



DISTRIBUTION OF IMPROVED COOK STOVE - PHASE 13



Document Prepared by EKI Energy Services Limited

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Project Title	Distribution of Improved cook stove - Phase 13
Version	03
Report ID	VVER 344
Date of Issue	16-August-2022
Project ID	VCS 2417
Monitoring Period	03-October-2012 -02-October-2017 (First and Last date included)
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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 pollution¹ along with reduction of drudgery amongst the tribal households (Schedule Tribe) and families living below the poverty level (BPL category²) across across Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts which lies in Aurangabad, Amravati and Nagpur Divisions of 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 of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts of Maharashtra who are provisioned with improved cookstoves under the project activity.

It is worthwhile to note that firewood and wood chips contributes as major cooking fuel amongst rural households in India. According to the NSSO³ 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

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.

³National 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

The cook stove deployed under the project activity⁶ is single pot, portable, metallic, improved biomass cook stoves⁷ 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 I⁸ standard. The design ensures complete combustion of biomass. The cook stove is tested 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 14,182 Nos. improved cook stoves¹⁰ amongst Below Poverty Line (BPL) and Scheduled Tribes (ST) households in rural areas of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts which lies in Aurangabad, Amravati and Nagpur Divisions of Maharashtra upon signing of the end user Tripartite Agreement¹¹.

The project through conservation of non-renewable biomass was estimated to result in an greenhouse gas emission reduction of 12,748 tCO_{2e} annually (ex-ante).

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).

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

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 maintenance¹² and post lifetime replacement within the crediting period.

The amount of emission reductions achieved for the current monitoring period is 60,837 tCO₂e.

The start date of the project activity is 03-October-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 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

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.

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1.5 Project Start Date

The start date of the project activity is 03-October-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 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(listed). 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 03-October-2012 to 02- October -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

Project Location

The project is located in state Maharashtra, India.

The list of division is given below:

Division: Aurangabad

Districts: Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur

Division: Amravati

Districts: Buldhana, Akola, Washim, Amravati and Yavatmal

Division: Nagpur

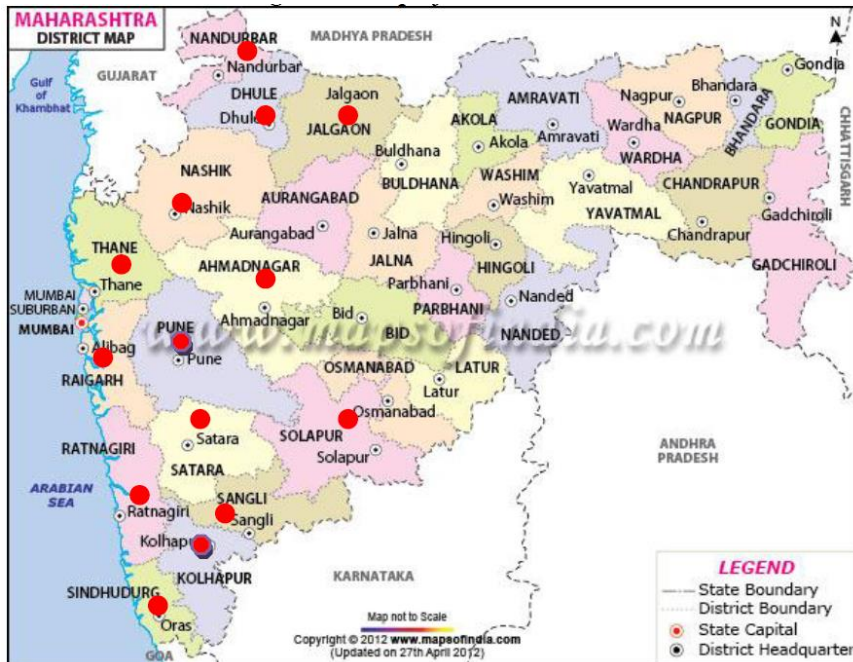
Districts: Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia

