DISTRIBUTION OF IMPROVED COOK STOVE - PHASE III

Document Prepared by EKI Energy Services Limited

Contact Information: Office no.201, Plot 48, Scheme 78 Part 2 Vijay Nagar, Near Brilliant Convention Centre Indore- 452010 (M.P. India)

Project Title	Distribution of Improved cook stove - Phase III
Version	03
Report ID	VVER 343
Date of Issue	26-July-2022
Project ID	VCS 2424
Monitoring Period	20-November-2012 to 19-November-2017 (First and Last date included)
Prepared By	Mr. Pankaj Rajpoot
Contact	Manager Operations – GHG Services EKI Energy Services Limited Email ID : registry@enkingint.org T +91 731 42 89 086, M +91 7828347589 Address: Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar Indore - 452010 (M.P, India) Website www.enkingint.org

CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity (usage of improved cook stoves) has been deployed to facilitate clean cooking practice and reduce health risk due to indoor air pollution[1] along with reduction of drudgery amongst the tribal households (Schedule Tribe) and families living below the poverty level (BPL category[2]) across Ahmednagar and Nandurbar District in Maharashtra. The usage of improved cook stoves through replacement of inefficient traditional cook stove contributes towards reduction of greenhouse gas emission, reduction of by-products of incomplete combustion like black carbon and conservation of fuel wood resulting in prevention of forest degradation. The higher efficient portable, single pot improved cook stoves distributed under the project activity has changed the prevailing practice of usage of traditional cook stoves across selected households in rural areas across Ahmednagar and Nandurbar district in Maharashtra.

It is worthwhile to note that firewood and wood chips contributes as major cooking fuel amongst rural households in India. According to the NSSO[3] 61st round survey, a considerable percentage of rural population of Maharashtra relies upon fire wood for cooking and the percentage is substantially much higher amongst the lower MPCE (Monthly Per Capita Expenditure) group. Since, the beneficiary selected under the project belongs to BPL and ST category of population in terms of capacity of expenditure therefore; improved cook stove use results in substantial fuel wood saving as this section is the major consumer of fuel wood.

The improved cook stoves distributed under the project activity are more efficient with thermal efficiency of 29.88%[4] as compared to traditional stoves with thermal efficiency of around 10%[5]. Owing to higher efficiency, use of efficient improved cook stove results in reduced consumption of non-renewable biomass in compared to baseline by minimizing thermal energy losses and facilitating complete combustion. Reduced consumption/ combustion of non-renewable biomass results in reduction of GHG emission.

Technology Employed

The cook stove deployed under the project activity[6] is single pot, portable, metallic, improved biomass cook stoves[7] made of cast iron for combustion of solid biomass. The improved cook stoves are manufactured in accordance to IS 13152, Part-1: 1991, CPRI Design Type I[8] standard. The design ensures complete combustion of biomass. The cook stove is tested

[1] Household Cook stoves, Environment, Health and Climate Change – World Bank (Executive summary, page 9-11)

[2] As per the article in The Hindu (http://www.thehindu.com/news/national/article3013870.ece) dated March 20, 2012 anyone with daily consumption expenditure below Rs. 22.42 is categorised under BPL. The article depicts of 24.5% of the total population in Maharashtra under BPL in 2009-10.

[3] National Sample Survey Office

[4] Thermal Efficiency Test Report of Improved Cook stove tested at Biomass Cook stove Testing Centre, Dept. of Renewable Energy Sources, Udaipur

[5] Paragraph 6 (Option 2) of approved applicable methodology AMS –II.G., Version 03

6 Manufactured by Vikram Stoves and Fabricators (Ministry of New and Renewable Energy) approved manufacturer and distributor of improved cook stoves) selected by RDWC Department, Government of Maharashtra for distribution of improved cook stoves amongst identified beneficiaries.

7 MNRE accredited system -http://mnre.gov.in/schemes/decentralized-systems/national-biomass-cookstoves- initiative/

8 The design of the cook stove is certified by Bureau of Indian Standards relating to its appropriateness to, IS 13152 (Part1).

for thermal efficiency (29.88%) as per water boiling test protocol specified in IS 13152, Part 1: 1991.

Measures undertaken

The Rural Development and Water Conservation (RDWC) Department, Government of Maharashtra is involved in promoting betterment of living standard for the tribal household (ST) and families living Below Poverty Line (BPL) in villages of Maharashtra. The department as a part of its aforesaid programme selects households from amongst the ST and BPL category depending upon level of vulnerability (assessed on basis of 13 parameters: Category and size of usable land, Type of house, Availability of regular usable clothes, Protection of food or food security, Cleanliness, Ownership of required goods, Heights /Level of literacy, Family working capacity, Source of livelihood goods, Number of children in age group (5 to 14), Type of bankruptcy, reason for staying away from family of Earning member, Choice of help /Yojana)[9] and provide financial assistance to facilitate better and hygienic living standard. The household selected for financial assistance under the programme is provided with an improved cook stove system. The household considered as end users of cook stoves under the project activity are poor enough to afford for procurement of improved cook stoves and are also least interested towards similar investment as wood is available for free. So, in absence of the improved cook stove disseminated under the project activity the household would have continued with use of traditional cook stoves. Since, the project activity is conceived under the program of Govt. of Maharashtra which provides cook stove only to BPL and ST category household so; there is no chance of cook stove to be distributed to non-baseline household. The identification of beneficiaries and distribution of cook stoves comes under the preview of the Rural Development and Water Conservation Department.

The project activity includes dissemination of 14,600 Nos. improved cook stoves[10] amongst Below Poverty Line (BPL) and Scheduled Tribes (ST) households in rural areas of Ahmednagar and Nandurbar Districts of Nashik Division, n in Maharashtra upon signing of the end user Tripartite Agreement[11]. The project through conservation of non-renewable biomass was estimated to result in an greenhouse gas emission reduction of 13,125 tCO_2e annually (ex-ante). The revenue from carbon financing was conceived in deciding upon the capital cost as well as to meet up the cost towards imparting awareness and training, periodic maintenance[12] and post lifetime replacement within the crediting period.

The amount of emission reductions achieved for the current monitoring period is 60,724 tCO_2e.

The start date of the project activity is 20-November-2012. Since the project activity of improved cook stove usage by the end user does not require any construction or significant pre-project implementation, nor financial commitment on the part of end user therefore the real action pertaining to the earliest date of distribution of improved cook stoves under the

9 Criteria issued by Department of rural Development, Government of Maharashtra

10 Each of the cook stoves is included for the purpose of emission reduction calculation from the day on which it is distributed to the beneficiary and the end user agreement is signed.

11 Tripartite Agreement is for transfer the emission reduction right to the Project Participant by each beneficiaries/end users and is signed amongst end user, GKEMPL and Vikram Stoves. The tripartite agreement authorizes M/s G K Energy Marketers Pvt. Ltd (hereafter referred to as GKEMPL) by Vikram Stoves (manufacturer of improved cook stoves) and the end users for securing of carbon finance

12 "The Indian stove programme: an insider's view – the role of society, politics, economics and education" by Bhaskar Sinha, National Institute of Science, Technology & Development Studies (NISTADS), CSIR, New Delhi outlines that the woman are least interested for maintenance as they do not perceive the usefulness of the stove and revert back to traditional practice when the cook stove becomes non-functional therefore timely operation and maintenance are vital.

project activity is considered as the start date as per project start date definition of section 3.7 of the VCS Standard V.4.1.

1.2 Sectoral Scope and Project Type

- Sectoral Scope: 3- Energy demand
- Project Type: Type II.G.

The project activity fulfills the applicability criteria of small- scale project activity, Type II – Energy Efficiency Improvement Projects, Category G –'Energy efficiency measures in thermal applications of non-renewable biomass' of the 'Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-scale Project Activity Categories'.

This is non-AFLOU type of project

1.3 Project Proponent

Organization name	M/s G K Energy Marketers Pvt. Ltd
Contact person	Mr. Gopal Kabra
Title	Authorized Signatory
Address	Lokmanya Nagar, LBS Road, Flat No.- 350, Building No.- 25,Ground Floor, Pune, Maharashtra – 411030 India
Telephone	+91-997045
Email	gopal@energymarketers.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Pankaj Rajpoot
Title	Assistant Manager- Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91- 7828347589
Email	registry@enkingint.org

1.5 Project Start Date

The start date of the project activity is 20-November-2012

The project activity relating to improved cook stove usage by the end user does not require any construction or significant pre-project implementation, nor financial commitment on the part of end user. The real action pertaining to the earliest date of handover of improved cook stoves to beneficiary (also considered as date of onset of GHG emission reductions) under the project activity is considered as the start date as per project start date definition under paragraph 3.7 of the VCS Standard.

The distribution was initiated once all the Improved cookstoves (disseminated under the project activity) were supplied to the office of the concerned line department by the manufacturer and the project proponent has completed signing of tripartite agreement with selected beneficiaries.

The date of supply/ receipt of first lot of improved cookstoves from manufacturer to the regional office of the line department was considered as start date under the CDM registered PDD (evidenced through acknowledgement of the delivery receipt of the line department) as per CDM definition of Start Date. The start date referred to in the registered CDM-PDD was mirrored in the VCS PD. Since the date does not resembles to handover of the cookstoves to beneficiary and does not result in onset of actual emission reduction therefore the same was not considered as start date under VCS mechanism and therefore revised with date of distribution/ handover of improved cookstoves to beneficiary.

1.6 Project Crediting Period

The crediting period of the project activity is for 10 years (Fixed).

The length of the first crediting period is 20-November-2012 to 19-November-2022 (both dates inclusive).

As per errata and clarification, a project is deemed to have met the timelines where Verra confirmed (in writing, to the project proponent or an authorized representative) the project's eligibility on or before 4-February-2021.The listing process has been completed before 04-February-2021 and hence the errata and clarifications are not applicable

1.7 Project Location

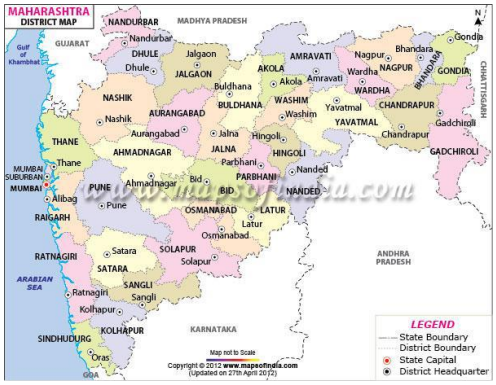
The project is located in state Maharashtra, India.
The list of division is given below:

Division: Nashik

Districts: Ahmednagar and Nandurbar

District	**Ahmednagar**	**Nandurbar**
Latitude	18.20°N to 19.90°N	21.00°N to 22.03°N
Longitude	73.90°E to 75.50°E	73.31°E to 74.32°E

Map of Ahmednagar



Map of Nandurbar

District wise list of Village included in the table below:

District	Ahmednagar
Taluka	Shrirampur

Sr.	Name of the village	Taluka
1	Ainatpur	Shrirampur
2	Belapur Bk.	Shrirampur
3	Belapur Kh.	Shrirampur
4	Bhairavnathnagar	Shrirampur

