

Appendix 12: The up – dated spread sheet (with 60% CH<sub>4</sub> concentration in the biogas and the up – dated biogas generation)

**Information Verified by Lead Assessor:**

**Date:** 28/06/2009

Applicability criteria as per AMS I E and AMS IIIR and further justification provided in the revised PDD.

**Reasoning for not Acceptance or Acceptance and Close Out:**

**Applicability criteria as per AMS I C version 13 ( Vs PDD version 3 )**

1. Explanation regarding thermal capacity of single unit is cross checked with the EB 41 annex 20. As per the general guidance of EB 41 annex 20, para 7, *"Output capacity of renewable energy equipment...For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MWth is the installed/ rated capacity of the thermal application equipment or device/s (e.g. biogas stoves)."* Thus it was found justified that thermal capacity of the biogas unit is not dependent on the gas stove efficiency and not on the varying digester capacity (2m<sup>3</sup>/ 3m<sup>3</sup>). As all the biogas units will be using gas stove of same technical characteristics, therefore consideration of 2.97 kW thermal equivalent capacity for 2m<sup>3</sup>/ 3m<sup>3</sup> biogas units is found justified. Thus Thermal capacity of biogas stove has been accepted.
2. Proponent has been revised the PDD version 04 by providing justification regarding Para 3 and Para 4; the proposed project activity is not involving the co-fired system and there are no existing renewable equipment before the proposed project activity which satisfied the applicability criteria Para 3 and Para 4. (Ok)

**Applicability criteria as per AMS I E version 01 ( Vs PDD version 3 ) :-**

Proposed project activity is not saving the non-renewable biomass accounted for by the other registered project activity ; this was confirm with the written under taking dated 10<sup>th</sup> June 2009 submitted by proponent. (OK)

**Applicability criteria as per AMS III R version 01 ( Vs PDD version 3 ) :-**

1. The animal waste is decaying anaerobically in pit in absence of proposed project activity; this was justified by proponent in the revised PDD version 04 by means of explaining pervious management practice for treatment of animal manure and also by discussing average ambient of region and depth of pit to demonstrate anaerobic condition. (Ok)
2. Proposed project activity involve installation of biogas digester to change the management system of animal manure treatment which was treated in pit as per the Para 1 (b) of AMS III R. (Ok)
3. Proponent has been revised the PDD version 04 by modified the justification regarding annual emission reduction from single biogas system and also it is now clear that 2m<sup>3</sup> unit and 3 m<sup>3</sup> unit will be achieved 2.36 t CO<sub>2</sub> / year and 3.45 t CO<sub>2</sub> / year respectively which is less then threshold value 5 t CO<sub>2</sub> / year ; hence it was accepted. (Ok)
4. Regarding justification of Para 4 (b) as per AMS III R version 01:-
  - a. Proponent has been submitted the spread sheet for comparison between Energy provided by the bio digester and current energy used by the household. ( Ok)
  - b. The methane collected in the biogas recovery system will be combusted in the biogas based cooking stoves and to confirm the requirement of paragraph 4b of AMS III R version 01, project proponent has carried out a comparison between pre-project scenario energy output and project scenario energy output (Appendix 16 Energy provided by the bio vs current energy used). The calculation worksheet shows that, the energy output in case of pre-project scenario and in case of project activity as 5.1 GJ/year and 2.76 GJ/year respectively. Project activity produces lesser energy than the required energy (in the base case), thus considering the baseline energy demand it has been accepted that the methane captured under the project activity will be utilised and destroyed through combustion in biogas based cooking stoves. For calculation purpose, PP have used tCO<sub>2</sub>e (in baseline CO<sub>2</sub> generation through the manure) divided by 21. (OK)
5. In the survey results, standard error has been deducted and the conservative values were used for CER estimation. (Ok)

Thus CL 04 was closed out.

**Approved Methodology AMS I C :-**

Since the version 13 of approved methodology AMS I C is expired and the grace period for submission of requests for registration is 07 Dec 09 23:59 GMT for this version 13, hence it is advices to PP that please up-date the PDD as per latest valid version of approved methodology AMS I C available on UNFCCC web site.

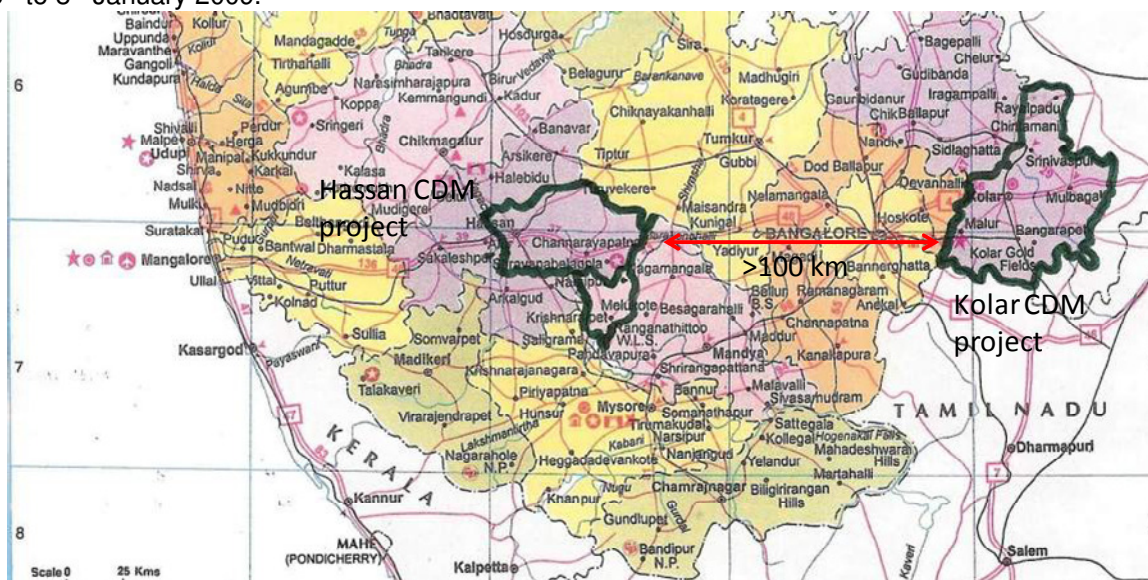
**Acceptance and Close out by Lead Assessor: Open**

**Date: 27/11/2009**

|   |                         |
|---|-------------------------|
| <b>Project Participant Response:</b>  | <b>Date:</b> 20/12/2009 |
| The PDD has been updated to accord with Version 16 of the approved methodology AMS I C.   |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| PDD V06   |                         |
| <b>Information Verified by Lead Assessor:</b>   | <b>Date:</b> 09/03/2010 |
| PDD has been revised as per Version 16 of the approved methodology AMS I C.   |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |                         |
| The sequence of justification in not in correct order (Please refer comment on PDDV6) .Please correct the sequence of justification.<br>CL#04 is open.    |                         |
| <b>Acceptance and Close out by Lead Assessor: Open</b>  | <b>Date:</b> 09/03/2010 |
| <b>Project Participant Response:</b>  | <b>Date:</b> 24/03/2010 |
| The sequence of justification has been placed in the correct order in PDD V07   |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| PDD V07   |                         |
| <b>Information Verified by Lead Assessor:</b>   | <b>Date:</b> 30/03/2010 |
| PP has been submitted the PDD version 07 dated 24/03/2010 with the correction in section B.1  |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |                         |
| The sequence of justification has been checked by validation team and found consistence with the AMC I C version 16. Thus this CL#04 has been closed out. |                         |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  | <b>Date:</b> 30/03/2010 |

|   |            |         |            |                     |               |  |
|---|------------|---------|------------|---------------------|---------------|--|
| Date:   | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |               |  |
| Type:   | CL         | Number: | 05         | Reference:          | Section A.6.1 |  |
| Lead Assessor Comment:  |            |         |            | Date: 07/04/2009    |               |  |
| Project proponent is requested to justify the non debundled status of the Kolar Biogas project activity, as another similar project activity (Hassan Biogas project) situated at similar region with the same project participants, in the same project category and technology/measure is currently undergoing CDM validation. |            |         |            |                     |               |  |
| Project Participant Response:   |            |         |            | Date: 27/04/2009    |               |  |

The similar project activity (Hassan Biogas project) is more than 100km away from the location of the Kolar Biogas project activity as shown on the map below which has now been incorporated into section A.4.5, pages 10-11 of PDD V03. Thus the areas of the two proposed project activities – Kolar Biogas project activity and Hassan Biogas project activity – do not border and there is significantly more than 1 km between the borders of the respective project boundaries. This was demonstrated to the assessor during the site visit that took place from 5<sup>th</sup> to 8<sup>th</sup> January 2009.



#### Documentation Provided by Project Participant:

The map shown above has now been incorporated into section A.4.5, pages 10-11 of PDD V03

#### Information Verified by Lead Assessor:

Date: 11/05/2009

Explanation given by proponent found acceptable. Please refer below comment (Not Ok)

#### Reasoning for not Acceptance or Acceptance and Close Out:

The distance of the two project sites (developed by same project proponent) has been cross checked with the political map of India and physical validation site visit, since the distance between the two project activities is more than 1 km, this project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB 30, Para 37).

However, project proponent is requested to provide a self declaration/undertaking towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling".

CL 05 is open.

#### Acceptance and Close out by Lead Assessor: Open

Date: 20/05/2009

#### Project Participant Response:

Date: 18/06/2009

Declaration towards non de-bundling based on EB guidelines is submitted as Appendix 18

#### Documentation Provided by Project Participant:

Declaration towards non – de-bundling based on EB guidelines

#### Information Verified by Lead Assessor:

Date: 28/06/2009

Project proponent has been submitted a self declaration towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling".

#### Reasoning for not Acceptance or Acceptance and Close Out:

Proposed project activity is not a debundled component of a large scale project activity in accordance to the requirement of Clarifications on determining the occurrence of de-bundling (EB 30, Para 37); this was accepted with the written declaration dated 10 June 2009 submitted by proponent towards non de-bundling issues based on guidelines on "Determining the occurrence of de-bundling".  
Hence CL#05 is closed out.

**Acceptance and Close out by Lead Assessor: Closed** | **Date: 28/06/2009**

|  |            |         |            |                     |               |
|--|------------|---------|------------|---------------------|---------------|
| Date:  | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |               |
| Type:  | CL         | Number: | 06         | Reference           | Section B.3.2 |
| Lead Assessor Comment:   |            |         |            | Date: 07/04/2009    |               |
| <div>1. Project proponent is requested further to justify the appropriateness of the baseline study which was conducted outside of the current project boundary. Please substantiate with objective evidences how the baseline survey conducted at Hassan Taluk of Hassan District should be considered as the most appropriate for Kolar Biogas project occurring at Kolar district.</div> <div>2. The baseline survey results related to average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area needs to be substantiated through survey documents/ reports.</div> |            |         |            |                     |               |
| Project Participant Response:  |            |         |            | Date: 27/04/2009    |               |

1. A survey has now been carried out to determine the baseline in the Kolar district. This was carried out by SKG Sangha during December 2008. In total 361 households were surveyed: 75 in Bangarapet Taluk, 69 in Kolar Taluk, 69 in Malur Taluk, 68 in Mulbagal Taluk and 80 in Srinivasapur Taluk. Survey sheets (provided in Annex 3 of PDD V03) were completed for every household surveyed. Weighted averages (according to different Taluks) for parameters were calculated using survey data and were used to determine emission reductions. Summary survey findings are shown in Annex 3 of PDD V03 and all quantitative data attained from the survey findings is now incorporated into the spreadsheet entitled ER\_Spreadsheet\_Kolar\_project\_v03. Full survey responses are too lengthy to be incorporated into an Appendix to the PDD but have already been made available to the validator (see Documentation Provided by the Project Participant below). Section B4, page 18 of PDD V03 has been modified to reflect this.

2. Survey documentation has been sent to SGS (see Documentation Provided by Project Participant below). A copy of the form used to carry out the survey and summary survey findings are provided in Annex 3 to PDD V03. All quantitative data attained from the survey can be seen in ER\_Spreadsheet\_Kolar\_project\_V03. The table below summarises baseline values on average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area, determined during the afore-mentioned baseline survey in Kolar District

| Parameter               | Surveyed value |         | Baseline parameter used in the PDD |        |
|-------------------------|----------------|---------|------------------------------------|--------|
|                         | Value          | Unit    | Value                              | Unit   |
| Kerosene consumption    | 1.99           | l/month | 23.88                              | l/year |
| Fuel wood consumption   | 12.79          | Kg/day  | 4.7                                | t/year |
| Animal waste generation | 96.76          | Kg/day  | -*                                 |        |

\* - Total animal waste generation is not used for calculations of emission reductions according to formulae stipulated under the AMS-III.R 'Methane recovery in agricultural activities at household/small farm level' and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

#### Documentation Provided by Project Participant:

##### **Documentation relevant to both points 1 & 2:**

##### **Full survey findings**

SKG Sangha provided all the relevant survey data to the assessor during the site visit that took place from 5<sup>th</sup> to 8<sup>th</sup> January 2009. The relevant copies of the survey forms along with survey data sheets were also sent to SGS as attachments to the e-mail dated 17.2.2009 addressed to Mr Vivek Kumar Ahirwar.

##### **Copy of survey form**

A copy of the survey form and survey results are provided in Annex 3 of PDD V03

##### **Survey findings**

Full quantitative survey findings can be seen in ER\_Spreadsheet\_Kolar\_Project\_V03 which is provided with this submission.

**Information Verified by Lead Assessor:**

**Date:** 11/05/2009

1. A survey has been carried out by SKG Sangha during December 2008 to determine the baseline in the Kolar district. Same has been revised in section B.4 of PDD version 3. (Ok)
2. The baseline survey results related to average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area are base on survey has been carried out by SKG Sangha during December 2008. Please refer the below comment. (Not Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

Please provide the summarised calculation in spread sheet "Final Kolar project survey report" (send to DOE on 17/02/2009) to verified the survey value of Kerosene consumption (1.99 l/month), fuel wood consumption (12.79 kg/day) and animal waste generation (96.76 kg/day) of a household in the project area. CL 06 is open.

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 20/05/2009

**Project Participant Response:**

**Date:** 18/06/2009

Survey documentation is attached to this submission as Appendix 25

There was a typing error in the data given in the table above. The up – dated table below summarises baseline values on average kerosene consumption, fuel wood consumption and animal waste generation of a household in the project area, determined during the afore-mentioned baseline survey in Kolar District

| Parameter               | Surveyed value |         | Baseline parameter used in the PDD |        |
|-------------------------|----------------|---------|------------------------------------|--------|
|                         | Value          | Unit    | Value                              | Unit   |
| Kerosene consumption    | 2.00           | l/month | 24.12                              | l/year |
| Fuel wood consumption   | 12.99          | Kg/day  | 4.7                                | t/year |
| Animal waste generation | 98.18          | Kg/day  | -*                                 |        |

\* - Total animal waste generation is not used for calculations of emission reductions according to formulae stipulated under the AMS-III.R 'Methane recovery in agricultural activities at household/small farm level' and the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

**Documentation Provided by Project Participant:**

Survey documentation is attached to this submission as Appendix 25

**Information Verified by Lead Assessor:**

**Date:** 28/06/2009

Survey documentation has been modified by proponent and same has been submitted to DOE. Please refer below comment. (Not Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

Proponent needs to clarify that why the value of baseline parameter for kerosene consumption used in PDD is 24.12 l/year; where as the surveyed value saying the same as 2.00 l/month i.e. 24 l/year? Hence CL 06 is open.