Division	District	Latitude	Longitude
Aurangabad	Aurangabad	19.00 - 20.00° N	74.00 - 76.00° E
	Jalna	19.10 - 21.30° N	75.40 - 76.40° E
	Parbhani	18.45 - 20.10° N	76.13 - 77.39° E
	Hingoli	19.43° N	77.11° E
	Bheed	18.30 - 19.30° N	74.50 - 76.60° E
	Nanded	18.25 - 19.91° N	77.00 - 78.41° E
	Osmanabad	17.35 - 18.40° N	75.16 - 76.40° E
	Latur	17.75 - 18.75° N	76.25 - 77.25° E
Amravati	Buldhana	19.85 - 21.28° N	75.95 - 76.81° E
	Akola	19.85 - 21.26° N	76.63 - 77.73° E
	Washim	19.61 - 21.16° N	76.70 - 77.40° E
	Amravati	20.53 - 21.76° N	76.61 - 78.45° E
	Yavatmal	19.26 - 20.42° N	77.18 - 79.98° E
Nagpur	Wardha	20.30 - 21.35° N	78.06 - 79.25° E
	Nagpur	20.35 - 21.44° N	75.15 - 79.40° E
	Bhandara	20.65 - 21.63° N	79.45 - 80.70° E
	Chandrapur	18.40 - 20.50° N	78.50 - 80.60° E
	Ghadchiroli	18.43 - 21.50° N	79.45 - 80.53° E
	Gondia	20.39 - 21.38° N	79.27 - 80.42° E