Sr.	Name of the village	Taluka
5	Bhamathan	Shrirampur
6	Bherdapur	Shrirampur
7	Bhokar	Shrirampur
8	Bramhangaon Vetal	Shrirampur
9	Dattanagar	Shrirampur
10	Dighi	Shrirampur
11	Ekalahare	Shrirampur
12	Fatyabad	Shrirampur
13	Galnimb	Shrirampur
14	Ghumandeo	Shrirampur
15	Gondegaon	Shrirampur
16	Govardhanpur	Shrirampur
17	Gurjarwadi	Shrirampur
18	Haregaon	Shrirampur
19	Jafrabad	Shrirampur
20	Kadit Bk.	Shrirampur
21	Kadit Kh.	Shrirampur
22	Kamalpur	Shrirampur
23	Kanhegaon	Shrirampur
24	Karegaon	Shrirampur
25	Khanapur	Shrirampur
26	Khandala	Shrirampur
27	Khirdi	Shrirampur
28	Khokar	Shrirampur
29	Kuranpur	Shrirampur
30	Ladgaon	Shrirampur
31	Mahankal Wadgaon	Shrirampur
32	Malewadi	Shrirampur
33	Malunje Bk.	Shrirampur
34	Malwadgaon	Shrirampur
35	Mandve	Shrirampur
36	Matapur	Shrirampur
37	Matulthan	Shrirampur
38	Muthewadgaon	Shrirampur
39	Narsari	Shrirampur
40	Naur	Shrirampur
41	Naygaon	Shrirampur
42	Nimgaon Khairi	Shrirampur

Sr.	Name of the village	Taluka
43	Nipani Wadgaon	Shrirampur
44	Padhegaon	Shrirampur
45	Rampur	Shrirampur
46	Sarala	Shrirampur
47	Shirasgaon	Shrirampur
48	Takalibhan	Shrirampur
49	Ukkalgaon	Shrirampur
50	Umbargaon	Shrirampur
51	Undirgaon	Shrirampur
52	Wadala Mahadeo	Shrirampur

District	Nandurbar
Taluka	Shahade

Sr.	Name of the village	Taluka
1	Abhanpur	Shahade
2	Adgaon	Shahade
3	Akaspur	Shahade
4	Alkhed	Shahade
5	Ambapur	Shahade
6	Amode	Shahade
7	Anakwade	Shahade
8	Anarad	Shahade
9	Asalod	Shahade
10	Asus	Shahade
11	Aurangpur	Shahade
12	Awage	Shahade
13	Bahirpur	Shahade
14	Bamkheda-t-sarangkheda	Shahade
15	Bamkheda-t-tarhad	Shahade
16	Bhade	Shahade
17	Bhadgaon	Shahade
18	Bhagapur	Shahade
19	Bhongra	Shahade
20	Bhortek	Shahade
21	Bhulane	Shahade
22	Bhute	Shahade

23	Biladi-t-haveli	Shahade
24	Biladi-t-sarangkheda	Shahade
25	Borale	Shahade
26	Bramhanpuri	Shahade
27	Budigavhan	Shahade
28	Bupkari	Shahade
29	Chandsaili	Shahade
30	Chandsaili	Shahade
31	Chikhali Bk	Shahade
32	Chikhali Kh.	Shahade
33	Chirde	Shahade
34	Chirkhan	Shahade
35	Damalde	Shahade
36	Damerkheda	Shahade
37	Dara	Shahade
38	Deur	Shahade
39	Dhandre Bk	Shahade
40	Dhandre Kh.	Shahade
41	Dhurkheda	Shahade
42	Dondwade	Shahade
43	Dongargaon	Shahade
44	Dudhkheda	Shahade
45	Fattepur	Shahade
46	Fes	Shahade
47	Ganor	Shahade
48	Godipur	Shahade
49	Gogapur	Shahade
50	Hingani	Shahade
51	Hol	Shahade
52	Hol-gujari	Shahade
53	Isalampur	Shahade
54	Jaavade-t-haveli	Shahade
55	Jainagar	Shahade
56	Jam	Shahade
57	Javade-t-borad	Shahade
58	Javkhede	Shahade
59	Junavane	Shahade
60	Kahatul	Shahade
61	Kakarde Bk	Shahade

62	Kakarde Kh	Shahade
63	Kalambu	Shahade
64	Kalmad-t-haveli	Shahade
65	Kalmadi-t-borad	Shahade
66	Kalsadi	Shahade
67	Kamaravad	Shahade
68	Kanadi Kh	Shahade
69	Kanadi-t-haveli	Shahade
70	Kansai	Shahade
71	Karajai	Shahade
72	Karankheda	Shahade
73	Karjot	Shahade
74	Katharde Kh	Shahade
75	Katharde-digar	Shahade
76	Kauthal-t-sarangkheda	Shahade
77	Kauthal-t-shahade	Shahade
78	Kavalith	Shahade
79	Khairve	Shahade
80	Khamkheda	Shahade
81	Khaparkheda	Shahade
82	Khargaon	Shahade

1.8 Title and Reference of Methodology

Consolidated baseline methodology for “Energy efficiency measures in thermal applications of non-renewable biomass”; AMS II-G, Version 03.0.0 Sectoral Scope: 03, EB 60.

1.9 Participation under other GHG Programs

Project has been registered with UNFCCC under Clean Development Mechanism program, Registration reference number is 8654.

The Project is not rejected by any other GHG programs.

1.10 Other Forms of Credit

India is non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. The project is registered under CDM with registration ID 8654. Project Proponent has submitted undertaking that they will not claim same GHG emission reductions of the project from CDM and VCS. Project Proponent would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. Project Proponent has also submitted an undertaking stating that they will not take REC benefits for the same Emission Reductions. Project Proponent has submitted undertaking for not availing other

forms of environmental credit for the same crediting period under consideration. Project Participant is not taking REC benefits for the same emission reductions.

1.11 Sustainable Development

The project contribution towards sustainable development is established in line with the sustainable development indicator framed by the host country DNA:

Social benefits:

1. Reduces drudgery of women and children of rural areas (due to reduced fuel wood use) by reducing time spent and distance travelled for fuel wood collection. Reduction in firewood requirement helps in spending more time in productive activities such as education, employment etc.
2. Improves overall health (particularly diseases related to respiratory system) of women and children by reducing smoke in the kitchen.

Environmental benefits:

1. Improves the local environment by reducing rate of forest degradation /deforestation in the project area. Conservation of forest is not only reduce non-renewable biomass demand and also reduce soil erosion and loss of biodiversity as a consequence of deforestation.
2. Reduces emission of black carbon to the atmosphere.
3. Reduces Green-house gas emissions.

Economic benefits:

1. Employment opportunities for local communities involved in monitoring, training of users, undertaking periodic maintenance and post life time replacement.
2. Reduces the expenditure involved in the pre project scenario for purchase of fuel wood.

Technological benefits:

1. Introduction of new technology to the rural communities.
2. Knowledge transfer to trainers including technicians for pertaining training to users, maintenance of system.
3. Demonstration of a successful project at household level creates replication potential in other states and countries.

In view of the above, the project proponent considers that, the project activity profoundly contributes towards sustainable development of the region as well as of the nation.

2 SAFEGUARDS

2.1 No Net Harm

According to the Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S .O.1533(E), dated 14-September-2006; the project activity of utilization of Improved Cook stove for cooking in rural households does not require environmental impact assessment study to be carried out.

2.2 Local Stakeholder Consultation

The project proponent has opted to develop CDM project for distribution of cook stoves in and across the different location in the state across different time frame. Based on the number of cook stoves aimed to be distributed under the planned program 30 phases are planned. Since the household to be covered in each phase are homogeneous owing to the household being identified by the Rural Development Department, Government of Maharashtra based on the level of poverty judged on the basis of the thirteen point criteria figured out by the Ministry and the total budgetary provision across the year. Because of the limited budgetary provision across a financial year a fixed number of populations can only be covered amongst the group leaving the others to be covered in subsequent time frame. Because of the similar category of population, the project proponent decided to carry out the stake holder's consultation for all the planned phases in a single go, so that the people from different geographical locations could able to respond to such meeting. The location for the consultation program is so selected that the particular location of the consultation represents the particular division or region of Maharashtra under whose jurisdiction several districts come into. As such the locations for the consultation program are selected and newspaper advertisements are published both in English and regional daily about the program so that the peoples from the particular region can attend the consultation program which they feel nearby. Local stakeholders' meetings were conducted to take public comments. Six stakeholder meetings were conducted at Nasik, Pune, Nagpur, Latur, Sangli and Washim districts of Maharashtra. The details of meetings are –

Date of Meeting	District	Meeting Venue
2nd February 2012	Nasik	Siaram Indrayani Housing Society, Takli Rd, Nasik– 06
2nd February 2012	Pune	G K Energy Marketers Pvt Ltd. Lokmanya Nagar, LBS Rd, Pune
2nd February 2012	Nagpur	246 KumbarPura, Jagnath Rd Gandhi Bag, Nagpur
2nd February 2012	Latur	Sut Mil Rd, Pushkar Residency, Latur
3rd February 2012	Sangli	Khan Bag, Jai Bhavani Chowk, Sangli
3rd February 2012	Washim	Dr. Jirvankar Bhar Jahangir Resod, Washim

Along with public notices published in newspapers namely The Free Press Journal, Mumbai and Navshakti, Mumbai on 26th January 2012, notification of the meetings was sent through invitations, letters and personally to various categories of stakeholders to attend the stakeholder meeting. The meeting was conducted in regional language –Marathi and English. The discussion points of the meeting included purpose of the consultation, background and role of bundling agency and manufacturer under this project, description of the project, demonstration of improved cook stove, about climate change and CDM, impact of climate change, global environment scenario, contribution of the project towards sustainable development of the country by the representative from bundling agency and Improved Cook stove manufacturer. After a detailed elaborative discussion on the project, the stakeholders were asked to provide their comments /feedbacks /suggestions on the project. The cook stoves in this project activity (Third phase) are distributed in Ahmednagar and Nandurbar district of Maharashtra which lies in Nashik division jurisdiction and therefore, it can be concluded that, the stakeholders consultation conducted on 2nd February 2012 at Nashik district of Nashik Division covered this project activity and the consultation was also conducted before the webhosting of the PDD.

Sl. No.	Name of Person	Designation
1	Palse Rina Mahavir	House-wife
2	Tambekar Sunita Suresh	House-wife

3	Londhe Sunita Ashok	House-wife
4	Suravse Rani Kalidas	House-wife
5	Kadam Ranjana Somanath	House-wife
6	Gaikwad Madakini Nanasahebh	House-wife
7	Gadekar Sunanda Uvraj	House-wife
8	Shinde Vijaya Bharat	House-wife
9	Pawar Sima Sandeep	House-wife
10	More Hanumanth Vijaya	House-wife
11	Rauth Sharda Asanthrao	House-wife
12	Savant Shantabai Navnath	House-wife
13	Dongre Sarasvati Shivaji	House-wife
14	Tingare Nilavati Kakasahebh	Working professional
15	Anand Ballu Chandve	Working professional
16	Prashant Kakasaheb Tingre	Working professional
17	Vijay Dagadu Lamakane	Worker
18	Amol Tanaji Mule	Worker
19	Shivaji Tanaji Chandane	Worker
20	Mangesh Ballu Gharbude	Farmer
21	Sunil Devdas Bhandare	Farmer
22	Babalu Tanaji Chandane	Worker
23	Anil Baburao Savant	Worker
24	Mahadev Goroba Kamble	Working professional
25	Pravin Kaksaheb Dingre	Worker
26	Lokhande Saheb	Work's Manager, Vikram Stoves & Fabricators

The overall response from the local stakeholders on the project was encouraging and positive. No adverse or negative comments or response received in the meeting. The participants of the meeting had not raised any significant concerns nor seek any clarification related to potential impacts of the project activity or any other issue. The project as a whole gives positive impression towards the issue of sustainable development of the country.
The stakeholder's comments sought during the meeting in following manners –

- The stakeholders were invited to ask any clarification or information on the project activity during the meeting.
- Evaluation form / questionnaire were asked to fill in by the stakeholders interested to give their inputs on the project activity.

