# VERIFICATION / CERTIFICATION REPORT

# "BAGEPALLI CDM BIOGAS PROGRAMME" IN INDIA

(UNFCCC Registration Ref. No. 0121)

Monitoring Period:

01 August 2009 to 31 July 2011

REPORT NO. 2012-0738

REVISION NO. 01

DNV KEMA ENERGY & SUSTAINABILITY

# VERIFICATION / CERTIFICATION REPORT

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| Date of first issue:<br>12 March 2013 | Project No.:<br>PRJC-349639-2011-CCS-IND |
| Approved by:<br>Michael Lehmann | Organisational unit:<br>DNV KEMA Energy & Sustainability<br>Accredited Climate Change Services |
| Client:<br>M/s Velcan Energy | Client ref.:<br>Mr. Sebastian Jamme |

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Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the project activity "Bagepalli CDM Biogas Programme" in India" (UNFCCC Registration Ref. No. 0121) for the period 01 August 2009 to 31 July 2011.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (version 2) of 5 March 2013 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.C (version 5) and the monitoring plan contained in the revised Project Design Document, version 3 of 22 August 2012.

DNV Climate Change Services AS is able to certify that the emission reductions from the project activity "Bagepalli CDM Biogas Programme" in India during the period 01 August 2009 to 31 July 2011 amount to 33 087 tonnes of $CO_2$ equivalent.

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|---|---|---|---|
| Report No.:<br>2012-0738 | | Subject Group:<br>Environmen | **Indexing terms** |
| Report title:<br>"Bagepalli CDM Biogas Programme" | | | Key words<br>Climate Change<br>Kyoto Protocol<br>Validation<br>Clean Development Mechanism<br><br>Service Area<br>Verification<br><br>Market Sector<br>Energy Industry |
| Work carried out by:<br>Seshan Ranganathan, Shilpa Swarnim | | | |
| Work verified by:<br>Krishnan Namboodiri | | | |
| Date of this<br>12 March 2013 | Rev. No.:<br>01 | Number of<br>17 | ☒ No distribution without permission from the client or responsible organisational unit<br>☐ free distribution within DNV after 3 years<br>☐ Strictly confidential<br>☐ Unrestricted distribution |

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## *Abbreviations*

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| ADATS | Agricultural Development and Training Society |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reduction(s) |
| $CH_4$ | Methane |
| CL | Clarification request |
| $CO_2$ | Carbon dioxide |
| $CO_{2e}$ | Carbon dioxide equivalent |
| DNV | Det Norske Veritas |
| DNA | Designated National Authority |
| EB | Executive Board |
| FAR | Forward Action Request |
| FCN | Fair Climate Network |
| GHG | Greenhouse gas(es) |
| GWP | Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| MVP | Monitoring and Verification Plan |
| NGO | Non-Governmental Organisation |
| ODA | Official Development Assistance |
| PDD | Project Design Document |
| PS | Project Standard |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VVS | Verification and Validation Standards |

# 1 INTRODUCTION

M/s Velcan Energy has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the CDM project activity 0121 "Bagepalli CDM Biogas Programme" in India (the project) for the period 01 August 2009 to 31 July 2011. This report contains the findings from the verification and a certification statement for the certified emission reductions.

## 1.1 Objective

Verification is the periodic independent review and *ex post* determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "Bagepalli CDM Biogas Programme" for the period 01 August 2009 to 31 July 2011.

## 1.2 Scope

The scope of the verification is to verify that:

- The project activity has been implemented and operated in accordance with the registered PDD or any approved revised PDD;
- The monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan, including compliance with any guidance provided by the Board regarding deviations from the provisions of a registered plan and/or methodology;
- The data and calculation of GHG emission reductions have been assessed to correctly support the emission reductions being claimed.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

## 1.3 Description of the project activity

| | |
|---|---|
| Project Parties: | India (host), France, Switzerland, Germany |
| Title of project activity: | Bagepalli CDM Biogas Programme |
| UNFCCC registration No: | 0121 |
| UNFCCC registration date: | 10 December 2005 |
| Baseline and monitoring methodology | AMS-I.C (version 5) |
| Sectoral scope(s): | Renewable Energy generation |
| Project Participants: | Agricultural Development and Training Society (ADATS), Velcan Energy, Atmosfair gGmbH. |

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|---|---|
| Location of the project activity: | The project activity (i.e. the individual biogas digesters at households) is spread over 5 taluks in the Chickballapur district (formerly Kolar district), Karnataka state, India. Of the 5 500 digesters mentioned in the registered PDD, a total of 5 485 digesters have been built and commissioned for the chosen verification period. |
| Project's crediting period: | 1 September 2006 to 31 August 2013 |
| Period verified in this verification: | 01 August 2009 to 31 July 2011 |

## 1.4 Methodology for determining emission reductions

The approved baseline methodology AMS-I.C (version 5) – "Thermal energy for the user"/19/ has been applied for the project activity. The baseline for the project activity as per the methodology AMS-I.C is the fuel consumption per household that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced that is kerosene and fuel wood in the case of the project activity.