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 28/06/2009

**Project Participant Response:**

**Date:** 04/08/2009

This is explained by rounding errors. The average value surveyed of the kerosene used for cooking is 1.6911 l/month and the average value surveyed of the kerosene used for starting fire in traditional stove is 0.3154 l/month, this leads on a total kerosene consumption of 2.0065 l/month. These figures should be rounded up to  $1.69 + 0.32 = 2.01$  l/month

|  |                         |
|--|-------------------------|
| <b>Documentation Provided by Project Participant:</b>  |                         |
| No document  |                         |
| <b>Information Verified by Lead Assessor:</b>  |                         |
| Correct value of $F_{\text{kerosene}}$ is 24.12 litres/annum.  |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   | <b>Date:</b> 27/11/2009 |
| The value for $F_{\text{kerosene}}$ is 24.12 litres which is the average value surveyed of the kerosene used for cooking is 1.6911 l/month and for starting fire in traditional stove is 0.3154 l/month, this leads on a total kerosene consumption of 2.0065 l/month. Same was crossed - checked with submitted survey data and found correct. Hence CL#6 was closed out. |                         |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>   | <b>Date:</b> 27/11/2009 |

|  |            |            |                     |                         |               |
|--|------------|------------|---------------------|-------------------------|---------------|
| Date:  | 07/04/2009 | Raised by: | Vivek Kumar Ahirwar |                         |               |
| Type:  | CAR        | Number:    | 07                  | Reference:              | Section B.4.1 |
| <b>Lead Assessor Comment:</b>  |            |            |                     | Date: 07/04/2009        |               |
| <p>3. The CDM project start date as described in the Section C.1.1 of PDD, v01 is not representing the complete transparency, as it as an assumed timeline. The specific start date of the proposed CDM project activity needs to be further substantiated in accordance with the definition of "Starting date of a CDM project activity" EB 41 Meeting Report para 67.</p> <p>4. The project activity would have not occurred due to the described project barriers and how the CDM revenue has been seriously considered by the PP to revive the project acceptability needs to be explained further along with the requirement of EB 41 Annex 46 Guideline (now EB62 Annex 13).</p> |            |            |                     |                         |               |
| <b>Project Participant Response:</b>   |            |            |                     | <b>Date:</b> 27/04/2009 |               |

1. The EB 41 para 67 refers to the Glossary of CDM terms and clarifies what the definition means. The CDM-Glos-03 provides the following definition: "The starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins". The project start date is 1<sup>st</sup> May 2009. This has been chosen because this is the start date for project construction. This start date is documented in a signed letter "to whom it may concern" from CH4NGE Ltd. who will provide funding for the project. This letter is provided as Appendix 2.

Additionally, a purchase order for pipes, which also refers to the start date of 1 May 2009, is provided in Appendix 3.

2. **Barrier.** The project activity would not have occurred anyway because of the investment barrier referred to in EB35 Report Annex 34 Non-Binding Best Practice examples to Demonstrate Additionality for SSC Project Activities. That is, there are financially more viable alternatives to the project activity. This is demonstrated in our response to CAR 08 (1) below. Section B5, p30 (*Investment Barrier*) of PDD V03 has been modified accordingly. Further, the project activity would not have occurred without the CDM because, quite simply, beneficiary households could not afford the bio-digester units without the 73% cost subsidy provided by the sale of CERs. This is demonstrated by the fact that the bio-digesters cost between 82% and 103% of the average household income in the project activity area. This calculation is based on survey findings. Survey findings showed that the average annual income of households in the project area is around INR 25,468 whereas the bio-digesters cost INR 20,899 (2 cubic metre capacity) and INR 26,219 (3 cubic metre capacity). Survey findings are summarised in Annex 3 to PDD V03. All surveys were made available to the verifiers (see "Documentation Provided by Project Participant" below) during the site visit and full details of survey results are provided in the ER\_Spreadsheet\_Kolar\_project\_v03 spreadsheet). The prohibitive cost of the bio-digesters is further substantiated by the fact that nearly all of the biogas systems that have been installed to date have been paid for by the government subsidy programme and almost all biogas plants owners are basically farmers with an average annual income of INR 49,649 (i.e. richer farmers than those in the Kolar region) this is shown in the "Evaluation Study On National Project on Biogas Development, Programme Evaluation Organization Planning Commission, Government of India, New Delhi, 2002".

[http://planningcommission.gov.in/reports/peoreport/peoevalu/peo\\_npbpd.pdf](http://planningcommission.gov.in/reports/peoreport/peoevalu/peo_npbpd.pdf)

**Prior Consideration.** EB 41 Annex 46 Guideline is 'Guidance on the demonstration and assessment of prior consideration of the CDM'. It has different provisions for projects that start before 2 August 2008 (existing project activities), and those that start after that date (new project activities). For the new project activities, this guideline says that *'the project participant must inform a Host Party DNA and/or the UNFCCC Secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date [...]. Such notification is not necessary if a PDD has been published for global stakeholder consultation [...].'* The PDD was published for Global consultation at the commencement of the validation of the PDD so no further action is required. Section C.1.1.page 54 of the PDD has been modified to clarify this issue.

**Documentation Provided by Project Participant:**

**Documentation relevant to point 1**

The letter from CH4NGE Ltd, confirming the start date, has been provided to SGS as Appendix 2 and the purchase order for pipes was attached as Appendix 3. Both appendices were sent to SGS in e-mails dated 03.03.2009 addressed to Ajoy Gupta

**Documentation relevant to point 2**

**(a) Full survey findings**

SKG Sangha provided all the relevant survey data to the assessor during the site visit which took place from 5<sup>th</sup> to 8<sup>th</sup> January 2009. The relevant copies of the survey forms along with survey data sheets were also sent to SGS as attachments to the e-mail dated 17.2.2009 addressed to Mr Vivek Kumar Ahirwar.

**(b) Copy of survey form**

A copy of the survey form and survey results are provided in Annex 3 of PDD V03

**(c) Survey findings**

Full quantitative survey findings can be seen in ER\_Spreadsheet\_Kolar\_Project\_V03 which is provided with this submission.

**Information Verified by Lead Assessor:**

**Date:** 11/05/2009

1. Start date of project activity has not been correctly identified as per Para 67 of EB 41 report in the section C.1.1 of the PDD version 03. Please refer below comment 01( Not Ok)
2. The investment barrier as per EB35 Report Annex 34 Non-Binding Best Practice examples to Demonstrate Additionality for SSC Project Activities has been chosen by proponent to demonstrate additionality .(Ok)
3. The start date of project activity is after 2<sup>nd</sup> August 2008 and PDD was web hosted for public comment on UNFCCC web site during 16/09/2008 to 15/10/2008 and contract was signed with DOE on 08/09/2008 which shows that project activity is inline with Annex 46 of EB report 41 (now EB 62 Annex 13). This would be further checked after project proponent responded for below comment..

**Reasoning for not Acceptance or Acceptance and Close Out:**

Please clarify that why the start date of project activity has been considered as 1 May 2009 as the project activity start date as per Para 67 of EB41 report which stating that "starting date of a CDM programme activity is the earliest date at which either the implementation or construction or real action of a programme activity begins"; however the agreement between SKG Sangha and CH4NGE Ltd stating that the fund for Kolar Biogas Project will be provided by CH4NGE Ltd has been signed on 18<sup>th</sup> December 2008 which is before 1 May 2009 shows that earliest date at which real action of a project activity begins CAR07 is open.

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 20/05/2009

**Project Participant Response:**

**Date:** 18/06/2009

The start date of the project activity has been changed to the date of the signature of the agreement between SKG Sangha and CH4NGE, 18<sup>th</sup> December 2008 (please see PDD v04 section C.1.1). As the PDDv01 was published for global consultation on the 16<sup>th</sup> September 2008, a notification is not needed in order to justify the prior consideration of the project activity.

**Documentation Provided by Project Participant:**

Revised PDD version 04

**Information Verified by Lead Assessor:**

**Date:** 28/06/2009

The start date of project activity is date of the signature of the agreement between SKG Sangha and CH4NGE, 18<sup>th</sup> December 2008 and same has been revised in the PDD version 04 .The PDD version 01 has been web hosted before the start date.

**Reasoning for not Acceptance or Acceptance and Close Out:**

The start date of the project activity is 18/12/2008 which is the date of of the signature of the agreement between SKG Sangha and CH4NGE, dated 18<sup>th</sup> December 2008 was the earliest start date at which financial commitments were made as definition of Start date as per CDM glossary of terms and EB41 Para 67 guidance. The PDD was web hosted before the start date of project activity hence proposed project activity is under the new project activity as per Annex 46 EB 41 (now EB 62 Annex 13) hence a notification is not needed in order to justify the prior consideration of the project activity.  
CAR 07 is closed out.

|  |                         |
|--|-------------------------|
| <b>Acceptance and Close out by Lead Assessor: Closed</b> | <b>Date: 28/06/2009</b> |
|--|-------------------------|

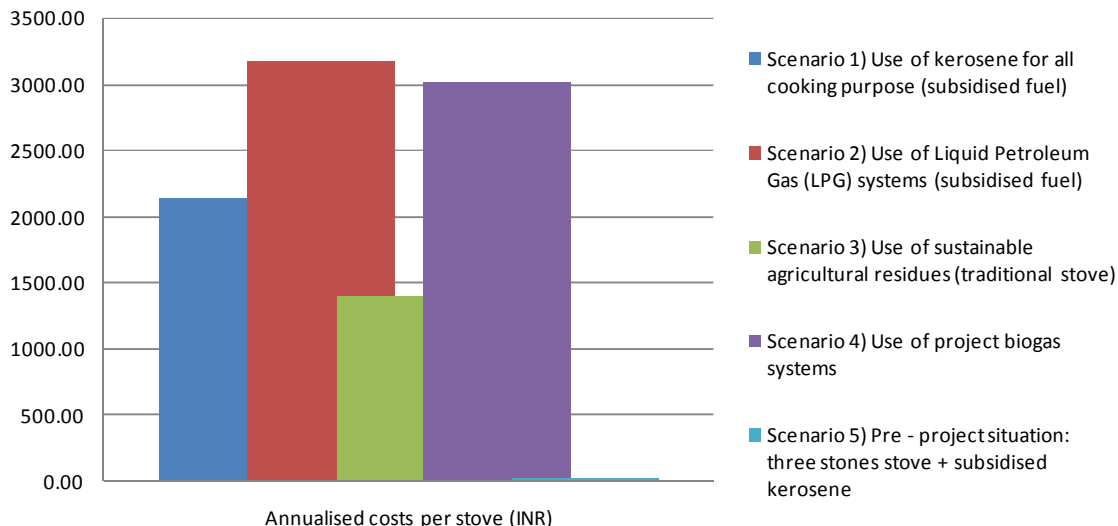
|       |            |         |            |                     |               |
|-------|------------|---------|------------|---------------------|---------------|
| Date: | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |               |
| Type: | CAR        | Number: | 08         | Reference:          | Section B.4.4 |

|   |                  |
|---|------------------|
| <b>Lead Assessor Comment:</b>   | Date: 07/04/2009 |
| <ol style="list-style-type: none"> <li>1. Project additionality has not been described as per the requirements of EB35_repan34, Non-binding best practice examples to demonstrate additionality for SSC project activities.</li> <li>2. Project proponent needs to substantiate the facts and figures as discussed under financial/investment analysis for identified baseline alternatives regarding the following - <ul style="list-style-type: none"> <li>- Cost of kerosene and use of kerosene,</li> <li>- Cost of LFG systems and use of LPG systems in rural India,</li> <li>- Use of sustainable agriculture residues,</li> <li>- Availability of government subsidies for biogas systems in rural India,</li> <li>- Average annual household income in project region and</li> <li>- Installation cost of biogas units (2m3 and 3m3 variety).</li> </ul> </li> <li>3. Project proponent is requested to provide proper traceable statistics regarding the numbers of biogas plants already installed in the project region and initiatives under which the biogas plants have been implemented.</li> <li>4. Project proponent is requested to provide proper substantiation for the claim regarding no initiatives for installation of biogas units supported by other NGOs or public agencies are available at the project boundary.</li> </ol> |                  |

|                                      |                         |
|--------------------------------------|-------------------------|
| <b>Project Participant Response:</b> | <b>Date: 27/04/2009</b> |
|--------------------------------------|-------------------------|

|   |  |
|---|--|
| <p>1. The EB35_repan34 'Non-binding best practice examples to demonstrate additionality for SSC project activities' says:</p> <p><i>'1. Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:</i></p> <p><i>(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;</i></p> <p><i>Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency). It is recommended to use national or global accounting practices and standards for such an analysis.</i></p> <p><i>(b) Access-to-finance barrier: the project activity could not access appropriate capital without consideration of the CDM revenues;</i></p> <p><i>Best practice examples include but are not limited to, the demonstration of limited access to capital in the absence of the CDM, such as a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.'</i></p> <p>The main barrier faced by the proposed project activity is the investment barrier. The only revenue stream comes from the CDM, therefore a simple cost analysis has been used. An annualised cost comparison of the project activity and the alternatives is now detailed in section B5, (<i>Financial/investment analysis</i>) and accompanying Annex 7 of PDD V03. The analysis is predominantly based on data provided in the "<i>Report on the use of LPG as a domestic cooking fuel option in India</i>", International Energy Initiative, 2004 (reference 6, Annex 5 of PDD V03) . All calculations are shown in Annex 7 of PDD V03.</p> <p>The graphic below summarises the annualised cost of each scenario considered. It clearly shows that there are several financially more viable activities that would have lead to higher emissions than the Project Activity – depicted by scenario (4).</p> |  |
|---|--|

### Annualised cost of the Project Activity and Alternative Scenarios



## 2. Further substantiation of facts and arguments used for the analysis of baseline alternatives

- Cost of kerosene and use of kerosene

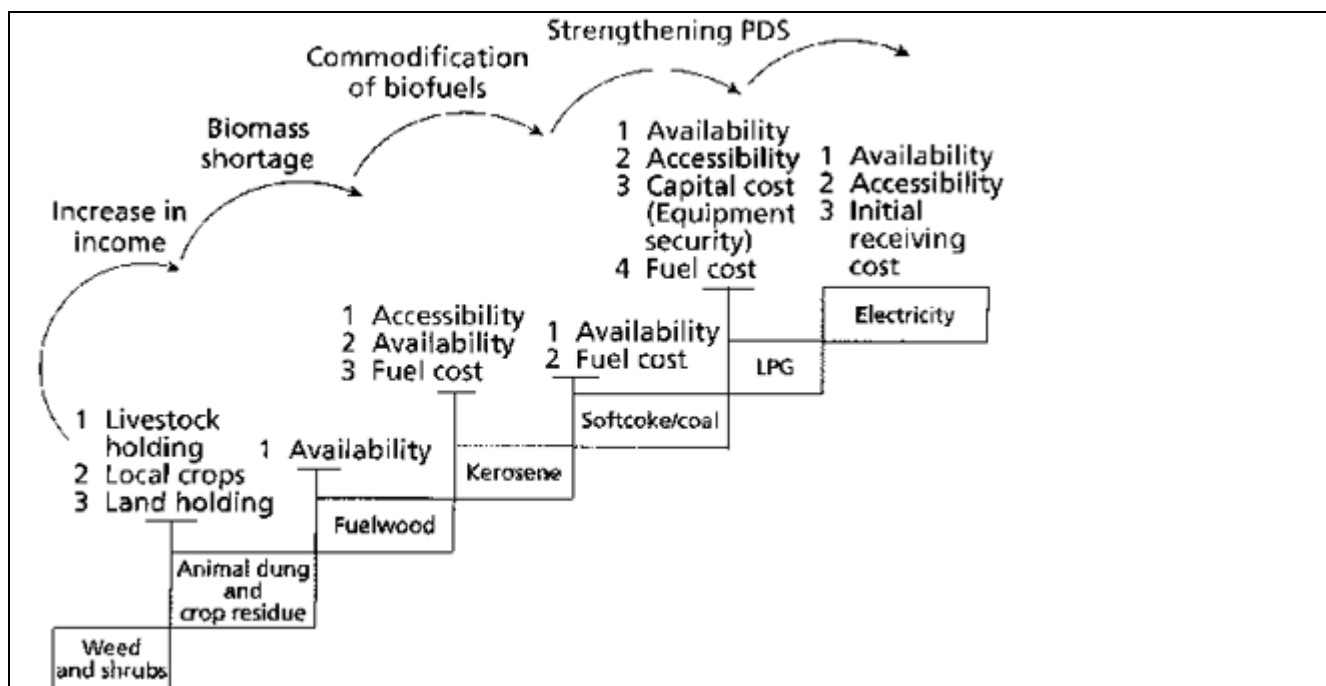
Data attained from the “Report on the use of LPG as a domestic cooking fuel option in India” (reference 6, Annex 5 of PDD V03) and from the baseline survey (which provides details of the current subsidised kerosene price) show that the annualised cost of using Kerosene for cooking is approximately INR 2,100. This is significantly about the annualised cost of the baseline scenario (scenario 5 – a continuation of the pre-project situation, which has an annualised cost of only INR 30).

Given its relatively high costs, kerosene is used primarily for enhancing the burning of fuel wood and for lighting. It is not generally used as an alternative primary fuel as most families cannot afford to buy enough kerosene for all their cooking needs and will continue using free fuel wood as their primary cooking fuel in the absence of the project activity. The prevailing practice by the public sector in India today is to make kerosene as cooking fuel available to families below the poverty line through the public distribution system at subsidized prices. The public distribution system for subsidised fossil fuel in the cooking fuel sector (including LPG) is working well. However, in many cases the kerosene is still too expensive for families to buy in the open market and only 3 litres per month is given through the Public Distribution System, which is by far not enough for meeting the household cooking needs. In spite of such subsidies existing for many decades they have failed to shift fuel consumption patterns away from biomass in rural areas (this is shown in “Reducing subsidies on household fuels in India: how will it affect the poor? Energy Policy 33 (2005)”. (<http://www.idfresearch.org/pdf/fuel%20subsidy.pdf>) (reference 8, Annex 5 of PDD V03).