The evaluation forms were analyzed for the comments and no negative comments is being found.

The summary of stakeholders comment received during stakeholder meeting of Nashik are summarised as below –

Queries	**Reply**
What benefits Improved Cook stove users will receive from the project activity?	Addressing to the query, the representative from Vikram Stoves replied that, use of improved cook stoves for household cooking will decrease the indoor air pollution, cooking time and fuel-wood consumption due to higher efficiency. Moreover, the users of

	improved cook stoves will get free maintenance service and also free of cost replacement of the system at the end of its lifetime
Explanation requested on activities that users have to perform under the project activity.	Responding to the query representative from Vikram Stoves clarified that, users have to continue using the ICS for daily cooking purpose. He also described the monitoring plan and briefed the parameters to be monitored and procedure to be followed by the user.
How long the user will get this benefit?	Responding to the query representative from Vikram Stoves clarified that, ICS systems considered under the project will receive free of cost maintenance service for 10 years post to registration.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The improved cook stove conceived under the project activity is MNRE and BIS (Bureau of Indian Standard) approved state of art and environmentally sound technology. The improved cook stove is manufactured in accordance to IS13152 (Part 1): 1991 (Solid Biomass – Chulha Part 1(Metallic))[13]. The standard has been prepared in line with the national approach towards fuel conservation, better environment, mitigating health hazards and loss of forest cover caused by burning of wood as cooking fuel and therefore, can be conceived as an environmentally sound technology for combustion of solid biomass for the purpose of cooking. Moreover, the materials used in manufacturing of the cook stove are of iron and steel which is recyclable after end use and hence, considered to be environmentally safe after lifetime also. Although the ICS distributed under the current phase pertains to different batch of manufacturing, but since the products are being manufactured complying to a particular performance standard (IS13152 (Part 1):1991) the quality output for each unit of products complies to a minimum level.

The cook stove distributed under the project activity is a portable, single-pot stove without chimney, natural draft and metal made stove specifically suitable for combustion of solid biomass. The cook stove broadly comprises of a combustion chamber, top plate for holding the utensils, grate for holding fuel during combustion and bottom plate that facilitates ventilation of air. The combustion chamber is cylindrical shaped and made up of mild steel. One side of the chamber of improved cook stove is opened for feeding of fuel. The chamber top plate is die cast and made up of cast iron.

[13] The Standard has been prepared by Indian Standard body in line with the national approach towards fuel conservation and better environment, mitigating Health hazards and drudgery and loss of forest cover caused by burning of wood as cooking fuel (Forward: Indian Standard Solid Bio-Mass, Chulha – Specification Part 1 Portable (Metallic))

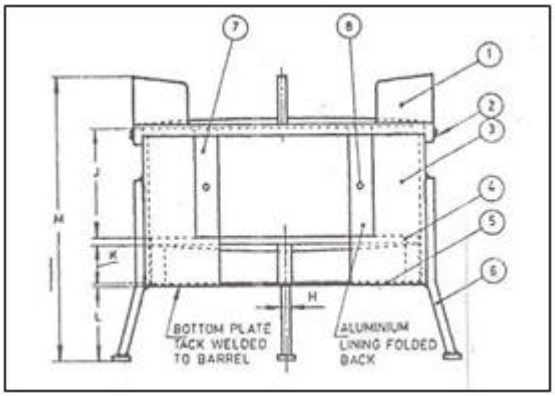
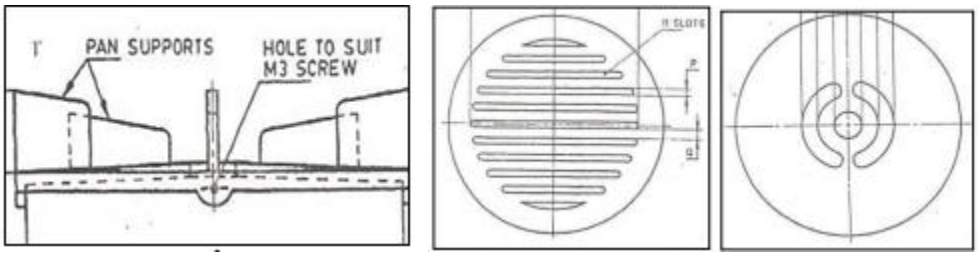


Diagram of Improved Cook Stove

1. Top plate,
2. Screw,
3. Barrel,
4. Grate,
5. Bottom Plate,
6. Legs,
7. Aluminium Lining and
8. Rivet



Top Plate Grate Bottom Plate

Material used for manufacturing of each component of the cook stoves are:

Component	Material
Top plate	Cast iron
Grate	Cast iron
Barrel	Mild steel
Bottom Plate	Mild steel
Lining	Aluminum
Perforated Sleeve	Mild steel
Handle	Mild steel
Pan Support	Mild steel sheet-flat-rod
Legs	Mild steel sheet and rod

Life time
The operational lifetime of the cook stove is 5 years 00 months. As per manufacturer authorization the operational life of improved cookstoves is over seven years, however beyond five years the operational efficiency drops below the rated efficiency and hence was considered as operational life time in the registered PDD.

Decline in the cook stove efficiency as assessed through periodic efficiency testing is being reported and considered as part of emission reduction calculation.

Replacement of Improved Cookstoves
Replacement of ICS was scheduled to be carried out
(a) in case of breakage/ dismantle of ICS during the operational period – on receipt of complaint the localised service providers of the project proponent visits the beneficiary with backup cook stoves (ICS) and provides the beneficiary with backup stoves if the service provider fails to address the issues locally. The malfunctioned ICS post collected from beneficiary is thereafter sent to the company workshop in case of possibility of repair. In case the ICS couldn't be repaired beneficiary are to be provided with new ICS.
(b) Observed requirement of complex repair- In case the maintenance team of the project proponent during scheduled O&M observes requirement of complex repairs the team may on discretion replace the existing cookstoves with a new one or a backup one. In such case the beneficiary is provided with backup new ICS the same are to be replaced with the repaired one operating at the desired satisfaction level of beneficiary.
(c) Post assessment of operational efficiency in the last year after the elapse of scheduled lifetime of ICS from the date of distribution.
During the current monitoring period of 5 years there has been no instances of replacement of improved cook stoves, therefore no such impact on emission reduction calculation due to increase of cook stoves efficiency.

Operation and maintenance
Operation and maintenance of Improved cook stoves are carried out periodically by authorised representative of project proponent (manufacturer of improved cook stoves). The authorized representative of the project proponent during the annual (periodic) maintenance, also motivates and persuades the beneficiaries for continuation of ICS usages for cooking of all meals towards reducing the health impact of the family especially the women and children in case of usage of traditional cook stoves and thereby ensuring the restoration of operation of ICS.

Approach for assessing share of Improved cookstoves users for estimation of emission reduction

1. The number of beneficiaries using Improved cook stoves during a particular monitoring period are assessed based on record of operation and maintenance, maintained by project proponent pertaining to discontinued users.
2. Annual third-party sample survey is being carried out to assess the share of beneficiaries using improved cookstoves. During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users.

   The survey observed/found most of the beneficiaries to have fully discontinued the usage of traditional cookstoves and have even dismantled the traditional cookstoves.

   Around 5-10% of beneficiaries during a particular crediting period have been assessed to have partially used traditional cookstoves (as deduced from the beneficiary survey) due to customary practice/festival or to manage guests. Considering the perceptive response of the beneficiaries regarding the number of day of functioning of traditional cookstoves, it is conservatively considered that the number of days of use of improved cookstoves for those particular beneficiaries who have used traditional cookstoves as zero/nil. Although such consideration negatively impacts the annualized emission reductions estimate but such consideration is being conservatively considered for the purpose of calculation.

3.2 Deviations

3.2.1 Methodology Deviations

Not Applicable

3.2.2 Project Description Deviations

Not Applicable

3.3 Grouped Projects

Not Applicable

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	B_{old}
Data unit	tonnes/ household/year
Description	Quantity of woody biomass used in absence of the project activity

Source of data	Teri Energy Data Directory Yearbook for 2010
Value applied	1.469
Justification of choice of data or description of measurement methods and procedures applied	The study as per Wood Fuel Trade in India – Food and Agricultural Organisation of the United Nation, July 2001, per capita per day biomass consumption of 1.52 kg and 5.6 kg of fuel wood consumption per household per day. Annual consumption per household per day is therefore estimated at 2.044 tonnes. **Further, the publication of TERI Energy Data Directory and Yearbook2010** outlines that, the per capita per month consumption of fire wood in Maharashtra at 25.51 kg/ month/capita. With average population size of 4.8 persons/household/the annual consumption of firewood is estimated at 1.469 tonnes/year/household. Being the annual household fuel consumption data estimated on the basis of the TERI Energy Data Directory is most conservative amongst the available fuel wood consumption figure available secondarily the value of 1.469 tonnes/household/year is considered for estimation of By, savings.
Purpose of Data	Quantity of biomass utilization is used to estimate the quantum of biomass that will be saved in the project scenario after factoring into the improvement of efficiency.
Comments	The maximum value of Bold is fixed at ex-ante. Factors calculated based on the number of days of traditional cook stove usage and number of days of improved cook stoves usage is multiplied with Bold to estimate the Bold to be used for emission reduction calculation.

Data / Parameter	η_{new}
Data unit	%
Description	Efficiency of the cook stove being deployed as a part of the project activity
Source of data	Test report issued by Biomass Cook stove Testing Centre, Dept. of Renewable Energy Sources, Udaipur
Value applied	29.88%
Justification of choice of data or description of measurement methods and procedures applied	Thermal efficiency test carried out as per water Boiling Test Protocol specified as per IS13152 protocol.

Purpose of Data	Efficiency of the improved cookstoves is used to estimate the saving in fuel wood. (The factor is not fixed ex-post and estimated based on monitored efficiency of sample number of cookstoves)
Comments	The value of Efficiency is monitored on an annual basis and vintage wise.

Data / Parameter	$B_{y,savings}$
Data unit	tonne/household/year
Description	Quantity of woody biomass saved due to implementation of the project activity
Source of data	Calculated
Value applied	0.9774
Justification of choice of data or description of measurement methods and procedures applied	$B_{y,\ savings\ is}$ calculated using equation $B_{y,\ savings} = B_{old} * (1- \eta_{old}/ \eta_{new})$ =1.469*(1-0.1/0.2988) =0.9774 tonne /household/year
Purpose of Data	Fuel wood saving is calculated for estimation of emission reduction.
Comments	The efficiency of the improved cook stoves is monitored on an annual basis based on the sample survey and if appliances are found to be operational with lower efficiency then, the actual efficiency determined during monitoring is considered to calculate emission reduction.