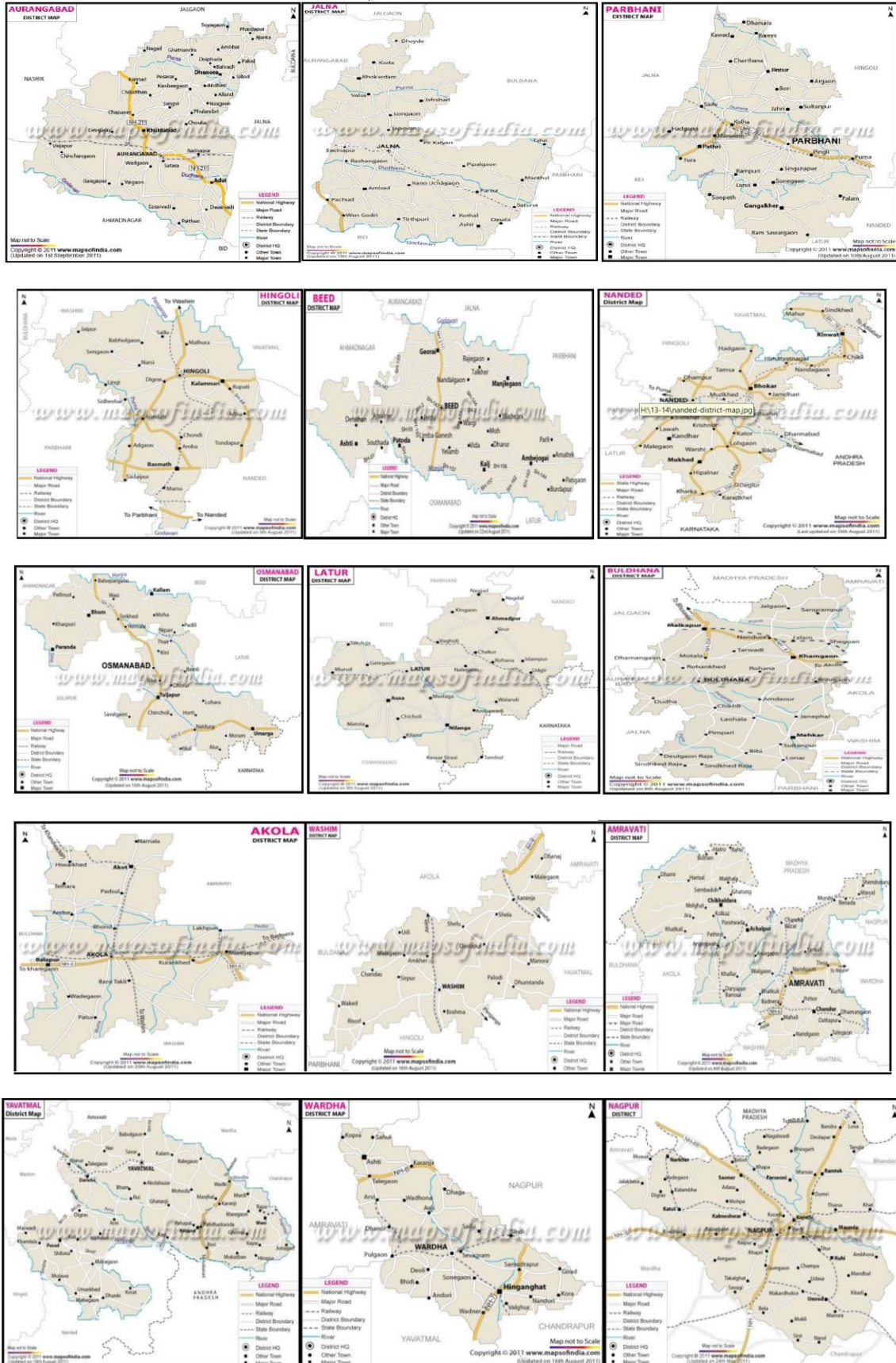
Map of India

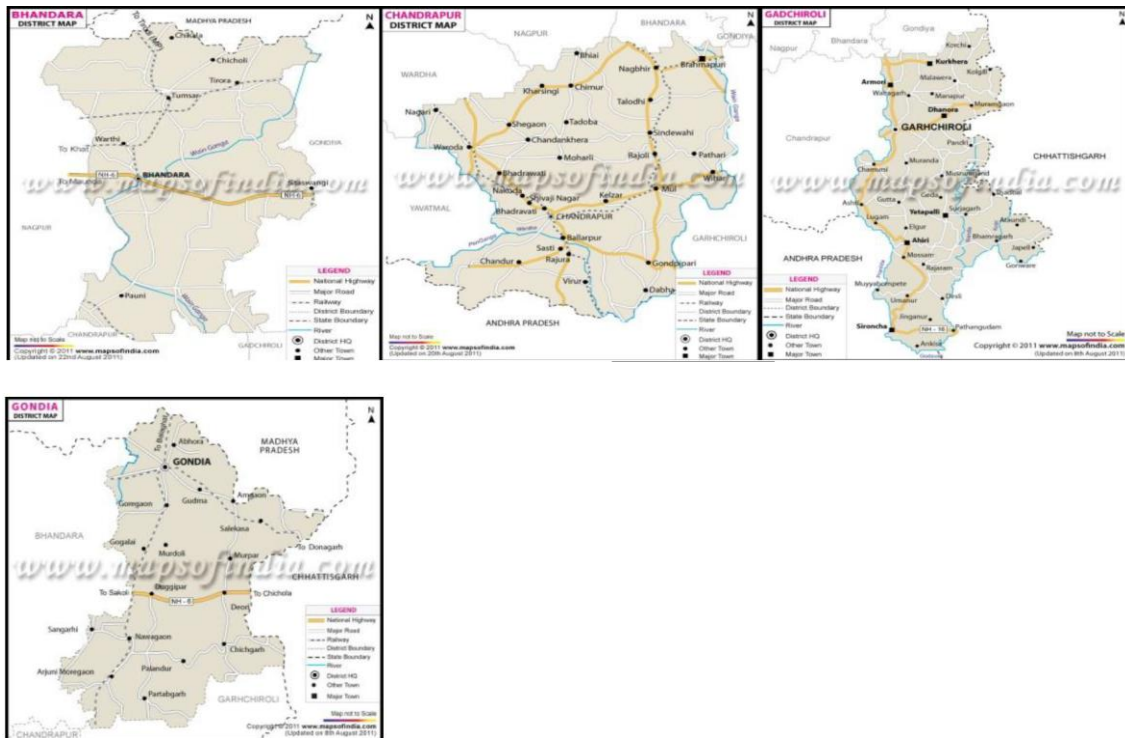


Map of Maharashtra



Map of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia





Aurangabad			Jalna		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
	Georai Tanda	Aurangabad	1	Pirkalyan	Jalna
	Ghardon	Aurangabad	2	Pachanwadgaon	Jalna
	Ghardon Tanda	Aurangabad	3	Pahegaon	Jalna
	Gharegaon Ektuni	Aurangabad	4	Palaskheda	Jalna
	Gharegaon Pimpri	Aurangabad	5	Panshendra	Jalna
	Girnera	Aurangabad	6	Paregaon	Jalna
	Girnera Tanda	Aurangabad	7	Pashta	Jalna
	Golatgaon	Aurangabad	8	Patra Tanda	Jalna
	Golwadi	Aurangabad	9	Patrud	Jalna
	Gopalpur	Aurangabad	10	Pimpalwadi	Jalna
	Hasanabadwadi	Aurangabad	11	Pimpri Dukri	Jalna
	Hatmali	Aurangabad	12	Mehgaon	Bhokardan
	Jambhai	Sillod	13	Merkheda	Bhokardan
	Janasi	Sillod	14	Mohalai	Bhokardan
	Janjala	Sillod	15	Muthad	Bhokardan
	Kaigaon	Sillod	16	Nalni Bk.	Bhokardan
	Kajipur	Sillod	17	Nalni Kh.	Bhokardan
	Kasod	Sillod	18	Nanja	Bhokardan
	Kelgaon	Sillod	19	Nasirabad	Bhokardan
	Kerhala	Sillod	20	Nimbola	Bhokardan
	Khandala	Sillod	21	Nimgaon	Bhokardan
	Khatkheda	Sillod	22	Padmavati	Bhokardan
	Khedi	Sillod	23	Musai	Ambad