The lower use of Kerosene for cooking in comparison with fuel wood is supported by external references e.g. the Preeti Malhotra article ‘Environmental implications of the energy ladder in rural India’ (<http://www.hedon.info/EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia>) (reference 7, Annex 5 of PDD V03) which gives a scheme of the energy ladder in rural India shown in figure 1 which demonstrates that kerosene is the next fuel used after fuelwood or fuelwood mix with crop residues. I.e., households need more income to overcome the barrier presented by fuel costs.

Figure 1 gives the Energy Ladder in Rural India, and barriers inhibiting transition to commercial fuels for cooking. Factors that can bring about transition to commercial fuels are highlighted in the boxes Section B.5, pages 25 -27 ((a) Use of kerosene for all cooking purposes) of the PDD V03 has been modified to reflect the above clarification.

Figure [1]



Additionally, circulars (in national language) from the Zilla Panchayat have been sent to SGS in Appendix 5 which give information on kerosene provided to households in rural areas.

## – Cost of LPG systems and use of LPG systems in rural India

Data attained from the "Report on the use of LPG as a domestic cooking fuel option in India", (reference 6, PDD V03) and from the actual official subsidised LPG price, show that the annualised cost of using LPG systems for cooking is approximately 3,200 INR. This is significantly above the annualised cost of the baseline scenario 5 (INR 30).

The limited use of LPG systems for cooking is corroborated by the article entitled 'Environmental implications of the energy ladder in rural India' (reference 7, PDD V03)

(<http://www.hedon.info/EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia>), shown in figure 1 above, which demonstrates that LPG systems are the third fuel used after fuelwood or fuelwood mix with crop residues. The high cost of LPG systems is also supported by an article on kerosene and gas stoves in South India published on HEDON (Household Energy Network) website

(<http://www.hedon.info/BP20:KeroseneAndGasStovesInNagercoil>) shown in Appendix 13, which states that "only relatively wealthy urban households will be in a position to afford gas stoves".

Additionally, circulars (in national language) from the Zilla Panchayat (that have been sent to SGS in Appendix 5) give information on LPG connections in town areas of Taluks. Section B.5, p27-28 ((b) *Installation of Liquid Petroleum Gas (LPG) systems*) of PDD V03 has been modified to reflect the above clarification.

## – Use of sustainable agriculture residues

Data attained from the "Report on the use of LPG as a domestic cooking fuel option in India", (reference 6, PDD V03) shows that the annualised cost of using sustainable agricultural residues for cooking is approximately INR 1,400. This is significantly above the annualised cost of the baseline scenario (INR 30). Furthermore, significant use of sustainable agricultural residues is not a viable scenario for two reasons. Firstly, there are limited sustainable agricultural residues available and secondly, the combustion of agricultural wastes is less efficient than burning fuel wood. According to the study on biomass management for sustainable soil fertility in Hassan district, carried out by the University of Agricultural Sciences Bangalore (reference 10 in Annex 5 of PDD V03) agricultural crops (e.g. Ragi, paddy, pulses, and other cereals) do not produce enough agricultural waste for providing a substantial source of fuel for meeting cooking needs. The

study was carried out in the Hassan district also in Karnataka and is applicable to Kolar as the technical report by Ramachandra on bioresource potential in Karnataka (Ref. 4 in the PDD) shows that fuel use for cooking is the same in the Eastern Dry zone where Kolar district lies and the Southern Dry zone where Hassan district lies.

Some beneficiary households (around 35% of the survey households) in the proposed project activity do indeed use small quantities of sustainable biomass residues for cooking purposes. This biomass use is not counted in the emission reduction calculations because the amount of biomass residues used is very low compared to the total amount of biomass used in a household. However, the sustainable biomass residues have zero net CO<sub>2</sub> emissions.

Section B.5, pages 28-29 ( *(c) The use of sustainable agricultural residues (biomass) as a fuel*) of PDD V03 has been modified to reflect the above clarification.

- Availability of government subsidies for biogas systems in rural India

Government subsidies were available under the centrally sponsored scheme National Project on Biogas Development (NPBD) under the Ministry of Non-conventional Energy Sources (MNES). Typically between 30 to 50% cost for building plant came in the form subsidy provided under this programme, and the balance amount (50 to 70%) was met by plant owners from their own resources and/or by taking loans from banks.

Government subsidies have contributed to biogas units in the past but such financing is not able to cover the vast need for improving the energy supply to rural households in India. This is shown in Appendix 11, a letter from the (local government) which provides details on biogas units built in the project area using government funds.

Limited subsidies are available and are decreasing. The Karnataka State targets for installation of biogas units in financial years 2007-08 and 2008-09 are 4,000 and 2,500 for the whole state, respectively, but none of these planned units are foreseen for the Kolar district. Details of the state-wide allocation of biogas units are provided in Appendix 10.

Section B.5, page 29, (*(d) Installation of biogas systems without the CDM*) of PDD V03 has been modified to reflect the clarification provided above.

- Average annual household income in project region

The survey showed that the average annual household income of the project area is around INR 25,468 (ca. €390) Section B.5, page 29, (*(d) Installation of biogas systems without the CDM*) of PDD V03 has been modified to reflect the clarification provided above. The survey findings are summarised in the spreadsheet entitled ER\_Spreadsheet\_Kolar\_project\_v03. Survey responses are too detailed to be incorporated into an Appendix to PDD V03. They have, however, been supplied to the verifier (see *documentation provided by the project participant* below)

- Installation cost of biogas units (2m<sup>3</sup> and 3m<sup>3</sup> variety).

SKG Sangha has spent more than 15 years on standardising the biogas plant design that is suitable for the area, durable, easy to maintain, acceptable to local people, and can function for many years. There are biogas plants that were installed 15-16 years ago that are still functioning well. The breakdown of costs for building 2m<sup>3</sup> and 3m<sup>3</sup> biogas units is given in a table below:

| Item                | Unit | Cost per unit | Small-2M <sup>3</sup> |            | Large-3M <sup>3</sup> |            |
|---------------------|------|---------------|-----------------------|------------|-----------------------|------------|
|                     |      |               | Quantity              | Cost       | Quantity              | Cost       |
| Bio-digester costs: |      |               |                       | Rs. 20,899 |                       | Rs. 26,219 |

|  |  |                    |      |               |            |               |            |
|--|--|--------------------|------|---------------|------------|---------------|------------|
|  | Beneficiary contribution                       |                    |      |               | Rs. 4,899  |               | Rs. 7,819  |
|  | Financed by CDM                                |                    |      |               | Rs. 16,000 |               | Rs. 18,400 |
|  | Breakdown of bio-digester cost:                |                    |      |               |            |               |            |
|  | Materials:                                     |                    |      |               |            |               |            |
|  | Bricks   | Brick              | 4.5  | 950           | Rs. 4,275  | 1250          | Rs. 5,625  |
|  | Sand   | Cubic feet         | 30   | 80            | Rs. 2,400  | 112           | Rs. 3,360  |
|  | Metal chips                                    | Cubic feet         | 40   | 30            | Rs. 1,200  | 45            | Rs. 1,800  |
|  | Cement   | Bags of 50 kg each | 280  | 14            | Rs. 3,920  | 16            | Rs. 4,480  |
|  | Mild steel                                     | Kg                 | 50   | 12            | Rs. 600    | 16            | Rs. 800    |
|  | 6" dia Asbestos cement pipe                    | M                  |      | 1.6           | Rs. 144    | 1.6           | Rs. 144    |
|  | G.I nipple with welded brackets 1/2 dia        | Unit               | 60   | 1             | Rs. 60     | 1             | Rs. 60     |
|  | Stove with double burner                       | Unit               | 1200 | 1             | Rs. 1,200  | 1             | Rs. 1,200  |
|  | High density polyethylene pipe 20 mm           | M                  | 15   | on average 30 | Rs. 450    | on average 30 | Rs. 450    |
|  | Gate valve and other pipe fittings             | Unit               | 500  | 1             | Rs. 500    | 1             | Rs. 500    |
|  | Transport and handling                         |                    |      |               | Rs. 400    |               | Rs. 450    |
|  | Labour   |                    |      |               |            |               | Rs. 0      |
|  | Digging of a pit                               |                    |      |               | Rs. 1,400  |               | Rs. 2,000  |
|  | Masonry  |                    |      |               | Rs. 1,200  |               | Rs. 1,600  |
|  | Unskilled labour                               |                    |      |               | Rs. 2,000  |               | Rs. 2,600  |
|  | Pipe fitting                                   |                    |      |               | Rs. 150    |               | Rs. 150    |
|  | Overheads                                      |                    |      |               | Rs. 1,000  |               | Rs. 1,000  |
|  | <b>Total bio-digester costs (per digester)</b> |                    |      |               | Rs. 20,899 |               | Rs. 26,219 |

Documentation on all of the above was provided for inspection by the assessor during the site visit 5<sup>th</sup> -8<sup>th</sup> January 2009. Section B.5, page 29, ((d) *Installation of biogas systems without the CDM*) of PDD V03 incorporates summary bio-digester cost information.

3. Traceable statistics regarding the numbers of biogas plants already installed in the project region and initiatives under which the biogas plants have been implemented

A letter from the local government was provided to SGS in Appendix 6 that shows the number of biogas units installed in the project area using government funds. This shows that an average of 416 biodigesters units per year have been built in the project area from 1995 to 2000 which represents only the 0.16 % of the total

biogas construction per year in India (250,000 per year). Section B.5, *page 29, ((d) Installation of biogas systems without the CDM)* of PDD V03 has been modified to reflect this.

4. Substantiation for the claim regarding no initiatives for installation of biogas units supported by other NGOs or public agencies are available at the project boundary  
 A letter from the local government confirms that SKG Sangha is the only organisation implementing a biogas programme in the Kolar district and has been supplied to SGS as Appendix 7.

**Documentation Provided by Project Participant:**

### 1. Documentation Relevant to Point 1 and Point 2

PDD V03 now incorporates a new Annex 7 which details the annualised cost calculations that underpin the additionality arguments. This analysis has been carried out using data and information attained from two reports, entitled "Report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004 (see <http://www.iei-asia.org/IEIBLR-LPG-IndianhomesReport.pdf>) and 'Environmental implications of the energy ladder in rural India', Preeti Malhotra (<http://www.hedon.info/EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia>). These are references 6 and 7 in Annex 5 of PDD V03.

### 2. Documentation Relevant to Point 2

*Cost of Kerosene/ Use of Kerosene* - The ineffectiveness of subsidies was shown in reference 8, Annex 5, PDD V03 - Gangopadhyay, S, Ramaswami, B and Wadhwa, W, Reducing subsidies on household fuels in India: how will it affect the poor?, Energy Policy 33 (2005). (see <http://www.idfresearch.org/pdf/fuel%20subsidy.pdf>).

*Cost of LPG Systems/ Use of LPG Systems* - Circulars (in national language) from the Zilla Panchayat with information on kerosene provided to households in rural areas and LPG connections in town areas of taluks in Kolar District (Appendix 5) and letter from Kolar Zilla Panchayath on biogas units installed under the government programme (Appendix 6) were sent to SGS in an e-mail dated 03.03.2009 addressed to Ajoy Gupta.

*Use of sustainable agricultural residues* - A study on biomass management for sustainable soil fertility in Hassan district, carried out by the University of Agricultural Sciences Bangalore ( is provided in reference 10 in Annex 5 of PDD V03)

*Availability of subsidies* - Appendix 11, a letter from the (local government) provides details on biogas units built in the project area using government funds.

*Average Household Income* - attained from survey findings see Annex 3 to PDD V03.

*Documentation relevant to household income*

#### (a) Full survey findings

SKG Sangha provided all the relevant survey data to assessor during the site visit 5<sup>th</sup> to 8<sup>th</sup> January 2009. and the relevant copies of the survey forms along with survey data sheets were also sent to SGS as attachments to the e-mail dated 17.2.2009 addressed to Mr Vivek Kumar Ahirwar.

#### (b) Copy of survey form

A copy of the survey form and survey results are provided in Annex 3 of PDD V03

#### (c) Survey findings

Full quantitative survey findings can be seen in ER\_Spreadsheet\_Kolar\_Project\_V03 which is provided with this submission.

Documentation on bio-digester cost estimates was provided for inspection by the assessor during the site visit 5<sup>th</sup> -8<sup>th</sup> January 2009.

### 3. Documentation relevant to point 3

Letter from Kolar Zilla Panchayath on biogas units installed under the government programme was attached as Appendix 6 to e-mail dated 03.03.2009 addressed to Ajoy Gupta.

### 4. Documentation relevant to point 4

Letter from Kolar Zilla Panchayath confirming that SKG Sangha is the only organisation implementing biogas programme in the Kolar district was attached as Appendix 7 to e-mail dated 03.03.2009 addressed to Ajoy Gupta.

**Information Verified by Lead Assessor:**

**Date:** 11/05/2009

1. Proponent has described the Investment analysis by Simple Cost Analysis is the main barrier for project activity. Please see below comments on Simple Cost Analysis. (Not Ok)
2. SectionB.5 of PDD version 03 has been revised according to above explanation given by proponent.
3. A Letter Ref. No Gen/JAY/irep/2008-09/3 from the local government (Zila Panchayath , Kolar) dated 29.11.2008 was provided by PP that shows number of biogas units installed in the project area using government funds .Same was checked and found acceptable as there are total 2084 biogas units are in the all 11 taluk of kolar district , under the "rashtriya jaivarila yojane" . ?(Ok)
4. The letter Ref. No. Gen/JAY/irep/2008-09/2 from the local government (Zila Panchayath , Kolar) dated 29.11.2008 was provided by proponent that shows there are no other organisation rather then SKG Sangha has implemented the biogas project. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

1. Scenario 1, 2 & 3 of Annualised cost of alternative scenario comparison mentioned in the Annex 7 of the PDD version 3 is based on June 2004 data. The selection of data for investment analysis was not as per Para 6 of Annex 45 of EB 41 (now EB62 Annex 05) which stating that input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant.
2. Cost of kerosene, number of LPG connections in that region and use of kerosene has been checked from the official memo (given by Government of Karnataka) and same has been checked during site visit.
3. Please provide the annex 7 ( Annualised cost of alternative scenario) with source of data for capital cost, useful life, discount rates, price of fuel, annual fuel cost and annual maintenance cost.
4. Please substantiate with some document proof for cost per unit of material involved for biogas unit construction.

The CAR 08 is Open.

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 20/05/2009

**Project Participant Response:**

**Date:** 18/06/2009

1.  
The latest available published data (June 2004) were used to prepare the annualised cost scenario in case 1, 2 and 3. However, the LPG and kerosene prices have been up – dated to 2008 data. 2008 data were used also for scenario 4 and 5.  
The annualised case shows that there are several financially more viable activities (scenarios 1, 3 and 5) that would have lead to higher emissions than the Project Activity – depicted by scenario 4.  
It is inevitable that costs have risen since the latest publicised data and if increased costs are used, the baseline scenario will be always scenario 5 (a continuation of the current situation), as it is the most financially attractive scenario for beneficiary households.

3.  
The summarised annualised cost spreadsheet with sources of data is attached to this submission as Appendix 24 and is also attached in PDD v04 as Annex 7.

4.  
The cost breakdown spreadsheet with the source of data is attached to this submission as Appendix 19, quotations from the market for the main materials used in the construction of a biodigester is also attached to this submission as Appendix 20, 21, 22 and 23.

Note that there are some difference between the breakdown given in the table above and the cost given by the chartered engineer. Please see below a table with the differences in the total cost of each biodigester:

|                         | Total cost per biodigester (2 m3 unit) | Total cost per biodigester (3 m3 unit) |
|-------------------------|--|--|
| PDD v04                 | Rs. 20,899                             | Rs. 26,219                             |
| Spreadsheet estimations | Rs. 22,259                             | Rs. 26,889                             |

The small differences between the costs previously supplied to SGS and the spreadsheet quotation are due to movements in market prices between the time that the spreadsheet was prepared (end 2008) and the time that the SKG Sangha finalised cost information for the project (March/ April 2009). SKG Sangha has noted that due to recent economic down turn some prices for materials and labour costs have changed.  
The difference in costs are not significant (the cost of the bio-digester as per the 2008's quotation is on average 5% higher than the more recent cost data supplied by SKG Sangha) and do not justify a full recalculation of the financial analysis for the purpose of demonstrating the additionality of the project activity.