Data / Parameter	**Energy Saving per cook stove or household**
Data unit	GWh_{th}/household/year
Description	Energy saving per cook stove due to improved efficiency of the distributed cook stove
Source of data	Calculated
Value applied	0.00407
Justification of choice of data or description of measurement methods and procedures applied	Energy Saving = $B_{y,\ saving} * NCV_{biomass}$ = Bold * $(1- \eta_{old}/\eta_{new})* NCV_{biomass}$ = 1.469 * (1- 0.1/0.2988) * 0.0150 = 0.01466 TJ /household /year = 0.00407 GWhth/household/year = 4.073 MWhth/ household/year

	= 1.358 MWhe / household/year Note: Value of $NCV_{biomass}$ is considered as per Paragraph 5 of the applicable methodology AMS -II. G. Version 03; IPCC default value for fuel wood i.e. 0.015 TJ/tonne is chosen.
Purpose of Data	The data is used to assess the applicability condition of the project under micro small scale guidelines and also de-bundling.
Comments	-

Data / Parameter	$F_{NRB,y}$
Data unit	-
Description	The factors relates to the fraction of non-renewable biomass
Source of data	Calculated using secondary sources
Value applied	87.9%
Justification of choice of data or description of measurement methods and procedures applied	The fraction of non-renewable biomass is calculated based on the fuel wood demand and supply of biomass across the state of Maharashtra.
Purpose of Data	Data is used for estimation of emission reduction.
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	η_{new}
Data unit	%
Description	Efficiency of the system being deployed in project activity
Source of data	Third party efficiency test report.
Description of measurement methods and procedures to be applied	The sample systems tested as per Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991 for solid biomass cook stove. The testing is carried out on annual basis of representative sample. The minimum value of tested efficiency or 29.88% which so ever is lower is used to calculate emission reduction of the systems for particular year of operation.
Frequency of monitoring/recording	Efficiency of the improved cookstoves under operation is monitored across sample system on an annual basis
Value monitored	Period | Date of Monitoring | Number of Improved cookstoves assessed | Minimum efficiency of the lot

	20-November-2012 – 19-November-2013	07-Dec-2013, 08-Dec-2013, 11-Dec-2013 12-Dec-2013	40	27.06%
	20-November-2013 – 19-November-2014	22-Nov-2014, 23-Nov -2014, 27-Nov -2014 28-Nov -2014	40	26.52%
	20-November-2014 – 19-November-2015	26-Nov -2015, 27-Nov -2015, 29-Nov -2015 30-Nov -2015	40	26.08%
	20-November-2015 – 19-November-2016	22-Nov -2016, 23-Nov -2016, 09-Dec-2016 10-Dec -2016	40	26.03%
	20-November-2016 – 19-November-2017	24-Nov -2017, 25-Nov -2017, 29-Nov -2017 30-Nov -2017	40	25.01%

Monitoring equipment

1. Digital Thermometer
2. Weighing scale

QA/QC procedures to be applied

Efficiency of the system is tested by third party agency on principle of the Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991. The number of sample system to be inspected is estimated in accordance to "**Guidelines for Sampling and Surveys for Project Activities and Programme of Activities"** Version 02, EB 69 Annex 5 and procedure for sample size calculation is specified in Section B.7.2 of the CDM PDD.

Purpose of the data

The value of the efficiency is used to calculate the $B_{y,\ savings}$ used for ex-post estimation of emission reduction.

Calculation method

Heat utilized = (n-1)×(W×0.214+w) ×(t2-t1) + (W×0.214+w) ×(t3-t1) kcal
Heat Produced = [(X×c1)+(x×d/1000×c2)] kcal
Thermal Efficiency = Heat utilised/ Heat Produced×100

Where

w	Mass of water in vessel, in kg
W	Mass of the vessel complete with lead and stirrer, in kg
X	Mass of the fuel consumed, in kg
c_1	Calorific value of wood in kcal/kg
x	Volume of the kerosene consumed, in ml
c_2	Calorific value of kerosene in kcal/kg
d	Density of kerosene, in g/ml
t_1	Initial temperature of the water, in ^{0}C
t_2	Final temperature of the water, in ^{0}C
t_3	Final temperature of the water in the last vessel at the completion of the test, in ^{0}C
n	Total number of vessels used
0.214	Specific heat of aluminium in kcal/kg^{0}C

Comments	As a part of the third party sample assessment of the operational efficiency of improved cookstoves, the minimum of the assessed efficiency from amongst the fourty system tested below 29.88% is considered as a efficiency to be considered for purpose of emission reduction calculation in place of 29.88% (rated efficiency). Although the ICS distributed under the current phase pertains to different batch of manufacturing, but since the products are being manufactured complying to a particular performance standard (IS13152 (Part 1):1991) the quality output for each unit of products complies to a minimum level. Moreover, the distribution is carried out during same period amongst homogeneous beneficiary segment, moreover the onset of operations of ICS has been kept at the same point of time. Therefore, as per the guidelines specified under the registered PDD Simple Random sampling methods were selected. The data estimated is archived both in paper and electronic spread sheet whereby the paper and the electronic form of the documents is maintained by the Project Participant for period of two year and electronic data is maintained till 2 years after the last issuance.

Data / Parameter	**No. cook stoves in use**
Data unit	Number
Description	The number of improved cook stoves distributed to households under the project activity and under operation.
Source of data	Third party agency survey report and database managed by the Project Participant (the end user agreement)
Description of measurement methods and procedures to be applied	The monitoring consists of third-party survey of representative sample on annual basis to evaluate the number of systems in operation. The percentage of cook stove in usage as estimated from the survey result is multiplied with the total number of cook stove to determine number of cook stove in operation and to be considered for the purpose of emission reduction calculation.
Frequency of monitoring/recording	Number of improved cookstoves under operation is monitored annually based on sample survey
Value monitored	During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of

days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users for the purpose of estimating emission reduction.

Period	No. of Dis-continued user	Date of Survey	Number of beneficiaries surveyed	% of partial users	% of users used ICS only
20-November-2012 – 19-November-2013	0	07-Dec-2013, 08-Dec-2013, 11-Dec-2013 12-Dec-2013	160	6.3%	93.75%
20-November-2013 – 19-November-2014	0	22-Nov-2014, 23-Nov -2014, 27-Nov -2014 28-Nov -2014	160	7.5%	92.50%
20-November-2014 – 19-November-2015	0	26-Nov -2015, 27-Nov -2015, 29-Nov -2015 30-Nov -2015	160	9.4%	90.63%
20-November-2015 – 19-November-2016	0	22-Nov -2016, 23-Nov -2016, 09-Dec-2016 10-Dec -2016	160	12.5%	87.50%
20-November-2016 – 19-November-2017	0	24-Nov -2017, 25-Nov -2017, 29-Nov -2017 30-Nov -2017	160	12.5%	87.50%

Number of Improved Cook stoves distributed – 14,600

Monitoring equipment	-
QA/QC procedures to be applied	The project proponent obtains an authorization from each /group of the household in form of end user agreement for processing of carbon revenue. The database containing all information of the end user agreement is maintained in a central server located with project participant and accessible to the project team at different locations. During the time of verification, the VVB can verify the list of beneficiaries who has signed the end user agreement (for which the emission reductions are claimed).
Purpose of the data	For estimation of baseline emission
Calculation method	$\text{Share of beneficiaries using Improved cookstoves} = \frac{160 - \text{no of partial users}}{160}$
Comments	The percentage of the representative sample using the improved cook stove determined from the sample survey is used to calculate the total number of cook stoves in operation.

	The survey report is kept and maintained by the project proponent for the period of two years after the last issuance. Since, the distribution of Improved cook stoves is carried out during same period amongst homogeneous beneficiary segment, and moreover the onset of operations of ICS has been kept at the same point of time. Therefore, as per the guidelines specified under the registered PDD Simple Random sampling methods were selected.

Data / Parameter	**Days of Operation**
Data unit	Number
Description	The parameter relates to the number of days for which the cook stove in operation during the particular year
Source of data	Monitoring Database
Description of measurement methods and procedures to be applied	The emission reduction as against the cook stove is calculated when the system is being delivered to the end user, the end user initiated its operation and the end user agreement is being signed. Since, the emission reduction is based on the days of operation therefore, it is important to monitor the number of days of non-functioning. The days of non-functioning is estimated based on the number of days between the date of complaint as against damage or non- functioning received and date of repair or replacement. The information is maintained in form of database and archived. Number of days of operation = 365–Average number of days the cook stove was non-functional The number of non-functional days is based on the number of days the cook stoves were under repair/replacement
Frequency of monitoring/recording	Days of operation of improved cookstoves under operation is monitored annually based on sample survey
Value monitored	

Period	Total number of beneficiaries	Number of beneficiaries for which defunct date was a day/more	Average days of operation
20-November-2012 – 19-November-2013	14,600	0	365
20-November-2013 – 19-November-2014	14,600	0	365
20-November-2014 – 19-November-2015	14,600	0	365
20-November-2015 – 19-November-2016	14,600	0	365
20-November-2016 – 19-November-2017	14,600	0	365

Monitoring equipment	-
QA/QC procedures to be applied	The database for the date of dissemination of cook stoves, date of receipt of complaint for repair/ replacement and the date of repair/replacement is recorded by the village coordinator. The related information is maintained by the village co-ordinator and passed on to the VCS team on a monthly basis. In case of the cook stove being replaced, a new end user agreement is signed with the end user and attached to the original agreement. Monitoring database and the end user agreement is maintained both in soft as well as hard copy.
Purpose of the data	For estimation of baseline emission
Calculation method	-
Comments	The number of days for which the improved cook stoves were non-functional is considered for estimation of emission reduction. The record of database and copy of end user agreement is kept and maintained by the project participant for the period of two years after the last issuance. For ex-post, the total number of days of non-operation of the improved cook stoves due to repair, maintenance is retrieved from the maintenance log books is averaged as against the total number of cook stoves in actual operation (as per survey) and is considered. Say, if n is the total no of non- operational days as per the maintenance records of all of the cook stoves, the average days of non-operation for each cook stove is estimated as = n/x where x is the number of cook stoves in actual operation as per the sample survey.