Aurangabad			Jalna		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
	Khullod	Sillod	24	Nagonyachiwadi	Ambad
			25	Nagzari	Ambad

Parbhani			Hingoli		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Babhali	Parbhani	1	Borgaon Bk.	Basmath
2	Babhulgaon	Parbhani	2	Borgaon Kh.	Basmath
3	Balsa kh.	Parbhani	3	Borisawant	Basmath
4	Bharaswad	Parbhani	4	Brahmangaon Bk.	Basmath
5	Bhogaon	Parbhani	5	Brahmangaon Kh.	Basmath
6	Borwand bk.	Parbhani	6	Chandgavhan	Basmath
7	Borwand kh.	Parbhani	7	Chikhali	Basmath
8	Bramhangaon	Parbhani	8	Chincholi T. A.	Basmath
9	Bramhapuri taraf lohgaon	Parbhani	9	Chondhi taraf Sendursena	Basmath
10	Bramhapuri taraf pathri	Parbhani	10	Dabhadi	Basmath
11	Asegaon	Jintur	11	Dagadgaon	Basmath
12	Asola	Jintur	12	Dagadpimpri	Basmath
13	Badanapur	Jintur	13	Darephal	Basmath
14	Balasa	Jintur	14	Dhamangaon	Basmath
15	Bamani Bk	Jintur	15	Dhanora-tarf-Aral	Basmath
16	Belkheda	Jintur	16	Dhaulgaon	Basmath
17	Antarweli	Gangakhed	17	Bhogaon	Hingoli
18	Arbujwadi	Gangakhed	18	Bodkhi	Hingoli
19	Badwani	Gangakhed	19	Bondala	Hingoli
20	Banpimpla	Gangakhed	20	Borala	Hingoli
21	Belwadi	Gangakhed	21	Boralwadi	Hingoli
22	Bhambarwadi	Gangakhed	22	Bori Shikari	Hingoli
			23	Borja	Hingoli
			24	Bramhapuri	Hingoli
			25	Chikhalwadi	Hingoli
			26	Chinchala	Hingoli

Beed			Nanded		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Belura	Bid	1	Hassapur	Nanded
2	Belwadi	Bid	2	Injegaon	Nanded
3	Bhalwani	Bid	3	Jaitapur	Nanded
4	Bhandarwadi	Bid	4	Kakandi	Nanded
5	Bhatsangvi	Bid	5	Berli Kh.	Mukhed
6	Bhavanwadi	Bid	6	Betmogra	Mukhed
7	Bordevi	Bid	7	Bhagnurwadi	Mukhed
8	Borkhed	Bid	8	Bhaswadi	Mukhed

9	Borphadi	Bid	9	Bhatapur P.D.	Mukhed
10	Bramhagaon	Bid	10	Bhatapur P.Mu.	Mukhed
11	Chakurwadi	Bid	11	Bhavani Tanda	Mukhed
12	Chandani	Bid	12	Bhendegaon Bk.	Mukhed
13	Chandegaon	Bid	13	Bhendegaon Kh.	Mukhed
14	Charahata	Bid	14	Bhingoli	Mukhed
15	Chaudaswadi	Bid	15	Billali	Mukhed
16	Chausala	Bid	16	Bomnali	Mukhed
17	Chavanwadi	Bid	17	Borgaon	Mukhed
18	Chincholi Mali	Bid	18	Chandola	Mukhed
19	Dahiphal	Bid	19	Chandola Tanda	Mukhed
20	Bramhgaon	Georai	20	Chavhanwadi	Mukhed
21	Chaklamba	Georai			
22	Chavhanwadi	Georai			
23	Chikhali	Georai			
24	Chopdyachiwadi	Georai			
25	Chorpuri	Georai			
26	Daithan	Georai			
27	Damunaik Tanda	Georai			
28	Deoki	Georai			
29	Deopimpri	Georai			
30	Dhalegaon	Georai			
31	Dhanora	Georai			

Osmanabad			Latur		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Aliyabad	Tuljapur	1	Borsuri	Nilanga
2	Amrutwadi	Tuljapur	2	Borsuriwadi	Nilanga
3	Andur	Tuljapur	3	Botkul	Nilanga
4	Apsinga	Tuljapur	4	Bujrugwadi	Nilanga
5	Arali Bk.	Tuljapur	5	Chandori	Nilanga
6	Arali Kh.	Tuljapur	6	Chandoriwadi	Nilanga
7	Arbali	Tuljapur	7	Channachiwadi	Nilanga
8	Babhalgaon	Tuljapur	8	Chichondi	Nilanga
9	Barul	Tuljapur	9	Chilwantwadi	Nilanga
10	Baswantwadi	Tuljapur	10	Chincholi	Nilanga
11	Aurad	Umarga	11	Chincholi	Nilanga
12	Babalsur	Umarga	12	Gondegaon	Latur
13	Balsur	Umarga	13	Gumphawadi	Latur
14	Baradwadi	Umarga	14	Hanamantwadi	Latur
15	Belamb	Umarga	15	Harangul Bk	Latur
16	Bendga	Umarga	16	Harangul Kh.	Latur
			17	Hisori	Latur
			18	Jawala Bk.	Latur
			19	Jewali	Latur