Monitoring is as per the revised PDD which is in compliance with the methodology and involves monitoring the number of biogas units commissioned, the non-operating hours of the biogas unit on daily basis throughout the year from which data the operating hours for the year for each biogas unit is derived.

The emission reductions per year are estimated from the monitored value of total number of operational days for each digester and the ex-ante baseline emission ratio per household per year of 3.56 $tCO_2$

# 2 METHODOLOGY

DNV has assessed and determined that the implementation and operation of the project activity, and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the Board.

The assessment involved a desk review of relevant documentation as well as an on-site visit.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

i) The actually installed 5 485 biogas units to ensure the conformance with the descriptions in the registered PDD /14/.

ii) Number of biogas units operational –monitored on a day to day basis /3//9/.

iii) Average annual operating time (hours) – all the units monitored on day to day basis by Balakendra teachers or Village Health workers which is entered into the ADATS online monitoring solution uploaded on Info Needs /3//4//9/.

iv) Non-usage days of installed and operational biogas plants /3/

v) Review of project documentation /7//8//9//10/-/14/ ;

***Verification team***

| ***Role*** | ***Last Name*** | ***First Name*** | ***Country*** | ***Type of involvement*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Desk review | Site visit | Reporting | Supervision of work | Technical review | TA 1.2 competence |
| Team leader (Verifier) | Ranganathan | Seshan | India | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Verifier | Swarnim | Shilpa | India | ✓ | ✓ | ✓ | | | ✓ |
| Technical reviewer | Namboodiri | Krishnan | India | | | | | ✓ | ✓ |

***Duration of verification***

| | |
|---|---|
| Monitoring report publication: | 18 December 2012 |
| Desk review: | 20 December 2012 to 10 January 2013 |
| On-site assessment: | 30 and 31 January 2013 |
| Reporting, calculation checks and QA/QC: | 1 February 2013 to 12 March 2013 |

## 2.1 Desk review

The monitoring report, version 01 dated 12 December 2012, has been made publicly available on the CDM website.

In addition to the monitoring report /1/ (version 2 dated 5 March 2013) and ER calculation sheet /2/, DNV reviewed:

- The PDD for the project activity (version 3 dated 22 August 2012) /14/
- The previous verification reports /10//11/.
- Baseline and monitoring methodology AMS-I.C, version 5 /19/
- Validation opinion for post registration changes in PDD dated 23 August 2012/13/.
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board /16//17//18//20//21/
- Other information and references relevant to the project activity's resulting emission reductions/3//4//5//6/.

During the desk review, DNV has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology and
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

## 2.2 On-site assessment

On 30 and 31 January 2013, DNV performed on-site assessments. During the on-site assessment DNV carried out:

- An assessment of the implementation and operation of the registered project activity is as per the revised PDD for the project activity (version 3 dated 22 August 2012) /14/;
- For on site assessment, DNV in line with the monitoring plan of the revised PDD /14/ and validation report /12/, and as per the sampling guidance /21/ calculated the sample size for acceptance sampling. The sample size was calculated using standard software /15/ based on the Acceptable Quality Level of 1% and Unacceptable Quality Level of 10% with alpha and beta at 5% which worked out to be 94 households. Considering that the sample is homogenous as the distribution of biogas digestors is in one district only, the households to be visited and whose documents to be checked were identified using simple random generation technique. During the site visit all records of the commissioned bio-digestors as per the list of 94 households were verified/3//4//5//6/ from the documentary evidence. In addition, DNV visited an additional 20 households that is a total of 114 households and checked the installation and functioning of the biogas. These 114 households included 64 households that figured in the random list. The additional households were those adjoining the random households selected and were chosen for their logistic advantages of visiting additional households for verification.
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD /22/ to /26/;
- A cross check between information provided in the monitoring report and logbooks, inventories, purchase records or similar data sources /3//4//5//6/;

In addition, all parameters required by the monitoring methodology AMS-I.C Version 5, and the management system were assessed during the site visit.