Data / Parameter	**Number of days of functioning of traditional cook stoves**
Data unit	Number
Description	The parameters refer to the number of days for which the traditional cook stove is being used by the household.
Source of data	Annual third-party agency survey of representative sample household
Description of measurement methods and procedures to be applied	Survey is carried out to estimate the number of days for which the household has operated the traditional cook stove during a particular monitoring period.
Frequency of monitoring/recording	Number of days of functioning of traditional cook stoves is monitored annually based on sample survey
Value monitored	During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those

	who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users. Since the beneficiary using traditional cookstoves were opted out of emission reduction estimation therefore the beneficiaries considered resembles only to those who are using improved cookstoves. Therefore, the days of usage of traditional cookstoves for beneficiaries considered is zero.
Monitoring equipment	-
QA/QC procedures to be applied	The survey is carried out by third party agency and is co-ordinated by the project proponent.
Purpose of the data	For estimation of baseline emission
Calculation method	-
Comments	Number of days of operation of the traditional cook stove is obtained from the result of sample survey. The number of days of traditional cook stove as per the survey is used to obtain the average days of usage of the traditional cook stoves for all the households who still use the improved cook stoves of this project activity. This average day is used to arrive at a factor - = (365- Average number of days of traditional cook stove usage in all households /365)

Data / Parameter	**Number of Cook stove replaced**
Data unit	Number
Description	The parameters refer to the number of cook stove that are replaced (due to end-of-life time or damage) by the new cook stove with efficiency greater than or equal to 29.88%.
Source of data	Monitoring database, new end user agreement and test certificate of the new system supplied.
Description of measurement methods and procedures to be applied	Record is being updated in the databases as and when the improved cookstoves are replaced by a new one . On replacement a new end user agreement is signed with the existing end user and the information relating to the replacement along with necessary details is updated in the database.
Frequency of monitoring/recording	Recorded as and when replaced
Value monitored	

Period	Number of improved cookstoves	Number of cookstoves replaced post end of life time	Number of cookstoves replaced

		distributed and under operation		due to defunct
	20-November-2012 – 19-November-2013	14,600	0	0
	20-November-2013 – 19-November-2014	14,600	0	0
	20-November-2014 – 19-November-2015	14,600	0	0
	20-November-2015 – 19-November-2016	14,600	0	0
	20-November-2016 – 19-November-2017	14,600	0	0

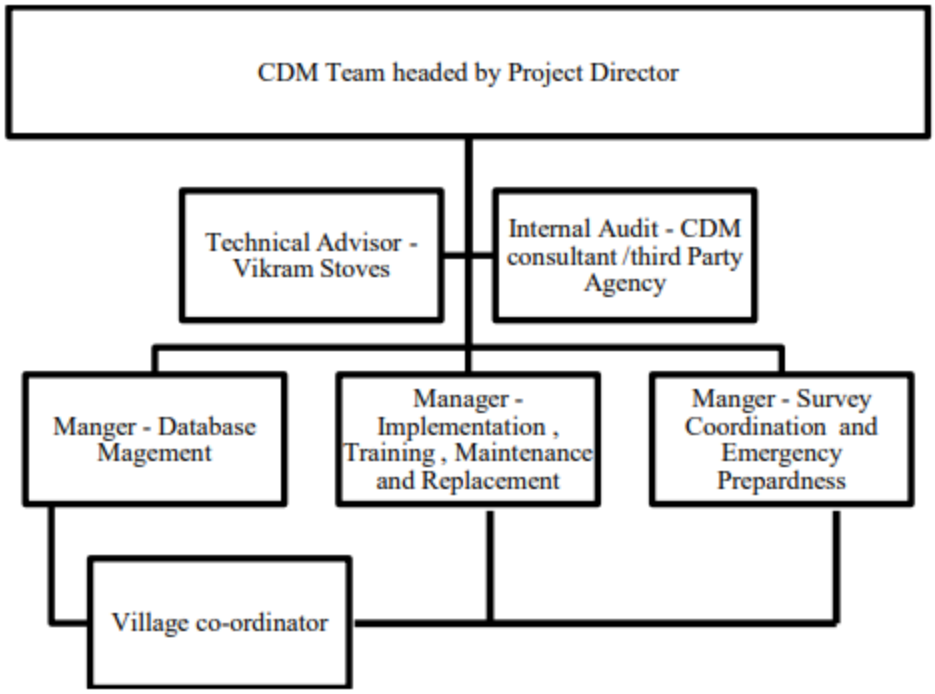
Monitoring equipment	-
QA/QC procedures to be applied	The copy of the new end user agreement for the replaced cook stove along with the efficiency certificate of the new system is archived along with the existing agreement. The database is updated as and when the system is replaced.
Purpose of the data	Assessment of baseline emission
Calculation method	-
Comments	The record of database and copy of end user agreements (both new and old one) is maintained by the project participant for the period of two years after the last issuance.

Data / Parameter	$B_{y, savings}$
Data unit	Tonnes/year/household
Description	Quantity of woody biomass that is saved through the project activity.
Source of data	calculated
Description of measurement methods and procedures to be applied	The quantity of woody biomass saved is calculated following the equation $B_{y, saving} = B_{old} * (1- \eta_{old}/\eta_{new})$ Where, B_{old} is calculated based on number of days cook stove is operational as calculated above and per capita biomass consumption of 25.51 kg/person/month multiplied by 4.8 members per rural household also factoring into the number of days for which the traditional cook stoves were in operation and the number of days of non-functioning of the improved cook stoves. The efficiency of the project system is tested on a representative sample basis.
Frequency of monitoring/recording	Calculated on an annual basis

Value monitored	<table><tr><td>20-November-2012 – 19-November-2013</td><td>Operational Efficiency considered</td><td>Estimated By savings/ ICS</td></tr><tr><td>20-November-2013 – 19-November-2014</td><td>27.06%</td><td>0.9261</td></tr><tr><td>20-November-2014 – 19-November-2015</td><td>26.52%</td><td>0.9151</td></tr><tr><td>20-November-2015 – 19-November-2016</td><td>26.08%</td><td>0.9057</td></tr><tr><td>20-November-2016 – 19-November-2017</td><td>26.03%</td><td>0.9047</td></tr><tr><td>20-November-2012 – 19-November-2013</td><td>25.01%</td><td>0.8817</td></tr></table>
Monitoring equipment	-
QA/QC procedures to be applied	The minimum tested efficiency of the representative samples or 29.88% is used for $\eta_{new.}$
Purpose of the data	-
Calculation method	-
Comments	The data estimated and the survey related documents is archived by the project participant for the period of 2 years after the last issuance.

4.3 Monitoring Plan

The monitoring of the Project activity is executed by the team of the Project Participant, Village level coordinator appointed by the Project Participant, Technical Advisor from Vikram Stoves and consultant whose specific role and responsibilities are explained as follows. The following section also explicitly indicates the monitoring plan, implementation and record archiving procedure, management of monitoring, facilitating survey, training, maintenance plan and emergency preparedness.
The detailed team structure for executing the monitoring is as follows:



Roles and Responsibilities

The roles and responsibilities of the team include:

- Undertaking awareness amongst the beneficiaries relating to usefulness of the cook stoves.
- Providing training to each entity on the operating methods and regular maintenance practice of improved cook stoves.
- Undertaking maintenance of the cook stoves on a periodic basis.
- Replacing supplied improved cook stoves with new one at the end of technical life time of the distributed system within the crediting period.
- Development and monitoring of project.
- Undertaking spot check, annual survey to access the usage, functional efficiency, maintain database and facilitate monitoring as described in section B.7.as well as the following section of the PDD.

The end users or beneficiaries is responsible for -

- Continual usage of cook stoves
- Undertaking regular maintenance
- Supporting the village coordinator and the project participant in undertaking monitoring
- Inform the village coordinator in case the cook stove malfunctions.
- Dismantle or refrain from use of traditional cook stove
- In case the family decides to shift to the same is intimated to the village coordinator.

The purpose of monitoring is to achieve actual and credible emission reduction estimation pertaining to the project activity. The project participant therefore, needs to monitor and archive data required for estimation of emission reduction.

According to the approved methodology AMS -II. G.; the monitoring comprises of –

1. Efficiency check of the representative sample on annual basis to ensure that, the cook stoves are still operating at the specified efficiency (ηnew). If appliances are found to be operational with efficiency lower than 29.88%, the efficiency determined during monitoring is used to calculate emission reduction. (In accordance to Paragraph 15 of the approved methodology)

- Thermal efficiency test is carried out in accordance to the Water Boiling Test Protocol as specified in IS 13152 (Part 1): 1991 standard.
- The sample size is selected in accordance to "Guidelines for Sampling and Surveys for Project Activities and Programme of Activities" Version 2, EB 69.

2. Monitoring also consists of checking of representative sample on annual basis to determine if the improved cook stoves are still operating or are replaced by an equivalent in service appliance. In case of replacement, it is ensured that, efficiency of new equipment is similar to the equipment being replaced.
   If the cook stove is replaced with higher efficiency appliances, then, the efficiency of 29.88% is considered as conservative approach. (In accordance to Paragraph 16 of the methodology)

3. Monitoring ensures that:

a. Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or

b. If baseline stoves continue to be used, monitoring ensures that the fuel-wood consumption of those stoves is excluded from Bold.

Therefore, the project proponent has developed a plan for monitoring under the following heads –

Implementation Arrangements and Record archiving-
All the household post to the distribution of the cook stoves is oriented to its usage and regular maintenance. With registration of the project under the UNFCCC; the project participant imparts an awareness session over cookstove usage.

As a part of the implementation program the project participant ensures:

1. Signing of the end user agreement with the beneficiaries (the project participant completes signing of end user agreement with all the beneficiaries who are being provided with the cook stoves before registration of the project). As a part of the contractual agreement with each of the beneficiaries for the titled project a unique identification number is issued as against to each project cook stoves. Moreover, as a part of the agreement each of the end user ascertains that they won't be entering into agreement with other agencies to obtain revenue. The above two steps nullify the chances of double counting.
2. The coordinators are employed under the project activity and is responsible for monitoring, archiving of the records and undertaking maintenance.
3. Creating database to archive relevant information about the end user, cook stoves and related information of the end user agreement. The database is created based on the end user agreement and is managed by the team. The database contains all the relevant information about the beneficiary in regard to the end user agreement. Each of the beneficiaries in the database is identified by the unique identification number. The database manager ensures that there has been no double counting/ repetition of the beneficiary information, location and unique identification number of the cook stoves. The database is updated on a regular basis to include:
   a. Replacement of the cook stoves after schedule life time

b. Scheduled maintenance
c. Unscheduled maintenance or fault rectification measures undertaken
d. Temporary or permanent drop out

Finalizing the number of cook stoves for emission reduction estimation
As described in the section above in regard to the implementation arrangement and record archiving the dissemination of the cook stove to the household and its usage thereafter includes the following steps:

1. Signing of end user agreement
2. Dissemination of improved cookstoves

In accordance to the guidance of the methodology, emission reduction as against each cook stoves can only be estimated from the point of cook stove usage. Therefore, the date of dissemination of cook stoves and signing of the end user agreement with each beneficiary after dissemination is considered as the date from where the emission reduction calculation is initiated for each cook stove for the first monitoring period. For the purpose of estimation, the end date of cookstoves dissemination is considered as start date of the monitoring period.

Management of monitoring activities
The monitoring of the project activity is reviewed and coordinated by the top management of the Project Participant (GKEMPL) through Monitoring Coordinator, team of Project Participant (GKEMPL) headed by Project Director and technical team from Vikram Stoves.

The persons and staffs involved in monitoring is trained over the procedure in accordance to the manual and works out under the supervision of the Project Director. The major task to be undertaken and the responsibility are as follows:

1. Co-ordinator: Each coordinator acts as coordinating point between the project household and the Team (respective manger). The village coordinator is responsible to facilitate and oversee continual operation of cook stoves, maintain database related to number of cook stoves distributed and replaced thereafter, filing complain relating to non-functioning and undertaking on-call maintenance, recording of the complaint and maintenance time line and periodic submission of information to the team.
2. Team: Creating and maintaining database and end user agreement, up-gradation of beneficiary level information in the central database. The team monitors related information pertaining to the replacement of the cook stoves[14]. In case household considered under the project activity fails to meet the condition of the end user agreement or household drops out (because of the shift to location outside project boundary for employment purpose/migration for a temporary period or even the beneficiary decided to discontinue usage of improved cook stoves) then, such dropout household is conservatively deducted on temporary or permanent basis from the emission reduction calculation for the particular monitoring period. The VCS team is responsible for estimating the emission reduction.
3. Maintenance team – Vikram Stoves is responsible for imparting training relating to

[14] The replaced cook stoves is to dismantled and sold out to the cast iron and steel units respectively in order to recycle the system components. Such initiatives nullifies the chances of the replaced cook stove to be re-used.

the cook stove scheduled maintenance and undertaking periodic maintenance and on-call maintenance.