Buldhana			Akola		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Chinchpur	Khamgaon	1	Deori	Akola
2	Chitoda	Khamgaon	2	Deulgaon	Akola
3	Dadham	Khamgaon	3	Deulgaon	Akola
4	Dastapur	Khamgaon	4	Dewarda	Akola
5	Deulkhed	Khamgaon	5	Dhaga	Akola
6	Dhapati	Khamgaon	6	Dhamangaon	Akola
7	Dhorapgaon	Khamgaon	7	Dhamna Bk	Akola
8	Divthana	Khamgaon	8	Dhangarwadi	Akola
9	Dondwada	Khamgaon	9	Dharel	Akola
10	Dudha	Khamgaon	10	Dinoda	Akola
11	Dyangangapur	Khamgaon	11	Diwthana	Akola
12	Fattepur	Khamgaon	12	Edlapur	Akola
13	Ganeshpur	Khamgaon	13	Fattepur	Akola
14	Garadgaon	Khamgaon	14	Gajipur	Akola
15	Gawandhala	Khamgaon	15	Garsoli	Akola
16	Geru	Khamgaon	16	Gaulkhed	Akola
17	Gerumatargaon	Khamgaon	17	Girjapur	Akola
18	Ghanegaon	Khamgaon	18	Gyajuddin Nagar	Akola
19	Gharod	Khamgaon	19	Hanwadi	Akola
20	Ghatpuri	Khamgaon	20	Hilalabad	Akola
21	Gondhanapur	Khamgaon	21	Jainpur Pimpri	Akola
22	Hingana Umara	Khamgaon	22	Jalgaon Nahate	Akola
23	Hingna Karegaon	Khamgaon	23	Januna Bk	Akola
24	Hiwarkhed	Khamgaon	24	Jaulka	Akola
25	Hiwra Bk.	Khamgaon	25	Jaulkhed Bk.	Akola
			26	Jaulkhed Kh.	Akola
			27	Jitapur Pr. Adgaon	Akola
			28	Jitapur Pr. Rupagad	Akola
			29	Hata	Balapur
			30	Hatrun	Balapur
			31	Hingana Nimba	Balapur
			32	Hingana Shelad	Balapur
			33	Janorimail	Balapur
			34	Jogalkhed	Balapur
			35	Kadoshi	Balapur

Washim			Amravati		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Bramha	Washim	1	Asatpur	Achalpur
2	Bramhanwada N. Asola	Washim	2	Aurangpur	Achalpur
3	Chikhali Bk.	Washim	3	Bag Ambada	Achalpur

4	Chikhali Kh.	Washim	4	Balegaon	Achalpur
5	Degaon	Washim	5	Belkheda	Achalpur
6	Deothana Bk.	Washim	6	Ambpend	Warud
7	Depul	Washim	7	Amdapur	Warud
8	Dhanora Bk.	Washim	8	Amner	Warud
9	Dhanora Kh.	Washim	9	Antarkhop	Warud
10	Dharkata	Washim	10	Bahada	Warud
11	Dhilli	Washim	11	Bargaon	Warud
12	Dhumka	Washim	12	Belora	Warud
13	Dodki	Washim	13	Benoda	Warud
14	Dudkhed	Washim	14	Beskheda	Warud
15	Ekamba	Washim	15	Asegaon	Chandurbazar
16	Falegaon Thet	Washim	16	Barhanpur	Chandurbazar
17	Ganeshpur	Washim	17	Belaj	Chandurbazar
18	Ghota	Washim	18	Belkheda	Chandurbazar
19	Giwha	Washim	19	Belmandali	Chandurbazar
20	Gondegaon	Washim	20	Belora	Chandurbazar
21	Hisse Borhala	Washim			
22	Bambarda	Karanja			
23	Belkhed	Karanja			
24	Belmandal	Karanja			
25	Bembla	Karanja			