Please note that the CDM transaction cost has been updated in the spreadsheet "Kolar investment Analysis v04" in order to align with the actual market quotation:

| CDM transaction cost |        |     |
|----------------------|--------|-----|
| Registration fee     | 9,500  | USD |
| Validation cost      | 20,000 | USD |
| Verification cost    | 10,000 | USD |

The figures used in the Kolar investment Analysis v04 attached to this submission are in line with the validation cost given by SGS, the official registration cost set by the EB and the average verification costs given by the market (please see page number 57 in the report below):

<http://www.undp.org/energy/docs/cdmchapter5.pdf>

#### Documentation Provided by Project Participant:

3.  
The summarised annualised cost spreadsheet with source of data is attached to this submission as Appendix 24.  
4.  
The third party study spreadsheet is attached to this submission as Appendix 19, Quotations from the market for the main materials used in the construction of a bio-digester are attached as Appendix 20, 21, 22 and 23.  
*The investment analysis spreadsheet version 4 is attached to this submission*

|   |                         |
|---|-------------------------|
| <b>Information Verified by Lead Assessor:</b> | <b>Date: 28/06/2009</b> |
|---|-------------------------|

1. PDD has been modified and found that all input values used in investment analysis are valid and applicable at the time of the investment decision taken by the project participant. (Ok)
2. Cost of kerosene, number of LPG connections in that region and use of kerosene has been checked from the official memo (given by Government of Karnataka) and same has been checked during site visit. (Ok)
3. Proponent has been submitted the annualised cost spread sheet. Please refer below comment. (Not Ok)
4. Proponent has been submitted the Cost Break-up for construction of biogas unit along with supportive evidences. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

Please clarify how the "Annual fuel Cost" calculated in spread sheet – Annex 24" Financial Analysis Alternative Scenario "?

**Acceptance and Close out by Lead Assessor: Open**

**Date:** 28/06/2009

**Project Participant Response:**

**Date:** 04/08/2009

The annual fuel cost is calculated multiplying the fuel cost by the annual fuel usage:

- The annual fuel usage for scenario 1, 2 and 3 is provided by the "Report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004".
- The annual biogas consumption (scenario 4) is not needed for the annualised cost calculations as the biogas is free.
- The annual subsidized kerosene usage comes from the results of survey study, there is available an average of 3 litres of subsidized kerosene per month per household (36 litres per year). The wood is free so the annual fuel cost for the fifth scenario is 360 INR / year.

Please see table below:

|   | Price fuel<br>(INR / litre;<br>INR / kg) | Annual fuel<br>usage (litre /<br>year; kg / year) | Annual<br>fuel cost<br>(INR) |
|---|--|---|------------------------------|
| Scenario 1) Use of kerosene for all cooking purpose (subsidised fuel)         | 10.00                                    | 200.00  | 2000.00                      |
| Scenario 2) Use of Liquid Petroleum Gas (LPG) systems (subsidised fuel)       | 24.60                                    | 115.00  | 2,829.00                     |
| Scenario 3) Use of sustainable agricultural residues (traditional stove)      | 1.00                                     | 1395.00   | 1395.00                      |
| Scenario 4) Use of project biogas systems (data from SKG Shanga)              | 0.00                                     | -   | 0.00                         |
| Scenario 5) Pre - project situation: three stones stove + subsidised kerosene | 10.00                                    | 36.00   | 360.00                       |

Note that there was a calculation error in the annual fuel cost of the fifth scenario. The up – dated spreadsheet is provided in this submission as Appendix 24. Also the PDD v04 has been updated.

**Documentation Provided by Project Participant:**

Update version of Appendix 24

**Information Verified by Lead Assessor:**

The annual fuel cost is calculated multiplying the fuel cost by the annual fuel usage and the values used in this calculation was verified with the relevant document provided by PP.

**Reasoning for not Acceptance or Acceptance and Close Out:**

**Date:** 27/11/2009

The calculation of "Annual fuel Cost" in spread sheet – Annex 24" is based on annual fuel usage for scenario 1, 2 and 3 and this was verified with document "Report on the use of LPG as a domestic cooking fuel option in India", International Energy Initiative, 2004" provided by PP and for scenario 5 is based on average of 3 litres of subsidized kerosene per month per household, the annual subsidized kerosene usage comes was verified with the results of survey study submitted by PP. The Up –dated Annex 24 was submitted by PP and the corrections was checked and found satisfactory.

**Financial Expert Comment :**

4. Section B.5 of PDDV6:- Please provide the reference of EB guidance (i.e. EB35 Annex 34 '**Non-binding best practice examples to demonstrate additionality for SSC project activities**' ) before start discussion on demonstrate the additionality.
5. Section B.5 of PDD V6: **Financial/investment analysis** :-
  - a. There are no '**Financial**' term define under EB35 Annex 34. Please correct it.
  - b. The description of this barrier is not as per Para 01 (a) of EB35 Annex 34. Please correct it.
  - c. Discussion of alternatives is not required as per Para 01 (a) of EB35 Annex 34. Please correct it.
  - d. As per Para 01 (a) of EB35 Annex 34; '*Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency).*'

As per above best practice example ,PP needs to clarify that the demonstration of additionality is fall under which of the following options :

  - i. the application of investment comparison analysis using a relevant financial indicator
  - ii. application of a benchmark analysis or
  - iii. a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency).
6. Kindly clarify why the PP has demonstrated the common practice analysis & Impact of CDM Registration which is not a requirement of EB35 Annex 34 'Non-binding best practice examples to demonstrate additionality for SSC project activities'.

This CAR#08 is re-open due to above financial expert comment.

|  |                         |
|--|-------------------------|
| <b>Acceptance and Close out by Lead Assessor: Open</b> | <b>Date: 10/03/2010</b> |
|--|-------------------------|

|                                      |                         |
|--------------------------------------|-------------------------|
| <b>Project Participant Response:</b> | <b>Date: 24/03/2010</b> |
|--------------------------------------|-------------------------|

1. Introductory paragraphs have been added to the document providing more detail on the approach taken to demonstrate the additionality of the project. This includes a reference to EB35 Annex 34 **'Non-binding best practice examples to demonstrate additionality for SSC project activities'**. This section also provides references to other relevant guidelines pertaining to the demonstration of additionality for SSC (and other) project activities
2. In Section B.5 of PDD V6: **Financial/investment analysis** :-
  - a. The sub heading Financial/investment analysis has been modified to "Stage 2 - Investment barrier analysis". We have used the term "investment barrier" to be consistent with the SSC guidelines contained within Attachment A to Appendix B of *"The simplified modalities and procedures for small-scale clean development mechanism project activities"*. We have incorporated the term "Stage 2" into the sub-heading as our approach to the additionality analysis has drawn from a number of UN guidelines (now described in the PDD at the start of the analysis) and has been synthesised into 4 discrete stages.
  - b. The description of this barrier is now fully consistent with both Attachment A to Appendix B of "The simplified modalities and procedures for small-scale clean development mechanism project activities" and the ability to use simple cost analysis as prescribed in EB35 Annex 34.
  - c. The discussion of alternatives has been modified to demonstrate that there is a financially more viable alternative to the project activity that would have led to higher emissions (the investment barrier analysis requirement prescribed in Attachment A to Appendix B of "The simplified modalities and procedures for small-scale clean development mechanism project activities")
  - d. It has now been clarified in the PDD that we are using a simple cost analysis for the project (As per Para 01 (a) of EB35 Annex 34) to demonstrate the investment barrier analysis. This is because the CDM is the only real revenue stream for the project activity.
3. We have now incorporated a justification for the common practice analysis in the PDD. We have, however, removed the analysis of the impact of CDM registration. Our justification centres on the fact that drawing from the various UN guidelines for SSC and other projects to demonstrate additionality we found ourselves using an approach very similar to the approach outlined in EB39 Annex 10. In the interests of completeness we therefore decided to retain the common practice analysis to complement the barrier analyses.

#### **Documentation Provided by Project Participant:**

##### **PDD V07**

Note that all baseline survey and cost data referenced as having been obtained from SKG Sangha in the additionality analysis have already been reviewed by SGS during the site visit or have been supplied to SGS as appendices or spreadsheets. A detailed description of these sources of information is provided in earlier responses to CAR 08.

Note that stage 3 – Other barriers – access to finance barrier refers to one document that has already been made available to SGS. This is a letter from CH4NGE that shows that finance for the project is contingent upon validation and (hence CERs). This was supplied to SGS as Appendix 2.

Note that stage 4 – Common practice analysis refers to a letter from the government that shows that SKG is the only entity implementing a biogas programme in the region. This was supplied to SGS as Appendix 8.

#### **Information Verified by Lead Assessor:**

1. Section B.5 of the PDD has been revised and the approach to demonstrated additionality of proposed project activity now transparently describe by PP.(Ok)
2. Please see below Financial Expert Comments.
3. As per Additionality Tool 5.2 (EB39 Annex 10) the common practices is required and same has been demonstrated by PP in the revised PDD version 07, but PP is requested to follow the complete guidance of this tool. Please see comments given by Financial Expert.

|   |                         |
|---|-------------------------|
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  | <b>Date:</b> 30/03/2010 |
| <b>Financial Expert Comments:-</b><br>As the PP has applied relevant aspects of the <i>“Tool for the demonstration and assessment of additionality”</i> Version 05.2 (EB39 Annex 10), the PP is requested to use the appropriate investment analysis method and financial indicator as per the definitions provided in the tool.<br>As per the tool Sub-step 2b - Option I, when a simple cost analysis is used, there is no requirement to compare the cost of alternatives to the project scenario. Since the project generates no revenue on its own, the cost incurred in the project should be considered as the approach for project financial feasibility analysis. Comparison of annualized cost of alternatives with the project scenario is indicating towards Option II (Investment comparison analysis) and thus the investment analysis approach adopted in the PDD is not in line with the Option I among Sub-step 2b of <i>“Tool for the demonstration and assessment of additionality”</i> Version 05.2. Hence, the Proponent needs to demonstrate the most appropriate investment analysis as per the <i>“Tool for the demonstration and assessment of additionality”</i> in line with the CDM EB guidelines (i.e. simple cost, benchmark, or investment comparison analysis) as there is no revenue will be generated from the project activity.<br>CAR#08 is open. |                         |
| <b>Acceptance and Close out by Lead Assessor:</b>   | <b>Date:</b> 30/03/2010 |
| <b>Project Participant Response:</b>  | <b>Date:</b> 09/04/2010 |

1. At the outset of section B.5 of the PDD we had previously described our approach as being based primarily on the small scale CDM methodologies. We now state that our approach is based primarily on the tool for the demonstration and assessment of additionality v 05.2. This has necessitated modifications to all analytical step headings and introductory text to bring these fully in line with the tool v 05.2.
2. In step 2 of the analysis we wish to use simple cost analysis. In sub-step 2 a we now state that we are using simple cost analysis as the project generates no financial or economic benefits other than CDM related income. We also define the simple cost analysis as being an analysis of average annual costs.  $\text{Average annual costs} = (\text{capital costs} \div \text{technology lifetime}) + \text{annual fuel costs} + \text{annual maintenance costs}$ .
3. In sub-step 2b of the tool for the demonstration and assessment of additionality v05.2. we are required to
  - *“Document the costs associated with the CDM project activity and the alternatives identified in Step 1*
  - *...and demonstrate that there is at least one alternative which is less costly than the project activity.”*

*We have therefore made the following changes in the PDD version 8:*

- Deleted the graphic showing the “annualised costs” of each scenario identified in Step 1 and instead have inserted a table showing the “average annual costs” of the project and each alternative scenario.
  - Deleted the discussions of each alternative scenario vis-a-vis the project activity and instead have just stated clearly that the table (depicting the simple costs of each scenario) shows that the average annual costs of the project activity are higher than the costs of the pre-project situation. We have also deleted text stating that the emissions of the pre-project situation are higher than those of the project activity. We have done this as this was a requirement of the SSC methodologies but is not a requirement of the tool for the demonstration and assessment of additionality v 05.2
4. As we have modified the simple cost analysis we have also amended Annex 7 in the PDD version 8 accordingly. Note that whilst the analytical approach has been simplified the source information remains the same. The spreadsheet detailing the simple cost calculations is attached.

#### **Documentation Provided by Project Participant:**

PDD V8

Spreadsheet detailing the simple cost analysis “Investment Analysis 08042010. xls”

#### **Information Verified by Lead Assessor:**

Project participant has provided the revised PDD version 08 and “Investment Analysis 08042010. xls”

#### **Reasoning for not Acceptance or Acceptance and Close Out:**

**Date:** 20/04/2010

The additionality of the project has been presented in the PDD using “*Tool for the demonstration and assessment of additionality*” Version 05.2 (EB39 Annex 10). Steps 1, 2, & 4 of the additionality Tool were used to demonstrate additionality. In step 3; project participant has also referred to specific guidance for establishing the additionality of small scale CDM (SSC) projects “*Non-binding best practice examples to demonstrate additionality*” for SSC project activities” stipulated in the Annex 34 of EB 35 report. This is in accordance with general guidance to SSC methodologies (EB 41, Version 12).

Hence CAR#8 was closed.

#### **Acceptance and Close out by Lead Assessor: Closed**

**Date:** 20/04/2010

|   |            |            |                     |            |               |
|---|------------|------------|---------------------|------------|---------------|
| Date:   | 07/04/2009 | Raised by: | Vivek Kumar Ahirwar |            |               |
| Type:   | CAR        | Number:    | 09                  | Reference: | Section B.5.1 |
| Lead Assessor Comment:  |            |            | Date: 07/04/2009    |            |               |
| 7. Equation for baseline emission calculated in PDD version 01 is not consistent with the methodology AMS-I.E and AMS-III.R   |            |            |                     |            |               |
| 8. In baseline emission calculation for avoided methane from cattle manure, scaling factor has been used for 2m <sup>3</sup> units. Objective of this scaling factor needs to be explained  |            |            |                     |            |               |
| 9. Vs for dairy cow is not matching with the IPCC values  |            |            |                     |            |               |
| 10. All the IPCC default values were taken at 27°C. Please justify  |            |            |                     |            |               |
| 11. The schedule for construction and operation of biogas units as mentioned in the section B 6.3 (page no 26) of PDD version 01, needs to be further justified.  |            |            |                     |            |               |
| 12. Table mentioned in the B 6.3 needs to be explained clearly  |            |            |                     |            |               |
| Project Participant Response:   |            |            | Date: 27/04/09      |            |               |
| 1.<br><br>According to AMS-I.E “Switch from non-renewable biomass for thermal applications by the user”, version 1, baseline emissions for the non-renewable biomass component are calculated based on the use of the biomass (fuel wood) that is replaced, the fraction of the biomass that is non-renewable biomass, and the emissions factor of kerosene as a projected alternative fuel:<br><br><b>BENRB = Bbiomass * N * fNRB * NCVbiomass * EFkerosene * 10-3</b><br><br>Note that the variables N and 10-3 are not included in the original equation but are needed in order to apply the equation to the 10,000 households that form the project activity and to convert the emission reduction calculations from kg to Tonnes. The equation is shown in section B.6.1, equation (2), of PDD V03<br><br>– Methodology AMS-III.R “Methane recovery in agricultural activities at the household/small farm level”, version 1, does not contain any formulae. The methodology states that baseline emissions for the manure component should be calculated based on the amount of manure that would decay anaerobically in the pits, using the Tier 2 approach from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. We have used the following formulae (Eq. 10.22) taken from the IPCC Guidelines:<br><br><b>BEmanure = Σ(T) (EFT * NT) * N * GWP_CH4 / 1000</b><br><br>Where (Eq. 10.23)<br><br><b>EF(T) = VS(T) * 365 * Bo(T) * 0.67 kg/m3 * Σ(S,k) ((MCFS,k) / 100 * MS(T,S,k))</b><br><br>Section B.6.1 of PDD V03 has been modified to clarify our approach and its consistency with AMS-IIIR. |            |            |                     |            |               |
| 2. The objective of this scaling factor is to represent, in a conservative manner, the lower proportion of manure going into a 2 cubic metre unit than into a 3 cubic metre unit. The 2 c.m. unit has a capacity 2/3 lower than the 3 c.m. unit so the emissions reduction per unit due to the aerobically decayed of the manure will be 2/3 lower in the case of the 2 c.m unit.   |            |            |                     |            |               |
| 3. As is stated in paragraph 8 of the methodology AMS III. R, emissions factors for manure of different cattle categories are calculated based on nationally published (where available) and IPCC default values (where nationally published values are not available). We have taken the India specific value for dairy cows from Biogas Technology by B.T. Nijaguna (see reference 5 in Annex 5 in the PDD V01). As nationally published values are not available for other cattle, IPCC default Indian subcontinent values are   |            |            |                     |            |               |

used for buffalo and other cattle. This approach has been described in section B.6.3, p40 of PDD V03.