4. Daily usage- Household uses cook stove and intimate from time to time relating to non- functioning or temporary transfer/migration. The coordinator on basis of the usage report intimates the team.
5. Replacement of Existing improved cook stoves: In case the old cook stove is replaced by a new cook stove the same is to be done with similar or higher efficiency of existing cook stove (29.88%). On replacement a new end user agreement is signed with the existing end user the same information relating to the replacement along with necessary details is updated in the database. The copy of the new end user agreement for the replaced cook stove along with the efficiency certificate of the new system is archived along with the existing agreement. The database is updated as and when the system is replaced. The replaced cook stoves is dismantled and sold out to the cast iron and steel units respectively in order to recycle the system components. Such initiatives nullify the chances of the replaced cook stove to be re-used.

Monitoring of Traditional cook stove usage

The traditional cook stove is considered as an auspicious with religious value and household consider it as a linkage to their tradition so, the household has kept the stove. However, each household has assured and confirmed through signing of end user agreement with the project participant to continue using of improved cook stoves at household.
However, as a conservative approach to monitor fuel wood consumption in the project household from use of existing mud cook stove, third party survey is carried out of representative sample household on annual basis to evaluate the number of days for which the traditional stoves has been operated across the year. The number of days for which the traditional stoves were in operation is used to derive the factor to be adjusted with B_{old}. The factor is calculated as follows:
= (365 – Average No. of days of traditional cook stoves usage in all households) /365

The factor calculated using above approach is multiplied with B_{old} to calculate the value of B_{old} to be used for ex-post calculation of emission reduction.

Sampling design

Objective: The objective of the sample design is to determine –

a) **Efficiency of Improved cook stove in operation:** Efficiency of the system is tested by third party agency of a representative sample on principle of the Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991.
b) **Usage Survey** – This is conducted on annual basis to determine the number of cook stove in operation. The survey is initiated after a year from date of project registration.
c) **Usage of traditional cook stoves**: The survey is conducted to determine the number of days for which the household is using the traditional cook stoves.

Reliability Requirement: As per paragraph 22 of the approved methodology AMS - II.G; 90% confidence interval and 10% margin of error needs is considered conceiving the fact that survey is carried out on an annual basis.

Target Population: The number of cook stove conceived under the project activity is 14,600

Survey Method: Simple Random sampling is chosen, as the population under the project activity are homogeneous owing to the selection of beneficiary from similar socio-economic circumstances.

Sample Size:

The sample size is calculated using exact equation for random sampling –

$n \geq 1.645^2 N * p * (1-p) / ((N-1) * 0.1^2 * p^2 + 1.645^2 * p*(1-p))$

Where,

N	=	Sample size
N	=	14,600
P	=	expected proportion (on basis of assumption that, 90% of the cook stove is in operation and at the desired efficiency)
1.645	=	Represents 90% confidence required
0.1	=	Represent 10% relative precision

a) Sample size for Efficiency test

Although the cook stoves are designed to operate at a desired efficiency level throughout its life time subjected to periodic maintenance; efficiency test of the cook stoves is carried out on annual basis. The sample size for undertaking efficiency test is therefore, decided considering 90% of the cook stoves operates at a specified efficiency of 29.88%.

Following equation (3) above, the number of sample size arrived as below –

Time Period	**Percentage of cook stove operational at specified efficiency at any point of time during the entire crediting period (***This assumption is only for estimation of sample size***)[62]**	**Sample size for survey (No. of systems)**	**Sample size after conceiving response rate of 80%**
Annual	90%	31	40

(Note: the final sample size is rounded up and increased to the next closest integer)

The household for testing the efficiency as stated above is selected on a random sample basis. However while undertaking the sample beneficiary selection it is ensured that the household opted for efficiency testing are not common with the household /beneficiary selected for sample survey for improved cook stove usage and traditional cook stove usage during a particular year. Moreover, it is ensured that the household once selected for efficiency testing during a particular year is opted out from the selection procedure in course of the crediting period for further testing.

Data to be collected -

Field Measurement – Frequency: The efficiency testing of sample system is carried out on an annual basis. The inspection is carried out one year after the date of registration. There after once in every year the survey is conducted.

QA/QC Procedure: Each system is assigned with unique identification details. The systems to be sampled is randomly selected using software or random number tables and screen

shots of the same is kept in the data base. The PP gets the services of third party agency or any scope accredited DOE including the verifier for conducting the efficiency test of the samples presented by the PP before the preparation of the monitoring report.

Analysis: In case of the efficiency tested for the sample system is found to be lower than 29.88% then, the minimum value of efficiency tested is considered as a threshold for the subsequent years in place of 29.88% till the point further lower value of efficiency is tested.

b) Sample size determination for no. of improved cook stoves in operation and no of days of traditional cook stove usage

The sample size is estimated for determining the number of cook stoves in operation on basis of assumption that, 90% (This assumption is only for estimation of sample size) of cook stove is operational i.e. proportion of the cook stove in operation during a particular year is 0.9.

Therefore, n≥ 31

For covering 100 percent of the sample and expecting a response rate of 80%. Thus, the sample size is estimated as 31/80% = 39. However, to cover the wide range of population and have a conservative sample the PP selects 4 times the number of sample estimated i.e., 156 numbers of household every year for the sample.

The household survey is designed to estimate the percentage of cook stove still in operation and number of days for which the traditional cook stoves are used for the purpose of estimation of emission reduction. The survey questionnaire essentially contain the unique identification details of the household, satisfactory level of usage and service, date of signing of the agreement, information regard to the maintenance or replacement if any, number of person in the household, other type of stoves used if any (type of fuel) and number of days of traditional cook stove usage (specific details about the festive season and any other occasion the traditional cook stove is used, if the size of the members are extremely high when it is not possible to use the improved cook stove).

It is to be noted that the household selected for the usage survey for determination of proportion of cook stove in operation is common where the survey for determining the number days for which the traditional cook stoves usage is carried out. The samples once surveyed in a year is not considered for subsequent year.

Data to be collected

Field Measurement – Frequency: The survey is carried out on an annual basis from the date of registration in specified format duly signed by the beneficiary to assess whether the beneficiary has been using the cook stoves distributed till date and to assess the number of days for which the beneficiary has used the traditional cook stoves during that year.

QA/QC Procedure: Each system is assigned with unique identification details. The systems to be sampled is randomly selected using software or random number tables and screen shots of the same is kept in the data base. The PP gets the services of third party agency or any scope accredited DoE including the verifier for taking the survey before the preparation of the monitoring report.

Analysis: Based on the response the percentage of improved cook stoves which are distributed as the part of this project activity that are still operated by the households and the average number of days of operation of the traditional cook stoves by each household would be estimated and the same is considered for ex-post emission reduction calculation.

The sample beneficiaries/household is same where the survey is carried out for estimation of operation of improved cook stoves and traditional cook stoves i.e. a single survey is designed to capture both. Moreover, it is ensured that the household once selected for survey during a particular year is opted out from the selection in course of the subsequent crediting period for further testing.

Sl. No.	Description	Data to be collected	Method of survey	Sampling method	Proposed Sample size	Variance
1	Efficiency of Improved cook stove	Testing of the Efficiency of the improved cook stoves	Household Collection and conducting the test for the selected samples.	Simple Random sampling	40	90% Confidence level
2	Usage survey	No of system in operation	Household survey	Simple Random Sampling	160 household/ annum	90% confidence level
	Traditional cook stove usage	No of days for which the household use traditional cook stoves are used in the project household	Household survey	Simple Random Sampling	160 household/ annum	90% confidence level

Reliability Check
The sample size as indicated in the table above is subjected to the final value of the precision calculated and in case the value of the precision estimated from the survey result is less than ±10% then, the sample size is re-estimated and the additional number of beneficiary/households is interviewed to obtain the desired level of precision. The precision is calculated as follows:

Step1: Estimation of the value of proportion (p)
P = number of success/ number of cook stoves that were observed in the sample

Step 2: Estimating Standard Error of the proportion
The standard error of the proportion is estimated using the following equation Standard error of proportion = $\sqrt{(1-f)\ pq/n}$
Where,
f = sampling fraction = number of cook stoves that are observed in the sample/14600, i.e., 160/14600. p = proportion, 90%
q = (1-p)
n = number of cook stoves that are observed in the sample

Step 3: Estimating of Precision
Proportion=±z value * standard error of proportion
z value = for 90% confidence level the value of z is 1.645 Standard error of proportion = estimated in step 2

Step 4: Estimating of Relating Precision Relative Precision = Precision/proportion Where, Proportion is estimated in step 1 and precision in step 3

In case the value of the relative precision estimated based on the level of success relating to

1. Tested Efficiency of the improved cook stove being equal to greater than 29.88%
2. Number of the beneficiaries using improved cook stove
3. Number of beneficiaries/households using traditional cook stoves is not within the specified limit of ±10% the value of sample size is increased and survey is carried out amongst the additional population to obtain the desired level of precision i.e. within ±10%.

Training
The training is imparted to the following entities in following way-

Entity	Objective of training	Trained by	Onset	Frequency
Household	Operational procedure Scheduled maintenance Itemised recording and reporting	Vikram Stoves (for item no 1. and 2) team (for item 3)	After distribution	Once
Village Coordinator	Monitoring of the related parameter like Spot check of cook stove usage, situational review Database management and coordination with team System Maintenance	VCS team (for item no. 1 and 2) Vikram Stoves (for item 3)	On appointment	Once in a year
VCS team	Database management Undertaking Monitoring, Recording and archiving Preparation of monitoring report	Consultant and Top Management of the Project participant	On registration	Once in a year

Quality Assurance and Quality Control of monitoring activities–
Top management of the Project participant (GKEMPL) is responsible for QA/QC which includes monitoring of accurate and transparent record keeping, monitoring and evaluation so that all supporting documentation and records for the project is easily accessible for spot checking and cross referencing by a third-party agency. Top management of the project participant ensures quality control of the monitoring activities in order to guarantee of records and to confirm absence of double-counting in any form. Project participant ensures that, the detailed beneficiary level database and the project database is up to date and the latter is representative of the most recent definitions of clusters. Internal audit is carried out on six month basis by the consultant or third party agency and includes -

1. The internal review is carried out in every six month for compliance check in accordance to the manual.
2. Non conformity if noted is reported and brought into the notice of the top management and measures is undertaken to ensure that required compliance is met.
3. Training on the monitoring if felt by the auditor is imparted to the team.

Emergency Preparedness
In case the village coordinator is reported against malfunction/ non-function of cook stove which the technical team is unable to rectify the fault and unable to co-ordinate with the technical team of Vikram Stoves; the coordinator immediately replace the existing cook stove with the new one. The faulty stoves thereafter be transported to the industry for repair.

1. The coordinator is provided with stand-by stove components for repair and/or replacement.
2. Few numbers of cook stoves are stocked with the Panchayat Samity/ Block Development Office to reduce the down time of replacement.
3. In case the coordinator is unable to carry out maintenance, the same is reported to the technical team of Vikram Stoves and the nearby representatives visits the village to support the co- Ordinator in rectifying the fault.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline Emissions is estimated in following way –

$ER_y = B_{y,\ savings} * f_{NRB,y} * NCV_{\ biomass} * EF_{projected\ fossil\ fuel}$

Where, in accordance to paragraph 13 of the methodology, leakage related to the non-renewable woody biomass saved by the project activity is assessed based on ex post surveys of users and the areas from which this woody biomass is sourced. Subsequent to the clarification provided in sub paragraph (a) survey is not required for ex-post estimation of leakage in case B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakages.