Yavatmal			Wardha		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Asara	Arni	1	Barbadi	Wardha
2	Ayata	Arni	2	Belgaon	Wardha
3	Barbhai	Arni	3	Bhankheda	Wardha
4	Belora	Arni	4	Bhiwapur	Wardha
5	Bhandari	Arni	5	Bambarda	Hinganghat
6	Bhandari	Arni	6	Bhagawa	Hinganghat
7	Bhansara	Arni	7	Bhayyapur	Hinganghat
8	Bid	Arni	8	Bhiwapur	Hinganghat
9	Borgaon	Arni	9	Bondurni	Hinganghat
10	Borgaon	Arni	10	Bopapur	Hinganghat
11	Bramhanwada	Arni	11	Borgaon	Hinganghat
12	Chandani	Arni	12	Apti	Deoli
13	Chatari	Arni	13	Babhulgaon	Deoli
14	Chikani Kh.	Arni	14	Babhulgaon	Deoli
15	Chikhali	Arni	15	Bahaddarpur	Deoli
16	Chimata	Arni	16	Barhanpur	Deoli
17	Chinchbardi	Arni	17	Bhidi	Deoli
18	Dabhadi	Arni	18	Bhojankheda	Deoli
19	Daheli	Arni	19	Bopapur	Deoli
20	Datodi	Arni	20	Bopapur	Deoli

Yavatmal			Wardha		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
21	Dattrampur	Arni	21	Borgaon	Deoli
22	Deogaon	Arni			
23	Deurwadi	Arni			
24	Deurwadi	Arni			
25	Donwada	Arni			
26	Gangaon	Arni			
27	Gawana	Arni			
28	Ghonsara	Arni			
29	Gudha	Arni			
30	Ichora	Arni			
31	Iwaleshwar	Arni			
32	Jalandri	Arni			
33	Jamb	Arni			
34	Jawala	Arni			

Nagpur			Bhandara		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Chauki	Hingna	1	Agri	Tumsar
2	Chicholi	Hingna	2	Alesur	Tumsar
3	Dabha	Hingna	3	Ambagad	Tumsar
4	Datala	Hingna	4	Asalpani	Tumsar
5	Degma bk	Hingna	5	Ashti	Tumsar
6	Degma kh	Hingna	6	Bajartola	Tumsar
7	Devali	Hingna	7	Balapur Hamesha	Tumsar
8	Devali	Hingna	8	Bapera	Tumsar
9	Devali	Hingna	9	Bapera	Tumsar
10	Devali	Hingna	10	Bhondki	Tumsar
11	Ambadi	Kamptee	11	Binakhi	Tumsar
12	Asalwada	Kamptee	12	Borgaon	Tumsar
13	Asoli.	Kamptee	13	Bori	Tumsar
14	Avandhi	Kamptee	14	Brahmantola	Tumsar
15	Babulkheda	Kamptee	15	Bramhani	Tumsar
16	Bhamewada	Kamptee	16	Chandmara	Tumsar
17	Bhilgaon	Kamptee	17	Chandpur	Tumsar
18	Bhowari	Kamptee	18	Chargaon	Tumsar
19	Bhugaon	Kamptee	19	Chicholi	Tumsar
20	Bidbina	Kamptee	20	Chikhali	Tumsar
21	Bidgaon.	Kamptee	21	Chulhad	Tumsar
22	Bina	Kamptee	22	Chulhardoh	Tumsar
23	Borujwada	Savner	23	Davezari	Tumsar
24	Bramhpuri	Savner	24	Dawezari	Tumsar
25	Champa	Savner	25	Deonara	Tumsar
26	Chargaon	Savner	26	Deorideo	Tumsar

Nagpur			Bhandara		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
27	Chhatrapur	Savner	27	Deosarra	Tumsar
			28	Dewhadi	Tumsar
			29	Dhamlewada	Tumsar
			30	Dhanegaon	Tumsar

Chandrapur			Gadchiroli		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Bamhangaon	Chimur	1	Porla	Gadchiroli
2	Bamhani	Chimur	2	Potegaon	Gadchiroli
3	Bandar	Chimur	3	Pulkhal	Gadchiroli
4	Baradghata	Chimur	4	Raipur	Gadchiroli
5	Bhisi	Chimur	5	Rajagata Chak	Gadchiroli
6	Adegaon	Chimur	6	Rajagata Mal	Gadchiroli
7	Adegaon	Chimur	7	Rajoli	Gadchiroli
8	Ajgaon	Chimur	8	Rakhi	Gadchiroli
9	Amarpuri	Chimur	9	Ranbhumi	Gadchiroli
10	Ambeneri	Chimur	10	Rankheda	Gadchiroli
11	Amboli	Chimur	11	Ranmul	Gadchiroli
12	Amdi Begde	Chimur	12	Sakhara	Gadchiroli
13	Chak Jatepur	Chimur	13	Salaitola	Gadchiroli
14	Chichala Paiku	Chimur	14	Sawargaon	Gadchiroli
15	Chichala Shastri	Chimur	15	Sawela	Gadchiroli
16	Chichghat	Chimur	16	Shivni	Gadchiroli
17	Chicholi	Chimur	17	Maregaon	Gadchiroli
18	Chikhalapar	Chimur	18	Markbodi	Gadchiroli
19	Charurkhati	Warora	19	Maroda	Gadchiroli
20	Chichala	Warora	20	Maushi Chak	Gadchiroli
21	Chikani	Warora	21	Maushi Khamb	Gadchiroli
22	Chinora	Warora	22	Mendha	Gadchiroli
23	Dadapur	Warora	23	Mhasali	Gadchiroli
			24	Mohazari Patch	Gadchiroli
			25	Mudaza Bk	Gadchiroli