| Persons interviewed | Organization | Agenda |
|---|---|---|
| - Mr. Ram Esteves – Director | ADATS | - Assessment of project design as per the revised registered PDD and compliance with monitoring plan of the applied methodology. |
| - Dr. Sudha Padmanabha | FCN | - Detailed checking of monitoring report and ER spreadsheet as per monitoring plan and identifying on random basis the households whose data is to be verified and visited. |
| - Mr. Abid Pasha - System Administrator, | ADATS | -Management procedures like internal reviews to minimize uncertainties in data monitoring and data management. |
| - Mr. Chethan | FCN | |

| | | |
|---|---|---|
| | | - Project performance<br>- Resources, training needs and procedures for operation and maintenance. |

The interview included having dialogues with the household members regarding their usage of fuel wood and kerosene since the implementation of the project activity, the frequency and dependence on the biogas from the digesters for cooking.

## 2.3 Closing out of verification findings

The objective of this phase of the verification was to resolve any issues which needed be clarified prior to DNV's conclusion that i) the project activity has been implemented and operated in accordance with the approved revised PDD (version 3 dated 22 August 2012) /14/, ii) the monitoring plan complies with the monitoring methodology and the actual monitoring complies with the monitoring plan and iii) the data and calculation of GHG emission reductions are correct.

A corrective action request (CAR) is issued, where:

i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
ii. Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
iii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
iv. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

The verification identified one CL and one FAR for this monitoring period. The identified CL was satisfactorily addressed by the project participants (please refer to Appendix A for further details).

The identified CL was related to non functioning of one biogas unit and it does not lead to any changes/modifications in the webhosted monitoring report. The web hosted monitoring report version 1 dated 12 December 2012 was revised to version 2 dated 5 March 2013 to include Velcan Energy,Switzerland as party involved against Project participant in the cover page 1 of the monitoring report /1/ and to correct the transcription error in the total biogas non usage days during the monitoring period to 611 655 instead of 544 626 in Section E.6 of the monitoring report /1/.

# 3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "Bagepalli CDM Biogas Programme" for the period 01 August 2009 to 31 July 2011.

## 3.1 Remaining issues, CARs, FARs from previous validation / verification

According to the previous verification report/10/, no CAR, FAR or CL's were required to be closed out during this verification.

Similarly, no CARs / FARs were required to be closed based on the validation report/12/.

## 3.2 Post registration changes

There are no post registration changes identified by DNV during this verification.

## 3.3 Project implementation

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in the PDD (version 3 of 22 August 2012).

The project activity involved installation and operation of 5 500 digesters in phases, at individual households, thus avoiding the use of non-renewable biomass like the fuel wood from forests and the use of kerosene in the baseline scenario.

For the chosen monitoring period, a total of 5 485 digesters have been installed, which have been accounted for in the estimation of emission reductions. DNV has verified the number of units installed from Info Needs database and agreement between ADATS and end users. The project activity of 5 485 biogas units was implemented in 336 villages of 5 Taluks of Chickballapur district.

As stated in the PDD, prior to the implementation of the project activity, the source of thermal energy in the households was non-renewable biomass (wood) and kerosene. The implementation of the project activity has resulted in reduction of the consumption of non-renewable biomass and kerosene in individual household where the digesters have been installed.

As per the original monitoring plan in the registered PDD (AMS- I.C. - Thermal energy for the user, (version 05), the parameters to be monitored are

1. Number of biogas digesters installed (Number of installed $2m^3$ systems )
2. Number of digesters operational (Number of operating $2m^3$ systems )
3. Average annual operating time ($2m^3$ system average annual operating time)
4. Survey of energy produced by the digesters. (Energy produced by a sample of the systems)

However, in addition to the above parameters as defined in the monitoring plan, the project participant was also voluntarily carrying out an annual survey of the energy produced from the biogas digesters to confirm if this energy is able to replace the energy obtained from firewood and kerosene considered in the baseline. A revision to the monitoring plan in the registered PDD was proposed for the project activity to exclude this voluntary survey.

The project participant also proposed to revise the recording frequency of monitoring of the number of biogas digesters installed and the number of operating systems to be on a daily basis instead of every six months as stated in the registered PDD. Also the recording

frequency of reporting annual hours of operation on an average system was proposed to be changed to annual instead of bi-annual as stated in the registered PDD.

Furthermore, the Project Proponent will in addition be monitoring the non-usage days of biogas stoves which may be due to any reasons such as break downs, non -availability of cow dung etc., and will not be claiming emission reductions for those days. The emission reductions are only for the days when the biogas plants are operational.

The above mentioned changes were incorporated in the revised PDD version 3 dated 22 August 2012 /14/ along with validation opinion on the same. This revised PDD submitted on 27 September 2012 /14/ was approved by the CDM-EB.