Parameter	Data	Unit
B_{old}	1.469	Tonne fuel wood /cook stove/ year
$B_{y,\ savings}$	0.9774	Tonne fuel wood /cook stove/ year
$f_{NRB,y}$	87.90%	
$NCV_{biomass}$	0.015	TJ/tonne
$EF_{projectedfossilfuel}$	81.60	tCO_2e/TJ
$ER_{y,WGA,per\ cook\ stove}$ (Emission reduction/ cook stove /year without gross adjustment factor for B_{old} to account for leakage)	1.0515	tCO_2e /cook stove/ year

The leakage emission for ex-ante estimation of emission reduction is thereby calculated as a difference between the emission reduction estimated considering the actual value of Bold i.e. 1.469 Tonne fuel wood /cook stove/ year and emission reduction estimated by considering the value of Bold is estimated by multiplying Bold with a net to gross adjustment factor of 0.95.

For the purpose of ex-ante estimation of emission reduction, it is assumed that, only 90% of the cook stoves are operational in any point of time. Thus, the emission reduction per year ($ER_{y,\ WGA}$) without gross adjustment factor for B_{old} to account for leakage considering 90% of the cook stove as operational for the entire crediting period is 13,816 tCO_2e /year.

The Baseline Emissions achieved for this monitoring period is 63,922 tCO_2e /year.

The year wise efficiency of the improved cookstoves tested and considered for estimation of baseline emission is outlined in the table below

Third party assessment for monitoring period - 20-November-2012 – 19-November-2013			
Identification number	**Beneficiary name**	**District**	**Tested Efficiency**
GKEMPLPH-III-1650	Latabai Langade	Ahmednagar	27.059%
GKEMPLPH-III-8482	Bhagwan Warekar	Nandurbar	27.072%
GKEMPLPH-III-13161	Khandu Madake	Nandurbar	27.118%
GKEMPLPH-III-1410	Bhimashankar Swami	Ahmednagar	27.142%
GKEMPLPH-III-8305	Shrikrushna Parhad	Nandurbar	27.151%
GKEMPLPH-III-3939	Gulab Kaisan Dhane	Ahmednagar	27.173%
GKEMPLPH-III-1710	Jagannath Pawar	Ahmednagar	27.174%
GKEMPLPH-III-12127	Kartik Wankhede	Nandurbar	27.272%
GKEMPLPH-III-8456	Gajanan Chaudhari	Nandurbar	27.284%
GKEMPLPH-III-4661	Dharamraj Arjunrao Ubale	Ahmednagar	27.434%
GKEMPLPH-III-763	Mahesh Chopade	Ahmednagar	27.448%
GKEMPLPH-III-1037	Shivhar Devakate	Ahmednagar	27.506%
GKEMPLPH-III-4109	Keruba Ranu Jadhav	Ahmednagar	27.508%
GKEMPLPH-III-13564	Sham Sirsat	Nandurbar	27.550%
GKEMPLPH-III-3031	Vinaya Sunil Rautmare	Ahmednagar	27.581%
GKEMPLPH-III-1355	Suresh Gavhane	Ahmednagar	27.603%
GKEMPLPH-III-8216	Prayagbai More	Nandurbar	27.649%
GKEMPLPH-III-129	Shivaji Kadam	Ahmednagar	27.666%
GKEMPLPH-III-12201	Purushottam Bhone	Nandurbar	27.727%
GKEMPLPH-III-5842	Parmeshwar Babanrav Waghmode	Ahmednagar	27.810%
GKEMPLPH-III-13889	Ramprasad Khote	Nandurbar	27.871%
GKEMPLPH-III-9692	Shrikrushna Doifode	Nandurbar	27.893%
GKEMPLPH-III-5398	Kishor Bhagwat Bhale	Ahmednagar	27.927%
GKEMPLPH-III-6185	Angad Kashinath Shejul	Ahmednagar	27.950%
GKEMPLPH-III-9296	Kailas Kendre	Nandurbar	27.958%
GKEMPLPH-III-8192	Raju Nagre	Nandurbar	28.028%
GKEMPLPH-III-10302	Mina Khanjhode	Nandurbar	28.059%
GKEMPLPH-III-3911	Yedu Manik Jogdand	Ahmednagar	28.107%
GKEMPLPH-III-14566	Sadashiv Gholve	Nandurbar	28.150%
GKEMPLPH-III-689	Ravindra Mane	Ahmednagar	28.240%
GKEMPLPH-III-7397	Datta Vidhole	Nandurbar	28.319%
GKEMPLPH-III-1296	Kamalakar Shinde	Ahmednagar	28.326%
GKEMPLPH-III-13569	Ashok Gavhane	Nandurbar	28.338%
GKEMPLPH-III-2100	Mohan Ghawat	Ahmednagar	28.344%
GKEMPLPH-III-1938	Dhananjay Shinde	Ahmednagar	28.383%
GKEMPLPH-III-7996	Sushilabai Kute	Nandurbar	28.398%
GKEMPLPH-III-9873	Gajanan Mandlik	Nandurbar	28.471%
GKEMPLPH-III-10236	Manorama Kakade	Nandurbar	28.572%
GKEMPLPH-III-11736	Sanjay Kavhar	Nandurbar	28.725%
GKEMPLPH-III-6264	Ram Bhagwanrao Chalak	Ahmednagar	28.797%

Third party assessment for monitoring period - 20-November-2013 – 19-November-2014			
Identification number	**Beneficiary name**	**District**	**Tested Efficiency**
GKEMPLPH-III-6502	Bapusaheb Kisan Bhuse	Ahmednagar	26.522%

GKEMPLPH-III-4795	Rukhmin Ambadas Jadhav	Ahmednagar	26.790%
GKEMPLPH-III-1533	Sunita Naikwade	Ahmednagar	26.861%
GKEMPLPH-III-10862	Sandip Sose	Nandurbar	26.891%
GKEMPLPH-III-1156	Santosh Nirde	Ahmednagar	26.896%
GKEMPLPH-III-2887	Ashok Umaji Bagalne	Ahmednagar	26.929%
GKEMPLPH-III-13631	Keshav Thombre	Nandurbar	26.947%
GKEMPLPH-III-10555	Kaveri Badame	Nandurbar	27.066%
GKEMPLPH-III-11232	Uttam Tikhe	Nandurbar	27.072%
GKEMPLPH-III-5823	Balasaheb Nagorao Gorde	Ahmednagar	27.085%
GKEMPLPH-III-4431	Pandit Amrut Mugutrao	Ahmednagar	27.203%
GKEMPLPH-III-12024	Anita Chopade	Nandurbar	27.210%
GKEMPLPH-III-3379	Sudam Manikrao Gayaval	Ahmednagar	27.214%
GKEMPLPH-III-3687	Devidas Rama Chaure	Ahmednagar	27.281%
GKEMPLPH-III-2779	Sunil Dnyanoba Kavade	Ahmednagar	27.320%
GKEMPLPH-III-4478	Ramdas Radhakisan Lavhale	Ahmednagar	27.323%
GKEMPLPH-III-8335	Sunita Thakare	Nandurbar	27.340%
GKEMPLPH-III-6472	Shivaji Sakharam Nimbalkar	Ahmednagar	27.466%
GKEMPLPH-III-7959	Ramesha Deshmukh	Nandurbar	27.475%
GKEMPLPH-III-1104	Vishwajit Solanke	Ahmednagar	27.501%
GKEMPLPH-III-11140	Gangadhar Adani	Nandurbar	27.514%
GKEMPLPH-III-2825	Vilas Yashwant Borade	Ahmednagar	27.520%
GKEMPLPH-III-11367	Uddhav Sarode	Nandurbar	27.546%
GKEMPLPH-III-2770	Nagnath Vitthal Gaikwad	Ahmednagar	27.555%
GKEMPLPH-III-2020	Ambadas Sangale	Ahmednagar	27.573%
GKEMPLPH-III-10197	Vinod Shinde	Nandurbar	27.585%
GKEMPLPH-III-7099	Sudhakar Kharate	Nandurbar	27.586%
GKEMPLPH-III-6240	Suresh Shamarao Dhanwe	Ahmednagar	27.616%
GKEMPLPH-III-7973	Sanjay Payghan	Nandurbar	27.653%
GKEMPLPH-III-11244	Raghoji Khandare	Nandurbar	27.654%
GKEMPLPH-III-9330	Raju Bhoyar	Nandurbar	27.700%
GKEMPLPH-III-13757	Radhakisan Kadam	Nandurbar	27.785%
GKEMPLPH-III-10392	Madhukar Tayade	Nandurbar	27.803%
GKEMPLPH-III-9313	Gopal Shevale	Nandurbar	27.862%
GKEMPLPH-III-534	Aarti Salunke	Ahmednagar	27.867%
GKEMPLPH-III-10916	Kamal Ingole	Nandurbar	27.955%
GKEMPLPH-III-3302	Sachin Bapurao Shinde	Ahmednagar	27.959%
GKEMPLPH-III-3076	Shahurkh Navazkhan Pathan	Ahmednagar	28.266%
GKEMPLPH-III-9748	Ganesh Raut	Nandurbar	28.529%
GKEMPLPH-III-10047	Sheikh Mobin Amin	Nandurbar	28.612%

Third party assessment for monitoring period - 20-November-2014 – 19-November-2015			
Identification number	**Beneficiary name**	**District**	**Tested Efficiency**
GKEMPLPH-III-2842	Bibhishan Sahebrav Sul	Ahmednagar	26.076%
GKEMPLPH-III-13115	Manohar Deshmukh	Nandurbar	26.106%
GKEMPLPH-III-3075	Dharu Tahnu Kanade	Ahmednagar	26.153%
GKEMPLPH-III-13207	Rameshwar Male	Nandurbar	26.177%
GKEMPLPH-III-13254	Rani Gitte	Nandurbar	26.180%
GKEMPLPH-III-6688	Ahamadkha Habibakha Pathan	Ahmednagar	26.213%
GKEMPLPH-III-5401	Akshay Bhagwat Bhale	Ahmednagar	26.214%