Gondia		
Sr.	Name of the Village	Taluka
1	Alezari	Tirora
2	Arjuni	Tirora
3	Atari	Tirora
4	Bagholi	Tirora
5	Baiwada	Tirora
6	Balapur	Tirora
7	Barbaspura	Tirora

Gondia		
Sr.	Name of the Village	Taluka
8	Belati bk	Tirora
9	Berdipar	Tirora
10	Berdipar	Tirora
11	Bhajepar	Tirora
12	Bhambodi	Tirora
13	Bhiwapur	Tirora
14	Bhuratola	Tirora
15	Bhiriya	Tirora
16	Biroli	Tirora
17	Birsi	Tirora
18	Boda	Tirora
19	Gond mohadi	Tirora
20	Govindtola	Tirora
21	Gumadhawada	Tirora
22	Indora br.	Tirora
23	Indora kh	Tirora
24	Isapur	Tirora
25	Jamuniya	Tirora
26	Deori	Gondiya
27	Deutola	Gondiya
28	Dhakni	Gondiya
29	Dhamangaon	Gondiya
30	Dhamnewada	Gondiya
31	Dhapewada	Gondiya
32	Dongargaon	Gondiya

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 8808 through the web link:

<https://cdm.unfccc.int/Projects/DB/RWTUV1355662626.3/view>

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 8808. 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	Siam 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 KumbharPura, 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 (thirteen Phase) are distributed in Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati,

Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts of Maharashtra which lies in the Aurangabad, Amravati and Nagpur division jurisdiction. The stakeholders consultation conducted on 2nd and 3rd February 2012 at Nagpur, Latur and Washim district in Aurangabad, Amravati and Nagpur covered this project location and the consultation was also conducted before webhosting of the PDD. The meetings were attended by members from various backgrounds as listed below –

Participant of Nagpur meeting –

Sl. No.	Name of Person	Designation
1	Gopal R Kabra	CEO, GKEMPL
2	Raju Babasaheb Kadam	Farmer
3	Sopan Sham Kale	Student
4	Jitesh Gawale	Working professional
5	Kartik Kumar	Student
6	Imran Munjaver	Businessman
7	Makrand Mane	Working professional
8	Rahul Awtade	Businessman
9	Raju Namdev Pagar	Working professional
10	Sanjay Shinde	Businessman

Participant of Latur meeting –

Sl. No.	Name of Person	Designation
1	Vikram Kale	Sr. Operator
2	Namdev Kale	Student
3	Ramesh Padval	Farmer
4	Apparao Gonje	Working professional
5	Dinesh Kamble	Farmer
6	Goremama	Working professional
7	Pritesh Choudhury	Working professional
8	Vayjanath Navgire	Working professional
9	Papu Jagdale	Working professional
10	Somnath Lohar	Working professional
11	Shivaji Karad	Working professional
12	Somanath Chandane	Farmer
13	Kondeba Manere	Working professional
14	Rajkumar Shinde Working	Working professional
15	Vishal Pandit	Farmer

Participant of Washim meeting –

Sl. No.	Name of Person	Designation
1	Chandrakant Jaising Bhadre	Farmer
2	Jaganath Kadam	Working professional
3	Anand Bhanudass Pawar	Working professional

4	Appa Navgire	Working professional
5	Gautam Suryavanshi	Working professional
6	Rangarao Suryavanshi	Farmer
7	Dhanjay Suryavanshi	Farmer
8	Bhaskar Bhadre	Farmer
9	Satish Jagtap	Student
10	Ganesh Bhosale	Working professional
11	Sachin Jagdale	Working professional
12	Ashok Ghorpade	Working professional
13	Dhanjay Sanjekar	Working professional
14	Padmakar Meshram	Farmer
15	Vijay Navalkar	Farmer
16	Amol Barkue	Farmer
17	Prakash Subash Jhande	Working professional
18	Shaji Rathod	Working professional
19	Madhular Rathod	Local representative
20	Milind Bondge	Local representative
21	Mustaffa Mukadam Shekh	Local representative
22	Prithviraj Suryavanshi	Marketing Executive, Vikram Stoves