4. Section B.6.3, of PDD V03 has been modified to take account of temperature values obtained from a reputable source. Values corresponding to average annual temperature of 29.7°C are now used and have been taken for MCFLiquid and MCFLiquid with crust and MCFsolid. Temperature data was obtained from Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office.
5. Following further planning the schedule shown in section B.6.3. page 41 of PDD V03 has been slightly revised. With available capacity of masons and other staff, SKG Sangha can install at least 2000 units per quarter in non-rainy season, and 1000 units during a rainy season, when construction sometimes has to be delayed. The installation schedule, the cumulative number of units that will have been installed by the end of each year as well as number of forecasted operational units in each quarter, are provided in the table below:

| Year | Units installed | Cumulative units installed by the end of each year | Average units in operation in the year |
|------|-----------------|--|--|
| 2010 | 2,500           | 2,500  | 4,167                                  |
| 2011 | 3,500           | 6,000  | 7,833                                  |
| 2012 | 4,000           | 10,000   | 10,000                                 |
| 2013 | -               | 10,000   | 10,000                                 |
| 2014 | -               | 10,000   | 10,000                                 |
| 2015 | -               | 10,000   | 10,000                                 |
| 2016 | -               | 10,000   | 10,000                                 |
| 2017 | -               | 10,000   | 10,000                                 |
| 2018 | -               | 10,000   | 10,000                                 |
| 2019 | -               | 10,000   | 10,000                                 |

6. The table above shows:

- the number of bio-digester units installed during each year (the build schedule);
- the cumulative number of units that will have been installed by the end of each year; and
- the average number of units that will have been operating, that is producing biogas and creating emission reductions in each year.

\* The average number of units that will be operating in each year is one of the main determinants of project activity emission reductions. In the three years in which units are being installed (2009 -2011) the average number of units that will be operating in each year will always be lower than the cumulative number of units that have been installed by the end of each year. This is because units will be added gradually throughout each year and therefore not all units will be operating throughout the entire year. For example if a unit is installed on the first day of the year it can clearly be seen that that unit can be regarded as having operated all year. If, however, a unit is installed on the first day of the last month in the year it will only be operating for 1/12th of the year.

\*\* - Approximately one month lag should be allowed from the start of construction to the start of proper operation, as construction and technical checks last, on average, one month.

The implementation and operation schedule as shown above was obtained from the legal agreement between SKG Sangha and CH4NGE which specifies the implementation tasks that SKG Sangha must carry out on behalf of the project financier CH4NGE. This implementation schedule is shown in Appendix 14 which is supplied with this submission.

#### **Documentation Provided by Project Participant:**

##### **Documentation relevant to point 6**

This bio-digester implementation schedule is shown in Appendix 14 which is supplied with this submission.

#### **Information Verified by Lead Assessor:**

1. Explanation regarding baseline calculation equation has been found incorrect. Please refer below comment no 01( Not Ok)
2. The 2 c.m. unit has a capacity 2/3 lower than the 3 c.m. unit so the emissions reduction per unit due to the aerobically decayed of the manure will be 2/3 lower in the case of the 2 c.m unit. (Ok)
3. India specific value related to emission factors for manure for dairy cows has been taken from Biogas Technology by B.T. Nijaguna and emission factors for manure of buffalo and other cattle has been considered according to IPCC default Indian subcontinent values. Please refer below comment no 03. (Not Ok)
4. Justification given by proponent regarding IPCC default values were taken at 27°C .Please refer below comment no 04. (Not Ok)
5. PDD version 03 has been revised according to above explanation given by proponent regarding schedule for construction and operation of biogas units but see the below point 5 and 6 .( Not Ok)
6. Explanation given by proponent found satisfactory and acceptable. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

1. PP is requested not to alter the equations in first step as suggested by Approved Methodology, in case of any customised multiplication factor required as specific requirement of the project activity same can be included as second step along with proper explanation.
2. PP is requested not to alter the equation 10.22 from IPCC guideline in first step, in case of any customised multiplication factor required as specific requirement of the project activity same can be included as second step along with proper explanation.
3. In ER spread sheet, it is mentioned that the Vs value of Cow has been taken from IPCC default value. (Please see the "G-18" in ER spread sheet) but actually value has been taken from Biogas Technology by B.T. Nijaguna. Please clarify that which one is correct.
4. Please provide the temperature data as obtained from IMD, Govt. of India.
5. Number of units installed, cumulative units installed by the end of each year and average units in operation in the year is not consistent with PDD version 03.
6. Average units operated in the year are higher than the cumulative units installed by the end of each year.

CAR 09 is open.

**Acceptance and Close out by Lead Assessor: Open**      **Date:** 20/05/2009

**Project Participant Response:**      **Date:** 18/06/2009

1. The PDD has been modified in order not to alter the equation in first step; please see PDD v04 section B.6.1.
2. The PDD has been modified in order not to alter the equation in first step; please see PDD v04 section B.6.1.
3. The correct Vs value of cow is taken from the report Biogas technology by B.T. Nijaguna. The emission reduction spreadsheet has been changed and is attached with this submission (ER\_Spreadsheet\_Kolar Project\_v04)

The v04 emission reduction spreadsheet v04 has been also modified in order to use the parameter Bo for cows from page no 29 table 2.11 of B.T. Nijaguna (Appendix 21) instead of IPCC value (0.13 m3 methane / kg Vs):

The Bo for cows (0.15 m3 CH4 / kg Vs) has been calculated in the following way:

- Kg VS produce per cow per day = 3.8 kg dry matter per cow per day (source: Nijaguna)
- Biogas per cow per day = 1 m3 biogas per cow per day (source: Nijaguna)
- CH4 concentration in biogas = 60%
- Bo – Maximum methane producing capacity for manure produced by cows  
0.6 m3 CH4 / 3.8 kg Vs = 0.15 m3 CH4 / kg Vs

The impact of modifying the Bo between PDD V03 and V04 is summarized below.

| Year        | Avoided emissions from anaerobic decomposition of manure and waste 95% confidence level and Bo cow = 0.15 (PDDv04) | Avoided emissions from anaerobic decomposition of manure and waste 95% confidence level and Bo cow = 0.13 (PDDv03) |
|-------------|--|--|
| ER/per unit | 2.714  | 2.435  |
| 2010        | 11,307   | 10,148   |
| 2011        | 21,255   | 19,077   |
| 2012        | 27,135   | 24,354   |
| 2013        | 27,135   | 24,354   |
| 2014        | 27,135   | 24,354   |
| 2015        | 27,135   | 24,354   |
| 2016        | 27,135   | 24,354   |
| 2017        | 27,135   | 24,354   |
| 2018        | 27,135   | 24,354   |
| 2019        | 27,135   | 24,354   |

- The original data obtained from the Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office has been provided with this submission as Appendix 15.
- There are some typing errors in the table schedule in the document "Kolar responses to SGS findings 20090427". The correct table is shown in PDD v03 & v04
- There are some typing errors in the table schedule in the document "Kolar responses to revise findings 20090427". The correct table is shown in PDD v03 & v04

Please find below the right schedule:

| Year  | Units built | Cumulative units installed by the end of each year | Units in Operation |
|-------|-------------|--|--------------------|
| 2009* | 2,500       | 2,500  | 833                |
| 2010  | 3,500       | 6,000  | 4,167              |
| 2011  | 4,000       | 10,000   | 7,833              |
| 2012  |             | 10,000   | 10,000             |
| 2013  |             | 10,000   | 10,000             |
| 2014  |             | 10,000   | 10,000             |
| 2015  |             | 10,000   | 10,000             |
| 2016  |             | 10,000   | 10,000             |
| 2017  |             | 10,000   | 10,000             |
| 2018  |             | 10,000   | 10,000             |
| 2019  |             | 10,000   | 10,000             |

#### Documentation Provided by Project Participant:

- The emission reduction spreadsheet has been changed and attached with this submission (ER\_Spreadsheet\_Kolar Project\_v04)
- The original data obtained from the Natural resources data management system, a Branch of Department of Science and Technology, Government of India, Kolar District office has been provided with this submission as Appendix 15.

Information Verified by Lead Assessor:

Date: 28/06/2009

1. Section 6.1 of PDD has been revised regarding equation for baseline calculation; it is now more clarified that the used baseline equation is followed as per the methodological equation. (Ok)
2. Section 6.1 of PDD has been revised regarding equation 10.22; it is now more clarified that the used equation is followed as per the methodological equation. (Ok)
3. The correct Vs and Bo value of cow has been taken from the report Biogas technology by B.T. Nijaguna and also Bo for cows has been revised in ER spread sheet as 0.15 m<sup>3</sup> CH<sub>4</sub> / kg Vs. (Ok)
4. Proponent has been submitted a source for the average annual temperature as Branch of Department of Science and Technology, Government of India, Kolar District office, which mentioned the average monthly temperature for Kolar and same has been used in calculation of the average annual temperature i.e. 29.7 °C. (Ok)
5. Number of units installed, cumulative units installed by the end of each year and average units in operation in the year is consistent with PDD version 04. (Ok)
6. Average units operated in the year and the cumulative units installed by the end of each year are consistent with PDD version 04. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out: Closed**

Please refer above comment; hence the CAR 09 was closed out.

**Acceptance and Close out by Lead Assessor: Closed** | **Date: 28/06/2009**

|   |            |         |            |                     |               |  |
|---|------------|---------|------------|---------------------|---------------|--|
| Date:   | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |               |  |
| Type:   | CAR        | Number: | 10         | Reference:          | Section B.5.2 |  |
| <b>Lead Assessor Comment:</b>   |            |         |            | Date: 07/04/2009    |               |  |
| Equation for project Emission calculated in PDD version 01 is not consistent with the methodology AMS-III.R |            |         |            |                     |               |  |
| <b>Project Participant Response:</b>  |            |         |            | Date: 27/04/2009    |               |  |

According to methodology AMS-III.R “Methane recovery in agricultural activities at the household/small farm level”, version 1, the leakage from anaerobic digester is calculated using the following equation:

$$PE_{(ly)} = LF_{(AD)} ( GWP * D_{(CH_4)} * B_{(o)} * VS_{m,y}) / 1000$$

According to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, and Chapter 10, the equation can be written as follows (this is the equation shown in Section B.6.1. of PDD V01):

$$PE = LF_{AD} * f_{collected} * \sum_{(T)} (GWP_{CH_4} * 0.67 \text{ kg/m}^3 * B_{o(T)} * N_{(T)} * VS_{(T)} * 365) / 1000$$

Where:

- PE – annual project emissions from physical leakages in the biogas digesters (t CO<sub>2</sub>e/year);  
f\_collected – fraction of total excreted manure that is collected (dimensionless);  
LF<sub>AD</sub> – methane leakages from anaerobic digesters (dimensionless). Default value of 0.1 specified in the AMS-III.R is used;  
0.67 – conversion factor of m<sup>3</sup> CH<sub>4</sub> to kg CH<sub>4</sub>;  
B<sub>o</sub> – maximum methane producing capacity for manure produced by livestock category T (m<sup>3</sup> CH<sub>4</sub> per kg of VS excreted);  
N<sub>(T)</sub> – Average number of heads by livestock category T; and  
VS<sub>(T)</sub> – daily volatile solid excreted for livestock category T (kg dry matter per animal per day).

There are in fact only two differences between the two equations; f\_collected and N<sub>(t)</sub>. We chose to use the IPCC formula for two reasons. Firstly, this was the approach used in the only CDM project registered using the methodology AMS-III.R, which is called “Hubei Eco-Farming Biogas Project Phase I”, the CDM project activity that was registered the 19<sup>th</sup> February 2009. Secondly, we chose to use the IPCC approach which includes the variable f\_collected for consistency with the approach used to determine the baseline methane emissions from anaerobic decay of manure. The corresponding variable in the baseline is MS<sub>(T,S,K)</sub> shown in equation (4) of section B.6.1 of PDD V03. N<sub>(t)</sub> is added as we have found it impossible to carry out calculations correctly without this variable.

Fossil fuel or electricity will not be used for the operation of the bio-digesters so there will be no project emissions from such sources.

**Documentation Provided by Project Participant:**

No Document

**Information Verified by Lead Assessor:** **Date:** 11/05/2009

Using a different equation apart from what is mentioned in applied approved methodology AMS-III.R. is a case of deviation and the same needs to be approved by UNFCCC.

**Reasoning for not Acceptance or Acceptance and Close Out:**

Please see above comment; hence CAR 10 is open.

**Acceptance and Close out by Lead Assessor: Open** **Date:** 20/05/2009

**Project Participant Response:** **Date:** 18/06/2009

The PDD and the emission reduction calculations have been modified deleting the  $f_{\text{collected}}$  fraction; please see PDD v04 section 6.1. See table below with the difference in project emissions between PDD v03 and PDD v04:

| Year        | Project emissions (PE) with $f_{\text{collected}}$ factor and $B_o \text{ cow} = 0.13$ (PDDv03) | Project emissions (PE) without $f_{\text{collected}}$ factor and $B_o \text{ cow} = 0.15$ (PDDv04) |
|-------------|---|--|
| ER/per unit | 0.49  | 0.75   |
| 2010        | 2,025   | 3,115  |
| 2011        | 3,806   | 5,856  |
| 2012        | 4,859   | 7,476  |
| 2013        | 4,859   | 7,476  |
| 2014        | 4,859   | 7,476  |
| 2015        | 4,859   | 7,476  |
| 2016        | 4,859   | 7,476  |
| 2017        | 4,859   | 7,476  |
| 2018        | 4,859   | 7,476  |
| 2019        | 4,859   | 7,476  |

**Documentation Provided by Project Participant:**

The emission reduction spreadsheet has been changed and attached with this submission (ER\_Spreadsheet Hassan Project\_v04)

**Information Verified by Lead Assessor:** Date: 28/06/2009

Section 6.1 of PDD has been revised regarding equation for project emission calculation; the equation adopted for calculation of project emissions has been now followed as per the methodological equation. (Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

Project emission calculation was found satisfactory and compliance with methodological equation; hence this CAR 10 was closed out.

**Acceptance and Close out by Lead Assessor: Closed** Date: 28/06/2009

|  |            |         |            |                     |               |  |
|--|------------|---------|------------|---------------------|---------------|--|
| Date:  | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |               |  |
| Type:  | CAR        | Number: | 11         | Reference:          | Section B.5.2 |  |
| Lead Assessor Comment:   |            |         |            | Date: 07/04/2009    |               |  |
| 3. Leakage due to the project activity as per the methodology AMS-I.E and AMS-I.C need to be demonstrated. |            |         |            |                     |               |  |
| 4. In table B. 6.4, estimation of leakage was mentioned as zero. This needs to be justified.               |            |         |            |                     |               |  |
| Project Participant Response:  |            |         |            | Date: 27/04/2009    |               |  |

|  |               |                         |                     |
|--|---------------|-------------------------|---------------------|
| <p>1. Ex – ante leakage: For methodology AMS I.C (Version 14) and for methodology AMS I.E (version 01), if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered. Since there is no activity prior to the project activity, this project will not result in any such transfer and there will be no ex – ante leakage. This is now reflected in section B.6.1, p34of PDD V03.</p>   |               |                         |                     |
| <p>2. Ex – post leakage: In accordance with Paragraph 9 of the methodology AMS I.E:<br/> <i>“Leakage relating to the use of non-renewable biomass shall be assessed from <u>ex-post</u> surveys of users and areas from where biomass is sourced”.</i><br/> The possible source of leakage may be non-renewable biomass saved by the project activity that is then used by non-project households. The non-project households will be surveyed each year after project implementation to determine change in the use of NRB by the non-project households (<math>B_{NRB, non-project}</math>, calculated by applying the <math>f_{NRB}</math> of 78% to the monitoring parameter <math>B_{biomass, non-project}</math>). An increase of NRB use by the non-project households will be attributed to the leakage and subtracted from the baseline for calculating emission reductions at the time of verification of actual emission reductions. This is reflected in section B.7.1. page 46 of PDD V03</p> |               |                         |                     |
| <b>Documentation Provided by Project Participant:</b>  |               |                         |                     |
| No documents   |               |                         |                     |
| <b>Information Verified by Lead Assessor:</b>  |               | <b>Date:</b> 16/05/2009 |                     |
| <p>1. The project activity is green field project hence the no leakage as per AMS I C. (Ok)</p> <p>2. Non-renewable biomass would be saved by the project activity hence the leakage as per Para 9 of AMS I E has been considered in the PDD version03 ;but please see the below comment.(Not Ok)</p>  |               |                         |                     |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |               |                         |                     |
| <p>However, project proponent is requested to clarify how the requirement related to Para. 17 &amp; 18 of “General guidance on leakage in biomass project activities”, version 03, EB 47 is being fulfilled for the current project activity.<br/> CAR#11 is open.</p>   |               |                         |                     |
| <b>Acceptance and Close out by Lead Assessor: Open</b>   |               | <b>Date:</b> 29/05/2009 |                     |
| <b>Project Participant Response:</b>   |               | <b>Date:</b> 18/06/2009 |                     |
| <p>Biomass will not be used during the project activity so the project beneficiaries will not compete for the biomass as is stated in paragraph 17 &amp; 18 of “General guidance on leakage in biomass project activities”, version 03, EB 47. Therefore the requirement related to these paragraphs is not applicable to the project activities.</p>  |               |                         |                     |
| <b>Documentation Provided by Project Participant:</b>  |               |                         |                     |
| No document  |               |                         |                     |
| <b>Information Verified by Lead Assessor:</b>  |               | <b>Date:</b> 26/06/2009 |                     |
| <p>Biomass will not be used during the project activity; hence paragraph 17 &amp; 18 of Annex 28 EB47 is not applicable to this project activity.</p>  |               |                         |                     |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |               |                         |                     |
| <p>Biomass will not be used during the project activity and Non-renewable biomass would be saved by the project activity hence the leakage as per Para 9 of AMS I E has been considered in the PDD version04 and as project activity is green field project hence the no leakage as per AMS I C. Hence CAR 11 was closed out.</p>  |               |                         |                     |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>   |               | <b>Date:</b> 26/06/2009 |                     |
| <b>Date:</b>   | 07/04/2009    | <b>Raised by:</b>       | Vivek Kumar Ahirwar |
| <b>Type:</b>   | CAR           | <b>Number:</b>          | 12                  |
| <b>Reference:</b>  | Section B.7.3 |                         |                     |
| <b>Lead Assessor Comment:</b>  |               | <b>Date:</b> 07/04/2009 |                     |

6. The basis for assumption considered related to ratio of 30:70 for 2 m<sup>3</sup> and 3 m<sup>3</sup> biogas units respectively needs to be clarified further.
7. The thermal equivalent sheet provided by PP mention the thermal capacity of 10,000 is 28.9 MW; which is calculated based on "calorific value of biogas in a biogas-digester ".Please clarify that how same was calculated for 2m<sup>3</sup> and 3 m<sup>3</sup> biogas units?
8. The thermal equivalent sheet used Net calorific value 21 MJ/m<sup>3</sup> is not matching with the provided published data (i.e. 21.6 MJ/m<sup>3</sup>).Please clarify?
9. Please clarify the Average stove efficiency (i.e. 55% in thermal equivalent sheet) is thermal efficiency or combustion efficiency? If it is combustion efficiency then remaining 45% of un-combusted biogas leads to project emissions.
10. The schedule for construction and operation of biogas units as mentioned in the Section B.6.3 of the PDD needs to be further justified.