## 3.4 Information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD.

The PDD /14/ envisaged installation and operation of 5 500 digesters in phases, at individual households, against which 5 485 digesters have been installed.

Total emission reductions for the period 1 August 2009 to 31 July 2011 for the installed and operational 5 485 biogas units is 33 087 $tCO_2$.

The emission reductions of 33 087 $tCO_2$ during the current verification period of 1 August 2009 to 31 July 2011 are 15.39 % lower compared to the estimated emission reduction of 39 106 $tCO_2$ for the same period as per the PDD.

This variation is due to the lower number of 5 485 biogas digesters installed against 5 500 envisaged as per the PDD. Also, many units were under repair and maintenance during this monitoring period, hence leading to 611 655 non-operational biogas days for all installed biogas digestors together during the current monitoring period which led to a decrease of 15.39% of expected emission reductions for the monitoring period.

| Year | PDD ERs $tCO_2$ | Monitoring Report ERs $tCO_2$ |
|---|---|---|
| 1 August 2009 to 31 July 2011 | 39 106 | 33 087 |
| % deviation from PDD | | -15.39% |

## 3.5 Compliance of monitoring plan with monitoring methodology

DNV is able to confirm that the monitoring plan contained in the PDD (version 3 of 22 August 2012)/14/ is in accordance with the approved methodology applied by the project activity, i.e. AMS-I.C (version 5) /19/.

## 3.6 Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the PDD (version 3 of 22 August 2012)/14/.

The tables below describe for each parameter, which is to be measured according to the monitoring plan, how DNV has verified that i) the actual monitoring complies with the monitoring plan and that ii) data have been assessed to correctly support the emission reductions being claimed.

| | Assessment/ Observation |
|---|---|
| Data / Parameter:<br>(as in monitoring plan): | Number of installed 2 $m^3$ systems |
| Measuring frequency: | Continuous |
| Reporting frequency: | Daily |
| Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No) | Yes |
| Type of monitoring equipment: | Measured.<br>Online database for the project activity is been maintained /9/. These are entered in the database on the completion of 6 process activities for each of the biogas unit. Construction processes were monitored on a day to day basis and database maintained from its initiation to completion for each of the biogas units. |
| Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification? | Not applicable as no monitoring equipment is involved for monitoring the data. |
| Calibration frequency /interval: | Not applicable |
| Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications<br>(if local/national standards or the manufacturer's specifications are not available, international standards may be used)? | Not applicable |
| Is the calibration of measuring equipment carried out by an accredited person or institution? | Not applicable |
| Did calibration confirm proper functioning of monitoring equipment? (Yes / No): | Not applicable |
| Is(are) calibration(s) valid for the whole reporting period? | Not applicable |
| If applicable, has the reported data been cross-checked with other available data? | Yes, it has been cross checked against end user agreement signed with the beneficiary /5/. |
| How were the values in the monitoring report verified? | It has been verified with the ADATS database /4/ and log book /3/. |

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| Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? | Yes. A detailed QA/QC process has been defined in the PDD /14/. Implementation of the same found satisfactory. |
| In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard? | Not applicable |

| | Assessment/ Observation |
|---|---|
| Data / Parameter:<br>(as in monitoring plan): | Number of operating 2 $m^3$ systems |
| Measuring frequency: | Continuous |
| Reporting frequency: | Field data monitored on a daily basis |
| Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No) | Yes. |
| Type of monitoring equipment: | Field data monitored on a daily basis.<br><br>There are no monitoring equipment to measure this parameter. The non-operational days of all the installed units needs to be monitored to record the number of units operational in a year on a daily basis. During this monitoring period, the biogas systems were monitored on a day to day basis for non-operational days and annual usage hours by the Balakendra Teachers or the health workers at village level, which was entered into the ADATS database – InfoNeeds for all the biogas units /9//3/. |
| Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan and/or methodology does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification? | Not Applicable as no monitoring equipment is used for monitoring of this parameter. |
| Calibration frequency /interval: | Not applicable |
| Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the | Not applicable |