GKEMPLPH-III-4388	Dasharath Pujanram Gade	Ahmednagar	26.222%
GKEMPLPH-III-13680	Parmeshwar Sangale	Nandurbar	26.235%
GKEMPLPH-III-7721	Aanantha Kankhar	Nandurbar	26.253%
GKEMPLPH-III-12000	Vitthal Admane	Nandurbar	26.302%
GKEMPLPH-III-7462	Waman Gavhale	Nandurbar	26.307%
GKEMPLPH-III-4417	Suresh Radhakisan Chitalkar	Ahmednagar	26.372%
GKEMPLPH-III-2561	Shravanssing Dhannusng Pardeshi	Ahmednagar	26.394%
GKEMPLPH-III-2824	Bankat Ramrao Naikwade	Ahmednagar	26.412%
GKEMPLPH-III-10330	Ashok Jadhav(Deshamukh)	Nandurbar	26.466%
GKEMPLPH-III-6715	Amin Badshaha Pathan	Ahmednagar	26.483%
GKEMPLPH-III-2334	Surekha Rahul Ghodake	Ahmednagar	26.540%
GKEMPLPH-III-14379	Jafar Sayyed	Nandurbar	26.624%
GKEMPLPH-III-2280	Janaradhan Bhausaheb Bhosale	Ahmednagar	26.788%
GKEMPLPH-III-12646	Rekha Taktode	Nandurbar	26.807%
GKEMPLPH-III-6094	Jagannath Bhagwanrav Shinde	Ahmednagar	26.876%
GKEMPLPH-III-13791	Sajjan Andhale	Nandurbar	26.940%
GKEMPLPH-III-8529	Shankar Wagh	Nandurbar	27.002%
GKEMPLPH-III-1592	Atmaram Manjre	Ahmednagar	27.076%
GKEMPLPH-III-13944	Akshay Handibag	Nandurbar	27.107%
GKEMPLPH-III-5647	Vaijinath Sundarrao Yevale	Ahmednagar	27.349%
GKEMPLPH-III-10845	Kamalbai Raut	Nandurbar	27.356%
GKEMPLPH-III-14064	Gaikwad Govind	Nandurbar	27.422%
GKEMPLPH-III-1243	Dnyaneshwar Ghayatidak	Ahmednagar	27.428%
GKEMPLPH-III-5943	Dadasaheb Vashishta Dongare	Ahmednagar	27.531%
GKEMPLPH-III-8496	Dagdu Bhagat	Nandurbar	27.535%
GKEMPLPH-III-2834	Annasaheb Sukhdev Jogdand	Ahmednagar	27.569%
GKEMPLPH-III-13291	Pradeep Sakhare	Nandurbar	27.645%
GKEMPLPH-III-409	Arun Gosavi	Ahmednagar	27.646%
GKEMPLPH-III-6846	Shobha Bhimrao Kharad	Ahmednagar	27.657%
GKEMPLPH-III-13137	Sambhaji Darade	Nandurbar	27.663%
GKEMPLPH-III-4988	Suvarnamala Baburao Shingade	Ahmednagar	27.832%
GKEMPLPH-III-11757	Gajanan Godmale	Nandurbar	27.939%
GKEMPLPH-III-9660	Bansilala Jaiswal	Nandurbar	28.103%

Third party assessment for monitoring period - 20-November-2015 – 19-November-2016			
Identification number	**Beneficiary name**	**District**	**Tested Efficiency**
GKEMPLPH-III-1273	Ashok Khade	Ahmednagar	26.032%
GKEMPLPH-III-9721	Mahadev Thakare	Nandurbar	26.048%
GKEMPLPH-III-2262	Popat Bhagwan Bansode	Ahmednagar	26.067%
GKEMPLPH-III-14512	Kisan Sawant	Nandurbar	26.131%
GKEMPLPH-III-8275	Prabhakar Kalmbe	Nandurbar	26.145%
GKEMPLPH-III-74	Abasaheb Bhandvalakar	Ahmednagar	26.204%
GKEMPLPH-III-9970	Rangnath Chavan	Nandurbar	26.292%
GKEMPLPH-III-2526	Ramrao Sitaram Sawant	Ahmednagar	26.334%
GKEMPLPH-III-2539	Janlindar Bajirao Chinchakar	Ahmednagar	26.452%
GKEMPLPH-III-10123	Shankar Avchar	Nandurbar	26.477%
GKEMPLPH-III-2686	Pandit Uttreshwar Jogdand	Ahmednagar	26.484%
GKEMPLPH-III-10424	Narmadabai Kele	Nandurbar	26.517%

GKEMPLPH-III-9119	Devkumar Jiravankar	Nandurbar	26.573%
GKEMPLPH-III-3936	Amol Devidas Kadam	Ahmednagar	26.579%
GKEMPLPH-III-2902	Manisha Bhaurao Pawar	Ahmednagar	26.586%
GKEMPLPH-III-9802	Santosh Tupone	Nandurbar	26.589%
GKEMPLPH-III-4008	Manik Shriram Shinde	Ahmednagar	26.598%
GKEMPLPH-III-2936	Khandu Sonaji Survase	Ahmednagar	26.653%
GKEMPLPH-III-5324	Shakuntala Bhaskar Tambare	Ahmednagar	26.682%
GKEMPLPH-III-275	Shesherao Patil	Ahmednagar	26.707%
GKEMPLPH-III-13642	Vachist Garade	Nandurbar	26.724%
GKEMPLPH-III-14193	Laxmibai Giri	Nandurbar	26.739%
GKEMPLPH-III-2771	Annasaheb Tukaram Lande	Ahmednagar	26.760%
GKEMPLPH-III-9353	Punjabai Sarode	Nandurbar	26.764%
GKEMPLPH-III-13601	Ramakant Shinde	Nandurbar	26.799%
GKEMPLPH-III-5989	Manisha Narsing Khote	Ahmednagar	26.809%
GKEMPLPH-III-7090	Swaraj Misal	Nandurbar	26.856%
GKEMPLPH-III-11485	Dewanand Upadhaye	Nandurbar	26.910%
GKEMPLPH-III-7768	Uma Manawar	Nandurbar	26.918%
GKEMPLPH-III-1167	Bhaskar Andil	Ahmednagar	27.074%
GKEMPLPH-III-12573	Meenatai Tawar (Deshmukh)	Nandurbar	27.082%
GKEMPLPH-III-2924	Nitin Asaram Khod	Ahmednagar	27.112%
GKEMPLPH-III-5713	Arunrao Dadasaheb Chavan	Ahmednagar	27.170%
GKEMPLPH-III-11167	Gangaram Mahale	Nandurbar	27.199%
GKEMPLPH-III-3201	Vishnu Marotirao Bhoj	Ahmednagar	27.202%
GKEMPLPH-III-3365	Muralidhar Damodhar Chavan	Ahmednagar	27.213%
GKEMPLPH-III-12857	Dhnyaneshwar Vanskar	Nandurbar	27.350%
GKEMPLPH-III-14172	Sandeep Kedar	Nandurbar	27.582%
GKEMPLPH-III-2101	Radhabai Shinde	Ahmednagar	27.808%
GKEMPLPH-III-10487	Mahadeo Moharkar	Nandurbar	27.920%

Third party assessment for monitoring period - 20-November-2016 – 19-November-2017			
Identification number	**Beneficiary name**	**District**	**Tested Efficiency**
GKEMPLPH-III-915	Bhimrao Rathod	Ahmednagar	25.012%
GKEMPLPH-III-2709	Jadhav Rahibai Vinayak	Ahmednagar	25.068%
GKEMPLPH-III-5288	Ambadas Rajaram Navale	Ahmednagar	25.116%
GKEMPLPH-III-13334	Harichandar Maykar	Nandurbar	25.124%
GKEMPLPH-III-3398	Raju Pralahd Shinde	Ahmednagar	25.227%
GKEMPLPH-III-9884	Bhanudas Kaware	Nandurbar	25.254%
GKEMPLPH-III-13030	Ramkisan Kokate	Nandurbar	25.267%
GKEMPLPH-III-195	Vaijnath Lamture	Ahmednagar	25.280%
GKEMPLPH-III-7565	Zingraji Wankhede	Nandurbar	25.323%
GKEMPLPH-III-11667	Pralhad Manwar	Nandurbar	25.326%
GKEMPLPH-III-6223	Bharat Ranganath Kade	Ahmednagar	25.368%
GKEMPLPH-III-9634	Indubai Kharat	Nandurbar	25.378%
GKEMPLPH-III-4648	Nandkumar Baliram Londhe	Ahmednagar	25.475%
GKEMPLPH-III-2729	Maruti Govind Andhale	Ahmednagar	25.512%
GKEMPLPH-III-12428	Uddhav Kamkhede	Nandurbar	25.587%
GKEMPLPH-III-14183	Ranjit Yadav	Nandurbar	25.696%
GKEMPLPH-III-2623	Balbhim Uttam Uable	Ahmednagar	25.731%
GKEMPLPH-III-9151	Shaikh Israail Qureshi	Nandurbar	25.742%

GKEMPLPH-III-3543	Gopalrao Balaji Sirsat	Ahmednagar	25.748%
GKEMPLPH-III-1957	Raosaheb Kardile	Ahmednagar	25.756%
GKEMPLPH-III-8666	Satish Gade	Nandurbar	25.849%
GKEMPLPH-III-5101	Ashok Gunaji Sonvane	Ahmednagar	25.886%
GKEMPLPH-III-8438	Kishor Hade	Nandurbar	25.890%
GKEMPLPH-III-1690	Manoj Sable	Ahmednagar	25.897%
GKEMPLPH-III-12026	Kisan Rathod	Nandurbar	25.941%
GKEMPLPH-III-6178	Ashok Kundalik Naikawade	Ahmednagar	25.944%
GKEMPLPH-III-12367	Bhujanga Jadhao	Nandurbar	26.031%
GKEMPLPH-III-12961	Uddhav Magar	Nandurbar	26.047%
GKEMPLPH-III-8460	Jitendra Kakde	Nandurbar	26.127%
GKEMPLPH-III-6352	Rahul Dilip Londhe	Ahmednagar	26.275%
GKEMPLPH-III-6121	Vinod Chandrakant Salve	Ahmednagar	26.330%
GKEMPLPH-III-10667	Dinkar Bajad	Nandurbar	26.336%
GKEMPLPH-III-2903	Asarabai Baban Bhadake	Ahmednagar	26.365%
GKEMPLPH-III-4577	Bhima Rama Nikam	Ahmednagar	26.427%
GKEMPLPH-III-10636	Satwaji Nagre	Nandurbar	26.484%
GKEMPLPH-III-14426	Sundarrav Choure	Nandurbar	26.696%
GKEMPLPH-III-4365	Govardhan Trimbakrav Gade	Ahmednagar	26.797%
GKEMPLPH-III-7026	Babanasa Dagavar	Nandurbar	26.817%
GKEMPLPH-III-12208	Ganeshsingh Parihar	Nandurbar	27.038%
GKEMPLPH-III-3459	Gautam Sadhu Chavan	Ahmednagar	27.126%

5.2 Project Emissions

Project emissions are considered as zero for this project as no fossil fuels are used

5.3 Leakage

The leakage emission per cook stove is estimated as difference between the emission reduction estimated considering the actual value of Bold and emission reduction estimated considering the value of Bold obtained by multiplying Bold with a net to gross adjustment factor of 0.95.

Parameter	Data	Unit
Leakage emission	0.053	tCO_2e /cook stove/ year
Leakage emission due to use of traditional cook stove usage (assuming 0 for ex-ante)	0	tCO_2e /cook stove/ year
Leakage emission, (LEy, per cook stove)	0.053	tCO_2e /cook stove/ year

Therefore, the total leakage emission (LEy) for the project activity assuming 90% of 14,600 Nos. cook stove distributed is 691 tCO_2e /year.

The leakage emissions achieved for this monitoring period is 3,198 tCO_2e /year.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
20-November-2012 – 19-November-2013	13,187	0	660	12,527
20-November-2013 – 19-November-2014	13,295	0	665	12,630
20-November-2014 – 19-November-2015	12,890	0	645	12,245
20-November-2015 – 19-November-2016	12,433	0	622	11,811
20-November-2016 – 19-November-2017	12,117	0	606	11,511
	63,922	**0**	**3,198**	**60,724**

Comparison with the actual emission reductions achieved with the estimated emission reductions:

Duration	**Net emission reduction for the project activity in the year y, ER_y**	**Estimated Emission Reductions**	**Comparison**
20-November-2012 – 19-November-2017	60,724	65,625	-8.1%