**Project Participant Response:**

**Date:** 27/04/2009

1. When ER\_Spreadsheet\_Kolar\_Project\_V01 was prepared it had been assumed that the split of bio-digesters would be as follows; 70% 3 cubic metre capacity and 30% 2 cubic metre capacity. During project implementation due diligence that has been carried out since this spreadsheet was submitted to SGS it was discovered that it would be more prudent to assume that most beneficiaries would have fewer cows than had been originally anticipated and consequently most would use the smaller capacity digester. Consequently V03 calculations are based on a planning scenario in which 70% of bio-digesters would have a capacity of 2 cubic metres and the remaining 30% would have a capacity of 3 cubic metres (See ER\_Spreadsheet\_Kolar\_Project\_V03).

The projected ratio is a forecasted ratio based on SKG Sangha's experience to date of demand from different households in the project area. The rationale behind choosing the size of the bio-digester is to ensure that households will have enough manure to feed the biodigester and to generate gas. If less than an optimal amount of manure is fed into a bio-digester the biodegradation is slower and gas generation is not efficient. As a general rule, at least 2 heads of dairy cows are needed for a 2 m<sup>3</sup> digester, and at least 3 heads of dairy cows are needed for a 3 m<sup>3</sup> digester.

During project implementation, SKG Sangha will make records of every biogas unit installed and calculations of real emission reductions may be adjusted according to the actual ratio of 2 m<sup>3</sup> and 3 m<sup>3</sup> biogas units if the ratio turns out to be slightly different than is currently planned. This explanation has now been incorporated into section B.7.2. of PDD V03.

2. The thermal installed capacity of these units depends on the gas burner and not on the capacity of the digester. The burners for both 2 and 3 m<sup>3</sup> units will be the same so the thermal installed capacity will be 2.97 kW for both units. Therefore total installed capacity (29.7 MW) would still be below the small scale threshold of 45 MW. Therefore a mix of smaller and larger units will definitely fit into the limits for the size of small scale projects. This explanation has now been incorporated into section A.4.2, p8 of PDD V03.

3. A revised spreadsheet entitled Calculation of Thermal Equivalent\_v02 has been supplied along with this submission and has determined the installed capacity of the units with a biogas Net calorific value of 21.6 MJ/ m<sup>3</sup>. A summary of the calculation is provided below:

| Parameter   | Value  | Unt       | Source, where relevant   |
|---|--|-----------|--|
| Unit conversion rate                              | 0.278  | kWh/MJ    | Nijaguna, B.T, Biogas Technology (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002). |
| Calorific value of biogas in a biodigester        | 21.6 MJ/m <sup>3</sup><br>6.0048 kWh/m <sup>3</sup><br>0.0060048 kWh/l |           |  |
| Gas use of a burning stove                        | 900  | l/h       |  |
| Average stove thermal efficiency                  | 55%  |           |  |
| Calculated thermal installed capacity of one unit | 2.97   | kW        |  |
| <b>Thermal capacity of 10,000 units</b>           | <b>29.7</b>  | <b>MW</b> |  |

4. The figure for Average Stove Efficiency is Thermal Efficiency.

5. See CAR 9 above

#### Documentation Provided by Project Participant:

##### Documentation relevant to 1.

ER Spreadsheet Kolar Project V03 is attached

##### Documentation relevant to 2.

N/A

##### Documentation relevant to 3.

Calculation of Thermal Equivalent V02 is attached

#### Information Verified by Lead Assessor:

Date: 16/05/2009

1. The ratio has been changed to ratio 70:30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas units respectively .Please refer below point 1 .(Not Ok)
2. Explanation given by proponent has not satisfactory. Please refer CL 04.(Not Ok)
3. The NCV has been corrected as 21.6 MJ/m<sup>3</sup>. (Ok)
4. Average Stove efficiency is thermal efficiency same has been corrected in the calculation.(Ok)
5. CAR 09 has been closed.(Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

1. Please provide following justification with evidence regarding ratio 70:30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas units respectively used in ER spread sheet version 03 dated 23/04/2009:-
  - a. Please support the above statement mentioned in explanation 1; as "*most beneficiaries would have fewer cows than had been originally anticipated*" on the basis of Kolar project survey report and also ensure that the revised ratio 70:30 (i.e.70:30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas units respectively) is most possible projection for implementation of biogas digester for the project activity and it would not be changed during crediting period of project activity.
2. Please refer CL 04 above.
3. Thermal equivalence of bio gas unit is required.

CAR 12 is open.

**Acceptance and Close out by Lead Assessor: Open**      **Date:** 20/05/2009

**Project Participant Response:**      **Date:** 18/06/2009

1.

This can be substantiated with the difference in the heads of cattle per household between Hassan survey and Kolar survey. The earlier ratio calculation were based on Hassan, Channarayapatna, Krishnarajpet and Krishnarajanagara taluks survey (Hassan survey) the results in this survey shows that in total the heads of cattle per household is higher than the Kolar survey. Please see below a table with the results on the different surveys:

|              | Hassan survey |      | Kolar survey |      |
|--------------|---------------|------|--------------|------|
| - Dairy cows | 2.73          | head | 2.56         | head |
| - Buffalo    | 0.99          | head | 1.17         | head |
| - Other cows | 1.15          | head | 0.55         | head |

2&3

The installed capacity of one unit is 2.97 kW irrespective of whether the household has a 2M3 or 3M3 bio-digester. This is because the installed capacity is determined by the technical characteristics of the stove that is being used to burn the bio-gas – specifically the maximum thermal energy that the stove can provide in an hour – and all the households in the project activity will be using the same type of stove. The difference between having a 2M3 or 3M3 bio-digester will determine the overall volume of biogas available for each household and hence the total number of hours over which the stove can be used for cooking. Hourly energy generation potential for each stove – that is thermal capacity for each unit - will however be the same for all households, irrespective of size of bio-digester.

This is clarified in the indicative simplified baseline and monitoring methodologies for selected small – scale CDM project activity categories, version 12:

[http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid06\\_v12.pdf](http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid06_v12.pdf)

The paragraph 7 states the definition of the output capacity of renewable equipment:

*“For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MWth is the installed/rated capacity of the thermal application equipment or device/s (e.g. biogas stoves)”.*

As the above definition shows, installed/rated capacity is determined by the equipment that transforms fuel into thermal energy by burning it – in this case the stove. The installed thermal capacity of the equipment (stove) is defined as the maximum thermal energy that the equipment can provide in an hour and it depends on the calorific value of the fuel (energy in the biogas per volume unit) and on the burning stove thermal efficiency.

#### Documentation Provided by Project Participant:

No document.

#### Information Verified by Lead Assessor:

Date: 28/06/2009

1. The earlier ratio calculation were based on Hassan survey the results in this survey shows that in total the heads of cattle per household is higher than the Kolar survey; hence this ratio has been changed. (Ok)
2. Please refer CL 04.
3. Please refer CL 04.

#### Reasoning for not Acceptance or Acceptance and Close Out:

The ratio 70: 30 for 2m<sup>3</sup> and 3m<sup>3</sup> biogas unit respectively used in ER spread sheet is fixed; previously this ratio was 50:50 for same because that time the survey values were used on the basis of Hassan survey; now it has been change on the basis of Kolar survey value which shows that total head of cattle is less in case of Kolar while comparing Hassan survey; hence is ratio was finally fixed on 70:30 same would be checked at the time of verification.

Hence CAR 12 was closed out.

#### Acceptance and Close out by Lead Assessor: Closed

Date: 28/06/2009

|   |  |         |                  |                     |               |
|---|--|---------|------------------|---------------------|---------------|
| Date:   | 07/04/2009   |         | Raised by:       | Vivek Kumar Ahirwar |               |
| Type:   | CAR  | Number: | 13               | Reference:          | Section B.9.1 |
| <b>Lead Assessor Comment:</b>   |  |         | Date: 07/04/2009 |                     |               |
| Source of data and parameters mentioned in Section B 6.2 should be clearly mentioned (Page number/table no/volume of the reference document, if web link is available provide the link) |  |         |                  |                     |               |
| <b>Project Participant Response:</b>  |  |         | Date: 27/04/2009 |                     |               |
| The source of data and parameters have been updated please see section B.6.2. of PDD version 03.  |  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>F<sub>kerosene</sub></b>  |         |                  |                     |               |
| Value applied:  | 24.12  |         |                  |                     |               |
| Source of data used:  | Baseline survey  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>P<sub>kerosene</sub></b>  |         |                  |                     |               |
| Value applied:  | 0.817  |         |                  |                     |               |
| Source of data used:  | Local or regional value for kerosene used in the project area is not available, therefore the commonly suggested density is used (e.g. <a href="http://www.simetric.co.uk/si_liquids.htm">http://www.simetric.co.uk/si_liquids.htm</a> )   |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>NCV<sub>kerosene</sub></b>  |         |                  |                     |               |
| Value applied:  | 43.8   |         |                  |                     |               |
| Source of data used:  | Table 1.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1.  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>EF<sub>kerosene</sub></b>   |         |                  |                     |               |
| Value applied:  | 71,900   |         |                  |                     |               |
| Source of data used:  | Table 2.5 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 2.  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>B<sub>biomass</sub></b>   |         |                  |                     |               |
| Value applied:  | 4.74   |         |                  |                     |               |
| Source of data used:  | Baseline survey  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>f<sub>NRB</sub></b>   |         |                  |                     |               |
| Value applied:  | 0.78   |         |                  |                     |               |
| Source of data used:  | "Inventorying, Mapping and Monitoring of Bioresources Using GIS and Remote Sensing" study (Ramachandra and Rao 2005 – see reference 3 in Annex 5)<br><a href="http://www.ces.iisc.ernet.in/energy/paper/Biores_using_RS_GIS/index.htm">http://www.ces.iisc.ernet.in/energy/paper/Biores_using_RS_GIS/index.htm</a> |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>GWP_CH4</b>   |         |                  |                     |               |
| Value applied:  | 21   |         |                  |                     |               |
| Source of data used:  | 2006 IPCC Guidelines for National Greenhouse Gas Inventories   |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>N<sub>T</sub></b>   |         |                  |                     |               |
| Value applied:  | 2.56 for dairy cows, 1.17 for buffalos, 0.55 for other cattle  |         |                  |                     |               |
| Source of data used:  | Baseline survey  |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>VS<sub>T</sub></b>  |         |                  |                     |               |
| Value applied:  | 3.8 for dairy cow, 3.1 for buffalo, 1.4 for other cattle   |         |                  |                     |               |
| Source of data used:  | Tables 10A-4 to 10A-6 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 10), Biogas Technology by B.T. Nijaguna (see reference 5 in Annex 5), Table 2.12 p29.   |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>Bo<sub>T</sub></b>  |         |                  |                     |               |
| Value applied:  | 0.13 for dairy cattle, 0.1 for buffalo and other cattle  |         |                  |                     |               |
| Source of data used:  | Tables 10A-4 to 10A-6 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, volume 4, Chapter 10.   |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>MCF<sub>manure</sub> (MCF<sub>liquid</sub>, MCF<sub>liquid with crust</sub>, MCF<sub>solid</sub>)</b>   |         |                  |                     |               |
| Value applied:  | 80 for liquid/slurry manure management system (MCFl <sub>liquid</sub> ), 50 for liquid/slurry manure management system with natural crust cover (MCFl <sub>liquid with crust</sub> ), 5 for solid storage manure management system (MCF <sub>solid</sub> )   |         |                  |                     |               |
| Source of data used:  | Table 10.17 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10.   |         |                  |                     |               |
| <b>Data / Parameter:</b>  | <b>MS<sub>manure</sub> (MS<sub>liquid</sub>, MS<sub>liquid with crust</sub>, MS<sub>solid</sub>)</b>   |         |                  |                     |               |
| Value applied:  | 0.32 for liquid/slurry manure management system (MS <sub>liquid</sub> ), 0.20 for liquid/slurry with crust cover manure management system (MS <sub>liquid with crust</sub> ), 0.16 for solid storage manure management system (MS <sub>solid</sub> )   |         |                  |                     |               |
| Source of data used:  | Based on baseline survey   |         |                  |                     |               |
| <b>Documentation Provided by Project Participant:</b>   |  |         |                  |                     |               |
| Revised PDD   |  |         |                  |                     |               |
| <b>Information Verified by Lead Assessor:</b>   |  |         | Date: 16/05/2009 |                     |               |

1. The following data and parameters which have been used Ex- ante emission reduction calculation in section B.6.3. of PDD version 03.
2. Annual amount of kerosene used for cooking and starting fires in an average household is 24.12 litres and this was verified with baseline survey report provided by proponent.(Ok)
3. Density of kerosene is 0.817 kg/l and this was verified with [http://www.simetric.co.uk/si\\_liquids.htm](http://www.simetric.co.uk/si_liquids.htm) (Ok)
4. Net calorific value of kerosene is 43.8 TJ/Gg and this was verified with Table 1.2 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1 (Ok)
5. Emissions factor from burning of kerosene in households is 71,900 kg CO<sub>2</sub>/TJ and this was verified with Table 2.5 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, and Chapter 2. (Ok)
6. Quantity of biomass that is substituted or replaced in an average household is 4.7 tonnes and this was verified with baseline survey report provided by proponent. (Ok)
7. Fraction of biomass used in the absence of project activity that can be established as non-renewable biomass using survey methods is 0.78 which was verified with "Inventorying, Mapping and Monitoring of Bio resources Using GIS and Remote Sensing" study by Ramachandra and Rao. (Ok)
8. Global warming potential for methane is 21 t CO<sub>2</sub> / t CH<sub>4</sub> which was verified with 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Ok)
9. Number of heads per cattle species/category in an average household 2.56 for dairy cows, 1.17 for buffalos, 0.55 for other cattle has verified with baseline survey report provided by proponent. (Ok)
10. Daily volatile solid excreted for livestock category as 3.8 for dairy cow, 3.1 for buffalo, 1.4 for other cattle in kg dry matter / (head \* day) which was verified with India specific value taken for dairy cows from Biogas Technology by B.T. Nijaguna and IPCC default Indian subcontinent values are used for buffalo and other cattle. Please refer below comment .(Not OK)
11. Maximum methane producing capacity for manure produced by livestock category as 0.13 for dairy cattle, 0.1 for buffalo and other cattle which was verified with Tables 10A-4 to 10A-6 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10. (Ok)
12. Methane correction factor for cattle manure for each manure management system by climate region as 80 for liquid/slurry manure management system (MCFliquid), 50 for liquid/slurry manure management system with natural crust cover (MCFliquid with crust), 5 for solid storage manure management system (MCFsolid) which was verified with Table 10.17 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10. (Ok)
13. Fraction of livestock category manure handled using manure management system in climate region as 0.32 for liquid/slurry manure management system (MSliquid), 0.20 for liquid/slurry with crust cover manure management system (MSliquid with crust), 0.16 for solid storage manure management system (MSSolid) which was verified with baseline survey report provided by proponent .(Ok)

**Reasoning for not Acceptance or Acceptance and Close Out:**

In ER spread sheet, it is mentioned that the Vs value of Cow has been taken from IPCC default value. But in response, it is mentioned that the value has been taken from Biogas Technology by B.T. Nijaguna. Please clarify that which one is correct. If the values for cow have been referred from Biogas Technology by B.T. Nijaguna, please take all the values of cow from the same reference book and provide the copies of the relevant pages.