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| local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)? | |
| Is the calibration of measuring equipment carried out by an accredited person or institution? | Not applicable |
| Did calibration confirm proper functioning of monitoring equipment? (Yes / No): | Not applicable |
| Is(are) calibration(s) valid for the whole reporting period? | Not applicable |
| If applicable, has the reported data been cross-checked with other available data? | Yes |
| How were the values in the monitoring report verified? | The data has been verified against daily log book records for monitoring of biogas units by Balakendra teacher for operational and non operational hours /3/. |
| Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? | Yes |
| In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard? | Not applicable |

| | Assessment/ Observation |
|---|---|
| Data / Parameter: (as in monitoring plan): | 2 $m^3$ system average annual operating time |
| Measuring frequency: | Daily |
| Reporting frequency: | Field data monitored on a daily basis |
| Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No) | Yes |
| Type of monitoring equipment: | Field data monitored on a daily basis. |
| Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan and/or methodology does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the | Not Applicable as there are no monitoring equipment to measure this parameter. The operating time of biogas systems was monitored on a day to day basis by the Balakendra Teachers or the health workers at village level, which is entered into the ADATS database – InfoNeeds for all the biogas units |

| | |
|---|---|
| manufacturer's specification? | /9/. |
| Calibration frequency /interval: | NA |
| Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications (if local/national standards or the manufacturer's specifications are not available, international standards may be used)? | NA |
| Is the calibration of measuring equipment carried out by an accredited person or institution? | Not applicable |
| Did calibration confirm proper functioning of monitoring equipment? (Yes / No): | Not applicable |
| Is(are) calibration(s) valid for the whole reporting period? | Not applicable |
| If applicable, has the reported data been cross-checked with other available data? | Yes |
| How were the values in the monitoring report verified? | The data has been verified against daily log book records /3/ for monitoring of biogas units by Balakendra teacher for operational and non operational hours and also from InfoNeeds database at ADATS head office in Bagepalli /9/.<br>A revised monitoring plan was submitted and approved on 27 September 2012 by the EB /13/. In the revised monitoring plan, the operational hours needs to be monitored yearly once for randomly selected households. So for this verification period from 1 August 2009 to 31 July 2011 monitoring it was done for all the days for all the units. |
| Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? | Yes |
| In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard? | Not applicable |

| | Assessment/ Observation |
|---|---|
| Data / Parameter:<br>(as in monitoring plan): | Non-usage days of installed and operational biogas plants |
| Measuring frequency: | Daily |
| Reporting frequency: | Field data monitored on a daily basis |
| Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No) | Yes |
| Type of monitoring equipment: | It was monitored on a day to day basis by the Balakendra Teachers or the health workers at village level, which is entered into the ADATS database – InfoNeeds for all the biogas units /9/.<br>The operational days in a year for a biogas unit are 365 days minus non-operational days. |
| Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan and/or methodology does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification? | Not Applicable as no monitoring equipment is used to measure this parameter. |
| Calibration frequency /interval: | Not applicable |
| Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications<br>(if local/national standards or the manufacturer's specifications are not available, international standards may be used)? | Not applicable |
| Is the calibration of measuring equipment carried out by an accredited person or institution? | Not applicable |
| Did calibration confirm proper functioning of monitoring equipment? (Yes / No): | Not applicable |
| Is(are) calibration(s) valid for the whole reporting period? | Not applicable |
| If applicable, has the reported data been cross-checked with other available data? | Yes |
| How were the values in the monitoring report verified? | The data has been verified against daily log book records /3/ for monitoring of biogas units by Balakendra teacher for operational and non operational hours and also from InfoNeeds |

| | |
|---|---|
| | database at ADATS head office in Bagepalli /9/.<br>. |
| Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? | Yes |
| In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard? | Not applicable |

## 3.7 Assessment of data and calculation of emission reductions

DNV confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

As described in the approved PDD version 3 dated 22 August 2012 /14/, the equation for the emission reduction calculations have been suitably modified to reflect the non usage days and is calculated using a ratio of 3.56 $tCO_2$/unit operating/year.

In the PDD, the CER calculation has been revised as follows-

$$ER_y = \sum_{n=1}^{5500}(OS_y \times \frac{EM_y}{365} \times number.of.operational.days)$$

Where,

$OS_y$ : 2 $m^3$ operating system in year y.

$EM_y$ = 3.56 t $CO_2e$ per family/year= Baseline emissions per household with a 2 $m^3$ biogas system

Number of operational days = 365 - Non-usage days of installed biogas

DNV verified and confirms that there are no project emissions in the project activity and also there is no leakage due to the project activity.

Hence, the total emission reductions for the period 1 August 2009 to 31 July 2011 for the installed and operational 5 485 biogas units is 33 087 $tCO_2$.

The emission reductions during the current verification period of 1 August 2009 to 31 July 2011 are 15.39 % lower compared to the estimated emission reduction of 39 106 $tCO_2$ for the same period as per the PDD as detailed in paragraph 3.4.

The parameters reported, including source, frequency and review criteria as indicated in the monitoring plan were verified to be correct and in line with the validated monitoring plan of the PDD.