CAR 13 is open.

**Acceptance and Close out by Lead Assessor: Open**      **Date: 20/05/2009**

**Project Participant Response:**      **Date: 18/06/2009**

|   |  |  |                         |  |  |
|---|--|--|-------------------------|--|--|
| The correct Vs value of cow is taken from the report Biogas technology by B.T. Nijaguna. The emission reduction spreadsheet has been changed and attached with this submission (ER_Spreadsheet_Kolar Project_v04)   |  |  |                         |  |  |
| The version 03 emission reduction spreadsheet has been also modified in order to use the parameter Bo for cows from page no 29 table 2.11 of B.T. Nijaguna instead of IPCC value (0.13 m3 methane / kg Vs):<br>The Bo for cows (0.15 m3 CH4 / kg Vs) has been calculated in the following way:  |  |  |                         |  |  |
| <ul style="list-style-type: none"><li>○ Kg VS produce per cow per day = 3.8 kg dry matter per cow per day (source: Nijaguna)</li><li>○ Biogas per cow per day = 1 m3 biogas per cow per day (source: Nijaguna)</li><li>○ CH4 concentration in biogas = 60%</li><li>○ Bo – Maximum methane producing capacity for manure produced by cows<br/>0.6 m3 CH4 / 3.8 kg Vs = 0.15 m3 CH4 / kg Vs</li></ul> |  |  |                         |  |  |
| <b>Documentation Provided by Project Participant:</b>   |  |  |                         |  |  |
| The emission reduction spreadsheet has been changed and attached with this submission (ER_Spreadsheet_Kolar Project_v04)<br>Page 29 of B T Nijaguna is attached to this submission as Appendix 17.  |  |  |                         |  |  |
| <b>Information Verified by Lead Assessor:</b>   |  |  | <b>Date:</b> 29/06/2009 |  |  |
| The correct Vs and Bo value of cow has been taken from the report Biogas technology by B.T. Nijaguna and also Bo for cows has been revised in ER spread sheet as 0.15 m <sup>3</sup> CH <sub>4</sub> / kg Vs. (Ok)  |  |  |                         |  |  |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |  |  |                         |  |  |
| Emission reduction spread sheet and PDD V04 has been checked for source of information. The correct Vs and Bo value of cow has been taken from the report Biogas technology by B.T. Nijaguna and also Bo for cows has been revised in ER spread sheet as 0.15 m <sup>3</sup> CH <sub>4</sub> / kg Vs. ER sheet is consistent with PDD V04; Hence CAR 13 was closed out.                             |  |  |                         |  |  |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  |  |  | <b>Date:</b> 29/06/2009 |  |  |

|   |            |         |                         |                     |              |
|---|------------|---------|-------------------------|---------------------|--------------|
| Date:   | 07/04/2009 |         | Raised by:              | Vivek Kumar Ahirwar |              |
| Type:   | CAR        | Number: | 14                      | Reference:          | Section B.10 |
| <b>Lead Assessor Comment:</b>   |            |         | <b>Date:</b> 07/04/2009 |                     |              |
| <div>5. Parameter for monitoring of leakage in the production of renewable biomass as required by AMS I.E has not been included in the monitoring plan. The sample population of the survey method required for monitoring of the project GHG indicators has not been mentioned.</div> <div>6. The frequency of the survey to be conducted for data monitoring is not clear</div> <div>7. The detail description regarding data capturing, handling and archiving procedures are absent</div> <div>8. The Monitoring Plan of the PDD does not clearly mention the quality control and quality assurance procedures to be followed to mitigate data uncertainty and to ensure delivery of high quality data.</div>   |            |         |                         |                     |              |
| <b>Project Participant Response:</b>  |            |         | <b>Date:</b> 27/04/2009 |                     |              |
| <div>1. The possible source of leakage may be non-renewable biomass saved by the project activity that is then used by non-project households. The non-project households will be surveyed each year after project implementation to determine the change in the use of NRB by the non-project households (<math>B_{NRB, non-project}</math>, calculated by applying the <math>f_{NRB}</math> of 78% to the monitoring parameter <math>B_{biomass, non-project}</math>). An increase of NRB use by the non-project households will be attributed to the leakage and subtracted from the baseline for calculating emission reductions. It is suggested to have a sample size of 100 households for this purpose. This is now reflected in B.7.1. of PDD V03.</div> <div>2. <b>N<sub>operating</sub></b> (the number of bio-digester systems operating) will be monitored monthly. All other parameters will be monitored via a survey of a sample population carried out once per year but over a period of time, up to a couple of months. That is because surveying households is time-consuming: the monitoring team needs to spend up to half a day talking to the people of each household, checking how manure is fed into a biogas digester, how the biogas burner functions, and how the slurry is used.. The sample population for the project households will be a random sample of at least</div> |            |         |                         |                     |              |

5 % of installed biogas units each year. Therefore the schedule of surveying is projected to be as follows: 45 households in the 1<sup>st</sup> year, 210 in the 2<sup>nd</sup> year, 400 in the 3<sup>rd</sup> year, and 500 in each subsequent year. This information is detailed in section B.7.1 of PDD V03.

3. Section B.7.2. of PDD V03 has been modified to provide a detailed description of data capturing, handling and archiving procedures.
4. Section B 7.2 of PDD V03 has been enhanced to provide more information on quality control and quality assurance procedures. There will be two distinct parts of monitoring:

- Monitoring functionality of biogas units:

Each cluster will have a motivator, who is trained to repair biogas units and to check and monitor whether units are functioning properly. All beneficiaries will know how to contact this person and will contact him in case of any problem with the biogas digester. Such arrangement has been tested by SKG Sangha and is working well, as beneficiaries are keen on solving problems as soon as they appear: after trying cooking on biogas, women generally do not go back to cooking on traditional stoves.

The motivator will record in a paper book any period when a specific unit is not functioning. In addition, the motivator will visit all beneficiary households at least once per month to do regular checks whether the biogas unit is functioning.

The motivator will make records in hand writing in two copies of paper book. One book will be kept with the motivator, and one will be sent at the end of the month to the taluk level. The teams in the taluk level will compile monthly reports using the data received from motivators. These reports will also be made in hand writing on two copies of paper books. Again, one is kept at the taluk level and one is sent to the project level (main office of SKG Sangha. Here a monitoring team will enter the data into an electronic database and compile yearly project-level reports.

The team from the project level will also do random checks by visiting households and checking the data compiled by the motivator.

- Monitoring of other parameters:

This part of monitoring will be carried out using surveys of a random sample of households. This monitoring will be carried out by monitoring teams at the taluk level. The teams will randomly select at least 5% of households in each taluk and will visit them with a survey sheet. Data will be recorded by hand. Survey sheets will then be sent to the project level, where the monitoring team will enter the data into an electronic database. The original data sheets will be archived in the main office of SKG Sangha. The main measure for quality assurance will be the random check by the monitoring team from the project level. QA/QC measures are described in the tables of parameters monitored in the attached revised monitoring plan.

#### Documentation Provided by Project Participant:

##### 1. Documentation relevant to point 1

N/A

##### 2. Documentation relevant to points 2-4

Additional details about the monitoring protocol are provided in section 7.2 of PDD V03.

#### Information Verified by Lead Assessor:

Date: 16/05/2009

Monitoring of leakage as per AMS I E, survey methods for monitoring, frequency of monitoring and data archiving procedures

#### Reasoning for not Acceptance or Acceptance and Close Out:

The monitoring plan for the project has been clarified in the revised PDD, further explanation has been incorporated for leakage estimation as per AMS-I.E., sample population survey methods and frequency of the survey along with appropriate discussion on data capturing, handling and archiving procedures. Same has been checked and found satisfactory. CAR 14 is closed out.

#### Acceptance and Close out by Lead Assessor: Closed

Date: 20/05/2009

|       |            |         |            |                     |                |  |
|-------|------------|---------|------------|---------------------|----------------|--|
| Date: | 07/04/2009 |         | Raised by: | Vivek Kumar Ahirwar |                |  |
| Type: | CL         | Number: | 15         | Reference:          | Section B.12.1 |  |

|   |                  |
|---|------------------|
| <b>Lead Assessor Comment:</b>   | Date: 07/04/2009 |
| <p>5. The overall responsibility/ authority for project activity operations and monitoring needs to be clarified further.</p> <p>6. Further information on overall responsibility for data monitoring, reporting, reviewing and maintenance needs to be provided by the project participant.</p> <p>7. PDD version 01 does not provide any information regarding internal audit procedures required to be executed for GHG project compliance with operational requirements.</p> <p>8. PDD v01 does not mention any information regarding project performance reviews prior to submission of data for verification.</p>   |                  |
| <b>Project Participant Response:</b>  | Date: 27/04/2009 |
| <p>1. The diagram shown in section B 7.2 of PDD V03 shows the responsibility and functions at different project levels.</p> <p>2. The same diagram shown in section B7.2 to PDD V03 explains the overall responsibility for data monitoring, reporting, reviewing and maintenance.</p> <p>3. The internal audit of village level monitoring will be performed by the project level monitoring team by doing random checks (see the revised monitoring plan in section B.7.2. of PDD V03).</p> <p>4. The check of the monitoring data will be performed by the project level monitoring team. They will carry out desk-based review of monitored data to check for consistency and to identify any questionable data. The team will then do targeted visits to the village level to check pre-identified inconsistencies or questionable data entries, as well as do random visit of households to check village-level monitoring data. This approach is now reflected in section B.7.2. of PDD V03.</p> |                  |
| <b>Documentation Provided by Project Participant:</b>   |                  |
| Further information is now provided in section B.7.2. of PDD V03.   |                  |
| <b>Information Verified by Lead Assessor:</b>   |                  |
| Overall responsibility for project activity and internal audit procedures   |                  |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |                  |
| Further clarity on overall responsibility for project activity operations and monitoring, data monitoring, reporting, reviewing and maintenance approach along with internal audit procedure to be implemented for the project activity has been explained in PDD version 03. Same has been checked and found satisfactory. Hence CL 15 is closed out.  |                  |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  | Date: 20/05/2009 |

|  |            |            |                     |                  |               |
|--|------------|------------|---------------------|------------------|---------------|
| Date:  | 07/04/2009 | Raised by: | Vivek Kumar Ahirwar |                  |               |
| Type:  | CL         | Number:    | 16                  | Reference:       | Section E.1.1 |
| <b>Lead Assessor Comment:</b>  |            |            |                     | Date: 07/04/2009 |               |
| Consideration of project operational life time as 20 years needs to be further substantiated   |            |            |                     |                  |               |
| <b>Project Participant Response:</b>   |            |            |                     | Date: 27/04/2009 |               |
| There are biogas plants that were installed by SKG Sangha 15-16 years ago and that are still functioning properly. These plants were shown to the Assessor during the site visit 5 <sup>th</sup> to 8 <sup>th</sup> January 2009. Experience of these plants allows confidence in anticipating that the biogas units should last for at least 20 years. This is also consistent with a third party reference provided below. |            |            |                     |                  |               |
| <b>Documentation Provided by Project Participant:</b>  |            |            |                     |                  |               |
| A book on biogas technology in India gives 20 years as an operating period of an average biogas plant (Nijaguna, B.T, <i>Biogas Technology</i> (New Age International (P) Ltd, 4835/24 Ansari Road, Daryaganj, New Delhi 110 002, 2002); page 232).  |            |            |                     |                  |               |
| <b>Information Verified by Lead Assessor:</b>  |            |            |                     | Date: 16/05/2009 |               |
| Life time of the project activity has been taking conservatively 20 year on the basis of past experience .(Not Ok)   |            |            |                     |                  |               |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |            |            |                     |                  |               |
| Please provide the copy of page no 232 of Nijaguna, B.T, <i>Biogas Technology</i> for evidence for life time of project activity.  |            |            |                     |                  |               |
| <b>Acceptance and Close out by Lead Assessor: Open</b>   |            |            |                     | Date: 16/05/2009 |               |

|  |                         |
|--|-------------------------|
| <b>Project Participant Response:</b>   | <b>Date: 18/06/2009</b> |
| A copy of relevant page of Nijaguna, B.T, <i>Biogas Technology</i> for evidence for life time of project activity is provided as Appendix 16 to this submission  |                         |
| <b>Documentation Provided by Project Participant:</b>  |                         |
| A copy of relevant page of Nijaguna, B.T, <i>Biogas Technology</i> for evidence for life time of project activity is provided as Appendix 16   |                         |
| <b>Information Verified by Lead Assessor:</b>  | <b>Date: 26/06/2009</b> |
| A copy of relevant page of Nijaguna, B.T, <i>Biogas Technology</i> for evidence for life time of project activity was submitted by proponent.  |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>   |                         |
| Life time of the project activity has been taking conservatively 20 year as i.e. life time of biogas unit; this was verified from a copy of relevant page of Nijaguna, B.T, <i>Biogas Technology</i> . Hence CL 16 was closed out. |                         |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>   | <b>Date: 26/06/2009</b> |

|   |            |            |                     |                  |               |
|---|------------|------------|---------------------|------------------|---------------|
| Date:   | 07/04/2009 | Raised by: | Vivek Kumar Ahirwar |                  |               |
| Type:   | CAR        | Number:    | 17                  | Reference:       | Section E.1.1 |
| <b>Lead Assessor Comment:</b>   |            |            |                     | Date: 07/04/2009 |               |
| PDD version 01, does not mention about the local stakeholders identified and consulted for the project activity.  |            |            |                     |                  |               |
| <b>Project Participant Response:</b>  |            |            |                     | Date: 27/04/2009 |               |
| Representatives of the local government (Zilla Panchayath, Taluk Panchayath and Gram Panchayath) and general population in the project areas (people from households that could potentially be project beneficiaries, farmers, women from local self-groups, NGOs, as well as village representatives) were invited to the stakeholder consultation meeting. Some village people were consulted at their homes. This final stakeholder consultation meeting was held on 18 the December, 2008 in the rotary club hall, Kolar. Meeting place visit and interaction with the meeting attendees were done by the assessors on 6 <sup>th</sup> January 2009 during their site visit and also stakeholder consultation reports were reviewed by the assessor during the site visit 5 <sup>th</sup> to 8 <sup>th</sup> January 2009. Reference to the stakeholder consultation report has been supplied to SGS as Appendix 9. |            |            |                     |                  |               |
| <b>Documentation Provided by Project Participant:</b>   |            |            |                     |                  |               |
| Stakeholder consultation report for the Kolar project (was attached as Appendix 9 to e-mail dated 03.02.2009 addressed to Ajoy Gupta.   |            |            |                     |                  |               |
| <b>Information Verified by Lead Assessor:</b>   |            |            |                     | Date: 16/05/2009 |               |
| Stakeholder consultation meeting was held on 18 the December, 2008 in the rotary club hall, Kolar. This was checked with the copy of invitation letter, photograph of stakeholder meeting and conducting on-site interview with some of stakeholder which was attended this meeting. The attendance sheet was checked and feedback forms also checked and found ok acceptable; hence CAR 17 closed out.   |            |            |                     |                  |               |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |            |            |                     |                  |               |
| Explanation and necessary correction has been done by proponent in PDD, this was checked and found acceptable. Ok hence, CAR 17 is closed out.  |            |            |                     |                  |               |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  |            |            |                     | Date: 20/05/2009 |               |

|   |            |         |            |                         |  |
|---|------------|---------|------------|-------------------------|--|
| Date:   | 16/05/2009 |         | Raised by: | Vivek Kumar Ahirwar     |  |
| Type:   | CL         | Number: | 18         | Reference:              |  |
| <b>Lead Assessor Comment:</b>   |            |         |            |                         |  |
| Please clarify the roles and responsibility of CH4NGE Ltd. in current project activity. In the scope of project participant, appropriate Letter of Approval from Annex I country needs to be submitted against the participation of CH4NGE Ltd.   |            |         |            |                         |  |
| <b>Project Participant Response:</b>  |            |         |            | <b>Date:</b> 18/06/2009 |  |
| CH4NGE will provide full up-front funding for the project activity once validation has been completed and the funding round has been completed. This funding will include all costs for preparation of PDD by CarbonAided, Validation by SGS as well as ongoing monitoring and verification costs for the whole crediting period.<br>The appropriate letter of approval from the UK DNA will be sought once we have the letter of approval from the host country (India) DNA – it is a requirement of the UK DNA that we have such a letter before applying |            |         |            |                         |  |