As outlined above, the input data for calculating the emission reductions, the calculating process and the result are complete and transparent. Therefore, DNV is able to confirm the accuracy of the emission reductions.

## 3.8 Quality of evidence to determine emission reductions.

DNV assessed daily log book records for monitoring of biogas units by Balakendra teacher for operational and non-operational hours /3/, InfoNeeds database /4/ at ADATS head office in Bagepalli for the biogas units and the end user agreements between ADATS and biogas unit users/5/. All the data are also available in hardcopies and were evidenced during the verification process. As detailed in section 2 above, during the site visit DNV visited the households for inspection of the Biogas digestors installed and checked the records as per the random sample selected. DNV did not find any discrepancy in the data reported for the selected households and so accepted the data submitted with respect to the installation and non-operating days that have been used for emission reduction calculations /2/.

## 3.9 Management system and quality assurance

ADATS is responsible for the operation and maintenance of the project and data collection. ADATS has sufficiently established management procedures and has implemented them effectively to ensure that the process is consistent and the same has been verified to be in place by DNV on site /22//23//25/. The procedures cover management responsibilities, data monitoring procedures, training procedures, periodical internal audits, management reviews and corrective actions in case of any deviations.

DNV confirms from the discussions that were held during the site visit that the responsibilities and authorities in the management and operational system for monitoring and reporting are in accordance with the responsibilities and authorities as detailed in the PDD approved by EB /14/ and complies with the monitoring plan as per the PDD.

# 4 CERTIFICATION STATEMENT

*DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the CDM project activity "Bagepalli CDM Biogas Programme" in India for the period 01 August 2009 to 31 July 2011.*

*The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.*

*It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity.*

*DNV conducted the verification on the basis of the baseline and monitoring methodology AMS-I.C (version 5), the monitoring plan contained in the PDD (version 3 of 22 August 2012) and the monitoring report (version 2) dated 5 March 2013. The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.*

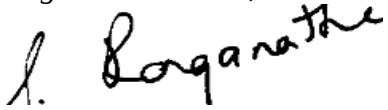
*DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.*

*In our opinion the GHG emissions reductions reported for the project activity for the period 01 August 2009 to 31 July 2011 are fairly stated in the monitoring report (version 2) dated 5 March 2013.*

*The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS-I.C (version 5) and the monitoring plan contained in the PDD (version 3 of 22 August 2012).*

*DNV Climate Change Services AS is able to certify that the emission reductions from the CDM project activity 0121 "Bagepalli CDM Biogas Programme" in India during the period 01 August 2009 to 31 July 2011 amount to 33 087 tonnes of $CO_2$ equivalent.*

*Bangalore and Oslo, 12 March 2013*



Seshan Ranganthan
*Verifier*
DNV Bangalore, India

Michael Lehmann
*Director of Services and Technologies*
DNV Climate Change Services AS

# 4 REFERENCES

**Documentation provided by the project participants**

| | |
|---|---|
| /1/ | Velcan Energy: *CDM monitoring report for project activity 0121 "Bagepalli CDM* Biogas Programme*" for the monitoring period 01 August 2009 to 31 July 2011*, Version 01 dated 12 December 2012 and Version 02 dated 5 March 2013. |
| /2/ | Velcan Energy: *Bagepalli ER calculation sheet "Bagepalli CDM* Biogas Programme*" for the monitoring period 01 August 2009 to 31 July 2011*, Version 01 dated 12 December 2012; *Biogas_NOD_2009-11*, Version 01 dated 12 December 2012 (Details of Non-operational days *for the monitoring period 01 August 2009 to 31 July 2011*) |
| /3/ | ADATS: Daily log book for monitoring of biogas units maintained by Balakendra teachers for break down details, operational and non operational hours for the monitoring period 01 August 2009 to 31 July 2011. |
| /4/ | InfoNeeds database at ADATS head office in Bagepalli for complete 5 485 biogas units monitoring details for the monitoring period 01 August 2009 to 31 July 2011. |
| /5/ | ADATS :End user agreements between ADATS and biogas unit users. |
| /6/ | ADATS: Store register maintained which has details of biogas stove issued |
| /7/ | Unique Distributors & Trade links Corporation: Various Purchase orders placed (20 Dec 2005,24 Jan 2006, 4 May 2006,29 May 2006,5Aug 2006,19 Sep 2006,17 May 2007,12 Jun 2007,24 Jul 2007,7 Aug 2007) and specification of biogas stove. |
| /8/ | Chartered Accountant: Audit report of ADATS for the year 2007-08 (1 April 07 to 31 March 08), 2008-09 (1 April 08 to 31 March 09), 2009-10 (1 April 09 to 31 March 10) and 2010-11(1 April 10 to 31 March 11) to know the number of installations. |
| /9/ | Infoneeds : Screen shot of biogas monitoring system |

**Other project documents or documents used by DNV to verify the information provided by the project participants**

| | |
|---|---|
| /10/ | DNV Climate Change Services AS: Second *Verification / Certification report for project activity 0121 "Bagepalli CDM* Biogas Programme *for the monitoring period* 01 September 2007 – 31 July 2009, Report No. 2010-0454, Revision 01, Dated 22 December 2012. |
| /11/ | DNV Climate Change Services AS : First verification report No 2007-1121 revision 01 dated 5 December 2007 |
| /12/ | Det Norske Veritas AS (DNV): Validation Report, (report number: 2005-9058) *dated 30 October 2005* |
| /13/ | Det Norske Veritas AS (DNV): Validation Opinion for Post registration changes dated 23 August 2013. (approved on 27 September 2012) |
| /14/ | Velcan Energy: Revised PDD version 3 dated 22 August 2012 (approved by EB on 27 September 2012) |
| /15/ | Williamgodden: Sample size calculator formula adopted for the project activity |

**Methodologies, tools and other guidance by the CDM Executive Board**

| | |
|---|---|
| /16/ | CDM Executive Board: *Clean Development Mechanism Validation and Verification Standard*, version 03.0 |
| /17/ | CDM Executive Board: *Clean Development Mechanism Project Standard*, version 02.1 |
| /18/ | CDM Executive Board: *Clean Development Mechanism Project Cycle Procedure*, version 03.1 |
| /19/ | CDM Executive Board: *Baseline and monitoring methodology AMS-I.*C, 5 |
| | |
| /20/ | CDM Executive Board: EB 70 annex 11 -Guidelines for completing the monitoring report form |
| /21/ | CDM Executive Board: EB 69 anne-5-Guidelines for sampling and surveys for CDM Project activities and Programme of Activities |

**Persons interviewed during the verification**

| | |
|---|---|
| /22/ | Mr. Ram Esteves, ADATS – Director. |
| /23/ | Dr. Sudha Padmanabha, FCN |
| /24/ | Mr. Chethan , FCN |
| /25/ | Mr. Abid Pasha, ADATS – System Administrator |
| /26/ | Representative of Sample Individual households visited. |

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# APPENDIX A

## CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

## Corrective action requests

| CAR ID | Corrective action request | Response by Project Participants | DNV's assessment of response by Project Participants |
|---|---|---|---|
| CAR 1 | No CAR has been raised during this verification period. | | |

## Clarification requests

| CL ID | Corrective action request | Response by Project Participants | DNV's assessment of response by Project Participants |
|---|---|---|---|
| CL 1 | During the visit to households, it has been observed that Biogas ID 8081, situated in the village Kommepalli at Chintamani taluk, was not operational. | The non-operation of every biogas unit is monitored. Emission reductions are not estimated for the days under repair.<br>Hence the next monitoring report for this duration will reflect its non-usage days and accordingly emission reduction calculations. | DNV has assessed the daily log book records for monitoring of biogas units by Balakendra teacher for operational and non-operational hours for the current monitoring period and verified that the ID number 8081 is reflecting as non- functional on the identified day of inspection.<br>Also the current monitoring period is for the period 1 August 2009 to 31 July 2011, and the identified non functional digestor during site inspection day (on 31 January 2013) does not fall under the current monitoring period. Hence DNV accepts PP's response that the next monitoring report for this duration will be reflecting its non-usage days<br><br>Ok Accepted<br>CL 1 Closed. . |

## Forward action requests from previous verification

| FAR ID | Forward action request | Summary of how FAR has been addressed in this reporting period | Assessment of how FAR has been addressed |
|---|---|---|---|
| FAR 1 | No FAR has been raised during previous verification period. | | |
| | | | |

## Forward action requests from this verification

| FAR ID | Forward action request | Response by Project Participants |
|---|---|---|
| FAR 1 | During the site visit it was noticed that biogas digestor ID number 8081 was non- functional .It is to be confirmed that this reflects as non-usage days in the next verification period. | |
| | | |