|   |                         |
|---|-------------------------|
| <b>Documentation Provided by Project Participant:</b>   |                         |
| No documents provided   |                         |
| <b>Information Verified by Lead Assessor:</b>   |                         |
| The required found will be providing by CH4NGE.   |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  | <b>Date:</b> 30/11/2009 |
| <p>A. Please provide details of funding which will be provided by CH4NGE. Please clarify whether this fund is repayable by project proponent or not, what is the share of CH4NGE in the CERs at what terms and conditions (Please support your response with documentary proof). As the CH4NGE will provide fund after the completion of validation process, so that PP are requested to clarify that how the PP is able to pay the cost involving during validation process e.g. baseline survey cost, validation site visit cost, validation signed contract cost etc. It would be appreciable to provide the documentary evidence for different cost involving in the process and paid by concerns participant like SKG Sangha, Carbon Aided and CH4NGE.</p> <p>B. Please submit or update the status of letter of approval from the UK DNA.</p>                         |                         |
| CL#18 is open.  |                         |
| <b>Project Participant Response:</b>  | <b>Date:</b> 20/12/2009 |
| <p>A. CH4NGE will provide all of the funding required to prepare, implement, maintain and monitor the project activities during the crediting period. The amount provided will be to an agreed budget and project proponent will not be required to repay this funding. Instead, CH4NGE will receive all of the CERs and will use the sale of these to repay the investment in the project. SKG Sangha will receive a 5% royalty on the gross proceeds of sale of the CERs. CH4NGE has made provision from its own internal resources to meet the costs incurred by CarbonAided under its contract with SGS for the Validation. These arrangements are covered by commercial and confidential contracts between CH4NGE and S K G Sangha and between CH4NGE and CarbonAided.</p> <p>B. The UK DNA has now approved the voluntary participation of CarbonAided and CH4NGE</p> |                         |
| <b>Documentation Provided by Project Participant:</b>   |                         |
| Copy of Written Approval of voluntary participation of CarbonAided  |                         |
| Copy of Written Approval of voluntary participation of CH4NGE   |                         |
| <b>Information Verified by Lead Assessor:</b>   | <b>Date:</b> 02/02/2010 |
| CH4NGE will provide all of the funding required to prepare, implement, maintain, and monitor the project activities during the crediting period. Same has been verified with the supportive document provided by PP.  |                         |
| <b>Reasoning for not Acceptance or Acceptance and Close Out:</b>  |                         |
| Information provided by PP was checked with supportive document and found acceptable. CL#18 is closed.  |                         |
| <b>Acceptance and Close out by Lead Assessor: Closed</b>  | <b>Date:</b> 02/02/2010 |

|  |            |                   |                     |
|--|------------|-------------------|---------------------|
| <b>Date:</b>   | 29/05/2009 | <b>Raised by:</b> | Vivek Kumar Ahirwar |
| <b>Type:</b>   | FAR        | <b>Number:</b>    | 19                  |
|  |            | <b>Reference:</b> | CAR 12              |
| <b>Lead Assessor Comment:</b>  |            |                   |                     |
| <p>3. Actual implementation schedule needs to be confirmed during verification</p> <p>4. As per PDD version 03, 70:30 ratios have been considered for installation of 2m<sup>3</sup> units and 3m<sup>3</sup>. Estimated emission reduction has been calculated based on proposed ratio of 2m<sup>3</sup> units and 3m<sup>3</sup> units installed. Since, this ratio influences the emission reduction, same needs to be checked during verification.</p> |            |                   |                     |

#### A.4 Annex 4: Team Members Statements of Competency

Name: Vivek Ahirwar

##### Status

|                  |           |                      |   |
|------------------|-----------|----------------------|---|
| - Lead Assessor  | x         | - Expert             |   |
| - Assessor       | x         | - Financial Expert   |   |
| - Local Assessor | Indi<br>a | - Technical Reviewer | x |

##### Scopes of Expertise

|   |  |
|---|--|
| <b>1. Energy Industries (renewable / non-renewable)</b>   |  |
| Technical Area(s):  |  |
| <b>2. Energy Distribution</b>   |  |
| Technical Area(s):  |  |
| <b>3. Energy Demand</b>   |  |
| Technical Area(s):  |  |
| <b>4. Manufacturing</b>   |  |
| Technical Area(s):  |  |
| <b>5. Chemical Industry</b>   |  |
| Technical Area(s):  |  |
| <b>6. Construction</b>  |  |
| Technical Area(s):  |  |
| <b>7. Transport</b>   |  |
| Technical Area(s):  |  |
| <b>8. Mining/Mineral Production</b>   |  |
| Technical Area(s):  |  |
| <b>9. Metal Production</b>  |  |
| Technical Area(s):  |  |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   |  |
| Technical Area(s):  |  |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b> |  |
| Technical Area(s):  |  |
| <b>12. Solvent Use</b>  |  |
| Technical Area(s):  |  |
| <b>13. Waste Handling and Disposal</b>  |  |
| Technical Area(s):  |  |
| <b>14. Afforestation and Reforestation</b>  |  |
| Technical Area(s):  |  |
| <b>15. Agriculture</b>  |  |
| Technical Area(s):  |  |

Approved Member of Staff by: Siddharth Yadav

Date: 26/05/2011

Name: Goswami, Tridip

#### Status

|                  |                                     |                      |                          |
|------------------|-------------------------------------|----------------------|--------------------------|
| - Lead Assessor  | <input checked="" type="checkbox"/> | - Expert             | <input type="checkbox"/> |
| - Assessor       | <input checked="" type="checkbox"/> | - Financial Expert   | <input type="checkbox"/> |
| - Local Assessor | <input checked="" type="checkbox"/> | - Technical Reviewer | <input type="checkbox"/> |

#### Scopes of Expertise

|   |                          |
|---|--------------------------|
| <b>1. Energy Industries (renewable / non-renewable)</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>2. Energy Distribution</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>3. Energy Demand</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>4. Manufacturing</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>5. Chemical Industry</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>6. Construction</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>7. Transport</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>8. Mining/Mineral Production</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>9. Metal Production</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b> | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>12. Solvent Use</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>13. Waste Handling and Disposal</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>14. Afforestation and Reforestation</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |
| <b>15. Agriculture</b>  | <input type="checkbox"/> |
| <i>Sub scope(s):</i>  |                          |

Approved Member of Staff by: Siddharth Yadav Date: 07/10/2010

Name: Nitin Babber

### Status

|                  |                                     |                      |                                     |
|------------------|-------------------------------------|----------------------|-------------------------------------|
| - Lead Assessor  | <input checked="" type="checkbox"/> | - Expert             | <input checked="" type="checkbox"/> |
| - Assessor       | <input checked="" type="checkbox"/> | - Financial Expert   | <input type="checkbox"/>            |
| - Local Assessor | <input type="checkbox"/>            | - Technical Reviewer | <input type="checkbox"/>            |

### Scopes of Expertise

1. **Energy Industries (renewable / non-renewable)** ☒  
Technical Area(s): TA 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar.
2. **Energy Distribution** ☐  
Technical Area(s):
3. **Energy Demand** ☒  
Technical Area(s): TA 3.1 Energy Demand
4. **Manufacturing** ☒  
Technical Area(s): TA 4.4 Refinery (oil and gas)  
TA 4.n Air compression  
TA 4.n Fuel switch
5. **Chemical Industry** ☐  
Technical Area(s):
6. **Construction** ☐  
Technical Area(s):
7. **Transport** ☐  
Technical Area(s):
8. **Mining/Mineral Production** ☐  
Technical Area(s):
9. **Metal Production** ☐  
Technical Area(s):
10. **Fugitive Emissions from Fuels (solid, oil and gas)** ☒  
Technical Area(s): TA 10.2 Oil and Gas industry, coal mine methane recovery and use
11. **Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride** ☐  
Technical Area(s):
12. **Solvent Use** ☐  
Technical Area(s):
13. **Waste Handling and Disposal** ☐  
Technical Area(s):
14. **Afforestation and Reforestation** ☐  
Technical Area(s):
15. **Agriculture** ☐  
Technical Area(s):

Approved Member of Staff by: Siddharth Yadav

Date: 20/06/2011

Name: Gautam, Ashok

#### Status

|                  |           |                      |   |
|------------------|-----------|----------------------|---|
| - Lead Assessor  | x         | - Expert             | x |
| - Assessor       | x         | - Financial Expert   |   |
| - Local Assessor | Indi<br>a | - Technical Reviewer | x |

#### Scopes of Expertise

|   |                  |
|---|------------------|
| <b>1. Energy Industries (renewable / non-renewable)</b>   | <b>x</b>         |
| Technical Area(s): <i>TA 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar</i> |                  |
| <b>2. Energy Distribution</b>   |                  |
| Technical Area(s):  |                  |
| <b>3. Energy Demand</b>   |                  |
| Technical Area(s):  |                  |
| <b>4. Manufacturing</b>   |                  |
| Technical Area(s):  |                  |
| <b>5. Chemical Industry</b>   |                  |
| Technical Area(s):  |                  |
| <b>6. Construction</b>  |                  |
| Technical Area(s):  |                  |
| <b>7. Transport</b>   |                  |
| Technical Area(s):  |                  |
| <b>8. Mining/Mineral Production</b>   |                  |
| Technical Area(s):  |                  |
| <b>9. Metal Production</b>  |                  |
| Technical Area(s):  |                  |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   |                  |
| Technical Area(s):  |                  |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b>                             |                  |
| Technical Area(s):  |                  |
| <b>12. Solvent Use</b>  |                  |
| Technical Area(s):  |                  |
| <b>13. Waste Handling and Disposal</b>  | <b>x</b>         |
| Technical Area(s): <i>TA 13.1: Waste handling and disposal</i>  |                  |
| <b>14. Afforestation and Reforestation</b>  |                  |
| Technical Area(s):  |                  |
| <b>15. Agriculture</b>  |                  |
| Technical Area(s):  |                  |
| Approved Member of Staff by: Siddharth Yadav  | Date: 28/03/2011 |

Name: Sarang Khati

### Status

|                  |                                     |                      |                                     |
|------------------|-------------------------------------|----------------------|-------------------------------------|
| - Lead Assessor  | <input checked="" type="checkbox"/> | - Expert             | <input checked="" type="checkbox"/> |
| - Assessor       | <input checked="" type="checkbox"/> | - Financial Expert   | <input type="checkbox"/>            |
| - Local Assessor | India                               | - Technical Reviewer | <input type="checkbox"/>            |

### Scopes of Expertise

- 1. Energy Industries (renewable / non-renewable)** ☒  
Technical Area(s): TA 1.1 Thermal energy generation from fossil fuels and biomass including thermal electricity from solar.
- 2. Energy Distribution** ☐  
Technical Area(s):
- 3. Energy Demand** ☐  
Technical Area(s):
- 4. Manufacturing** ☒  
Technical Area(s): TA 4.4 Refinery (Oil and gas)  
TA 4.n Fuel Switch
- 5. Chemical Industry** ☐  
Technical Area(s):
- 6. Construction** ☐  
Technical Area(s):
- 7. Transport** ☐  
Technical Area(s):
- 8. Mining/Mineral Production** ☐  
Technical Area(s):
- 9. Metal Production** ☐  
Technical Area(s):
- 10. Fugitive Emissions from Fuels (solid, oil and gas)** ☒  
Technical Area(s): TA 10.2 Oil and Gas industry, coal mine methane recovery and use.
- 11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride** ☐  
Technical Area(s):
- 12. Solvent Use** ☐  
Technical Area(s):
- 13. Waste Handling and Disposal** ☐  
Technical Area(s):
- 14. Afforestation and Reforestation** ☐  
Technical Area(s):
- 15. Agriculture** ☐  
Technical Area(s):

Approved Member of Staff by:

Siddharth  
Yadav

Date:

17/06/2011

Name: Deng Liangwei

#### Status

|                  |                          |                      |                                     |
|------------------|--------------------------|----------------------|-------------------------------------|
| - Lead Assessor  | <input type="checkbox"/> | - Expert             | <input checked="" type="checkbox"/> |
| - Assessor       | <input type="checkbox"/> | - Financial Expert   | <input type="checkbox"/>            |
| - Local Assessor | <input type="checkbox"/> | - Technical Reviewer | <input type="checkbox"/>            |

#### Scopes of Expertise

|   |                                     |
|---|-------------------------------------|
| <b>1. Energy Industries (renewable / non-renewable)</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>2. Energy Distribution</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>3. Energy Demand</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>4. Manufacturing</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>5. Chemical Industry</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>6. Construction</b>  | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>7. Transport</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>8. Mining/Mineral Production</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>9. Metal Production</b>  | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b> | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>12. Solvent Use</b>  | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>13. Waste Handling and Disposal</b>  | <input checked="" type="checkbox"/> |
| Technical Area(s): TA 13.2 Animal waste management  |                                     |
| <b>14. Afforestation and Reforestation</b>  | <input type="checkbox"/>            |
| Technical Area(s):  |                                     |
| <b>15. Agriculture</b>  | <input checked="" type="checkbox"/> |
| Technical Area(s): TA 15.2 Animal waste management  |                                     |

Approved Member of Staff by:

Siddharth  
Yadav

Date:

28/02/2011

Name: Vicmary  
Molina

#### Status

|                  |           |                      |   |
|------------------|-----------|----------------------|---|
| - Lead Assessor  |           | - Expert             | x |
| - Assessor       |           | - Financial Expert   |   |
| - Local Assessor | Chil<br>e | - Technical Reviewer |   |

#### Scopes of Expertise

|   |   |
|---|---|
| <b>1. Energy Industries (renewable / non-renewable)</b>   |   |
| Technical Area(s):  |   |
| <b>2. Energy Distribution</b>   |   |
| Technical Area(s):  |   |
| <b>3. Energy Demand</b>   |   |
| Technical Area(s):  |   |
| <b>4. Manufacturing</b>   |   |
| Technical Area(s):  |   |
| <b>5. Chemical Industry</b>   |   |
| Technical Area(s):  |   |
| <b>6. Construction</b>  |   |
| Technical Area(s):  |   |
| <b>7. Transport</b>   |   |
| Technical Area(s):  |   |
| <b>8. Mining/Mineral Production</b>   |   |
| Technical Area(s):  |   |
| <b>9. Metal Production</b>  |   |
| Technical Area(s):  |   |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   |   |
| Technical Area(s):  |   |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b> |   |
| Technical Area(s):  |   |
| <b>12. Solvent Use</b>  |   |
| Technical Area(s):  |   |
| <b>13. Waste Handling and Disposal</b>  | x |
| Technical Area(s): TA 13.2 Animal waste management  |   |
| <b>14. Afforestation and Reforestation</b>  |   |
| Technical Area(s):  |   |
| <b>15. Agriculture</b>  | x |
| Technical Area(s): TA 15.2 Animal waste management  |   |

Approved Member of Staff by: Siddharth  
Yadav

Date: 11/01/2011

Name: Abhishek Mahawar

#### Status

|                  |           |                      |   |
|------------------|-----------|----------------------|---|
| - Lead Assessor  | x         | - Expert             |   |
| - Assessor       | x         | - Financial Expert   | x |
| - Local Assessor | Indi<br>a | - Technical Reviewer |   |

#### Scopes of Expertise

|   |  |
|---|--|
| <b>1. Energy Industries (renewable / non-renewable)</b>   |  |
| Technical Area(s):  |  |
| <b>2. Energy Distribution</b>   |  |
| Technical Area(s):  |  |
| <b>3. Energy Demand</b>   |  |
| Technical Area(s):  |  |
| <b>4. Manufacturing</b>   |  |
| Technical Area(s):  |  |
| <b>5. Chemical Industry</b>   |  |
| Technical Area(s):  |  |
| <b>6. Construction</b>  |  |
| Technical Area(s):  |  |
| <b>7. Transport</b>   |  |
| Technical Area(s):  |  |
| <b>8. Mining/Mineral Production</b>   |  |
| Technical Area(s):  |  |
| <b>9. Metal Production</b>  |  |
| Technical Area(s):  |  |
| <b>10. Fugitive Emissions from Fuels (solid, oil and gas)</b>   |  |
| Technical Area(s):  |  |
| <b>11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride</b> |  |
| Technical Area(s):  |  |
| <b>12. Solvent Use</b>  |  |
| Technical Area(s):  |  |
| <b>13. Waste Handling and Disposal</b>  |  |
| Technical Area(s):  |  |
| <b>14. Afforestation and Reforestation</b>  |  |
| Technical Area(s):  |  |
| <b>15. Agriculture</b>  |  |
| Technical Area(s):  |  |

Approved Member of Staff by: Siddharth Yadav

Date: 22/07/2011