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# APPENDIX B

## POST REGISTRATION CHANGES

| **Type of post registration change** | **Description of post registration change*** | **Is prior approval by CDM EB required**?** | **In case prior approval by CDM EB is required, when was post registration change approved?** |
|---|---|---|---|
| Corrections | Not applicable | ☐ Yes<br>☐ No<br>☒ Not applicable | DD MMM YYYY |
| Temporary deviations from the registered monitoring plan and/or monitoring methodology | Not applicable | ☐ Yes<br>☐ No<br>☒ Not applicable | DD MMM YYYY<br>(I-DEV-XXXX) |
| Permanent changes from the registered monitoring plan or applied methodology | Not applicable | ☐ Yes<br>☐ No<br>☒ Not applicable | *Post Registration changes has been approved on 27 September 2012.*<br>*http://cdm.unfccc.int/Projects/DB/DNV-CUK1131002343.1/view* |
| Changes to the project design of a registered project activity | Not applicable | ☐ Yes<br>☐ No<br>☒ Not applicable | *Not applicable* |

* For further details refer to the "Post-registration changes request form" (F-CDM-PRC) and DNV's assessment opinion on the changes

** Refer to Appendix 1 to the CDM Project Standard /17/- o0o -

# APPENDIX C

## CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS

**Seshan Ranganathan**

Seshan Ranganathan, holds a Bachelor's Degree in Chemical Engineering and has done diploma course in Management and completed the graduate ship course in Industrial Engineering and has an overall working experience of around twenty nine years. Prior to joining DNV has around twenty four years experience in Chemical process industry (fertilizer & petrochemical manufacturing) covering production, technical services including energy audits and efficiency studies, waste heat recovery, efficiency studies of boilers ,power plants , safety audits and pollution control activities including waste water treatment, project management, corporate planning, sales, logistics in fertilizer & petrochemical industry . With respect to the thermal power plant the job assignment included the monitoring of flue gas exit temperatures, excess air used efficiency of fuel additives, condition of boiler refractory, insulation of steam lines etc. The experience also includes 5 years in process design & engineering for chemical process industry.He is qualified validator and verifier for CDM projects. He has completed the EMS lead auditor course. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in areas of (a) 1.1 Thermal energy generation from fossil fuels and Biomass including thermal electricity from solar (b) 1.2 Energy generation from renewable energy sources (c) 2.2 Heat distribution (d) 5.1/11.1/12.1 Chemical Processes Industries and (e) 13.1 Waste handling and disposal.

**Shilpa Swarnim**

Shilpa Swarnim holds a Master's degree in Science with major in Biotechnology. She has been previously associated with Indian Institute of Science, Bangalore as Research Assistant. She has also worked as Lecturer in Bangalore University affiliated college and her subjects of interest were Environmental Science and Climate change.
With total experience of approx. 7 years into Research and Academics her topic of research centers around issues related to Forestry, Environment, Climate change impact on forest ecosystems, studying the climate impact modeling for future predictions of climatic and vegetation dynamics.

She has completed ISO 14001:2004 - Environmental Management System Auditor / Lead Auditor Program, certified by IRCA along with DNV Training Programme on Corporate GHG Inventory.

Currently working in DNV AS . Bangalore unit, as Project manager, she is involved in the Validation and Verification of CDM projects pertaining to various sectors.

**Krishnan Namboodiri**, Senior CDM Specialist, DNV, India. Holds graduate degree in chemical engineering and has done a short term diploma course in Management. Prior to joining DNV in 2008, has had 24 years of direct work experience in the fertilizer and chemicals industry. Work experience covers 5 years in process design & engineering for chemical industry 7 years in technical services including environment management activities, 7 years in project management and 5 years in training & corporate planning in fertilizer & petrochemical manufacturing units. Has been actively involved in Management System Audits as per ISO 14001 for more than 8 years.

The above work experience includes-(a) experience in steam system optimisation & trouble shooting, development of improvement schemes in large fertiliser & caprolactum complex (b)

Design and engineering, efficiency studies and development of efficiency improvement schemes for fossil fuel fired steam & power generation plants (c) Implementation of energy saving measures in Ammonia plants , sulphuric acid plant etc (d) Monitoring, trouble shooting and development & implementation of of improvement schemes for of pollution control facilities (chemical, aerobic & anaerobic treatment systems ) in Fertiliser and petrochemical complex. Development & implementation of landfill facilities for solid and hazardous wastes from fertiliser & caprolactam manufacturing complex.

He has received extensive training in the CDM validation and verification process. He is an appointed GHG auditor for the CDM validation and verification program of DNV and has performed validation & verification and Technical Review of several CDM, VCS and GS projects in India and other countries.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in (1) Thermal energy generation from fossil fuels as well as thermal electricity from solar and (2) waste handling and disposal. (3) Energy demand (4) Chemical process industries (5) Household end use energy efficiency and (6) Energy generation from renewable energy sources.

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