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 stakeholders meeting of Nagpur, Latur and Washim are summarised as below –

Queries	Reply
· The benefits that, users of Improved Cook stove will receive from the project activity? · Whether the users have to file an application to any office to consider their system under the project activity?	Mr. Kabra of GKEMPL explained that, use of improved cook stoves for household cooking will reduce indoor air pollution, cooking time and also fuel-wood consumption due to higher efficiency. Moreover, the users of improved cook stoves will get free maintenance service and free of cost replacement of the system at the end of its lifetime with new improved cook stove. In reply to the next query, he clarified that, users need not to apply to anywhere to be considered under the project. The representative of GKEMPL will contact to every users for necessary due diligence

Time required for the CDM project development.	Responding to the query Mr. Kabra replied that, time line for CDM project development and registration is around one year but, the revenue inflow will take at least another one year.
Quantum of CER to be generated from each Improved Cook stove system?	Addressing to the query Mr. Kabra, GKEMPL replied that, approximately about 1.10 CER will be generated in every year by use of each Improved Cook stove

Queries	Reply
Tasks to be undertaken by the users of Improved Cook stove for successful receipt of CDM revenue and benefit to be received by them in return.	Addressing to the query Mr. Kale representative of Vikram stoves described the monitoring plan, the parameters to be monitored and steps to undertake by the user. Further, he continue with clarification that, Improved cook stove users will get free maintenance service and free of cost replacement of the Improved Cook stove system will be given at the end of lifetime during the crediting period.
How long can the user obtain the CDM benefit	Responding to the query Mr. Vikram Kale representative of Vikram stoves mentioned that, improved cook stove systems considered under the project will receive free of cost maintenance service for 10 years from date of registration.

Queries	Reply
Whether there is any possibility of negative impact to the health of the user or to the local environment?	The representative from Vikram Stoves explained that, there will be no detrimental effect on user's health due to the project activity as it is contributing in pollution reduction. Rather, the project is reducing fire-wood consumption through improved combustion technology and thereby reducing deforestation and green-house gases emission. Apart from this, the project is reducing indoor air pollution by means of smoke reduction.
The benefits that users of Improved Cook stove will receive from the project activity?	Mr. Suryavanshi representative from Vikram Stoves replied that, use of improved cook stoves for household cooking will reduce the indoor air pollution, cooking time and also fuel-wood consumption due to higher efficiency. Moreover, the users of improved cook stoves will get free maintenance service and free of cost replacement of the system at the end of its lifetime.
Clarification whether the plants to be installed in future will get this benefit?	Addressing to the query Mr. Suryavanshi, representative from Vikram Stoves replied that, all the improved cook stoves distributed after a particular date will be considered for carbon credit benefit under these projects. But, the no. of systems to be considered under the projects depends upon the threshold limit as given by the UNFCCC. Therefore, may be all stoves cannot be considered.
How long the user will get this benefit?	Responding to the query Mr. Suryavanshi representative from Vikram Stoves replied that, ICS systems considered under the project will receive free of cost maintenance service for 10 years post registration.

Local stakeholder consultation has been conducted at the time of project registration. For on-going stakeholder's communication, PP have made the provision of the grievance register. The local stakeholders/beneficiaries can anytime lodge their grievances if any in the register over the operational life time of the project.

No grievance received during the current monitoring period.

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))

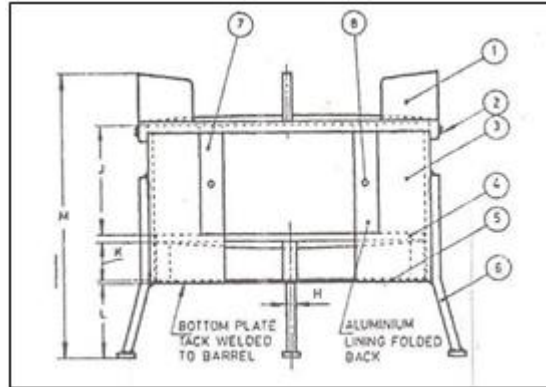
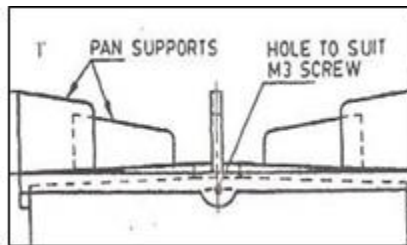
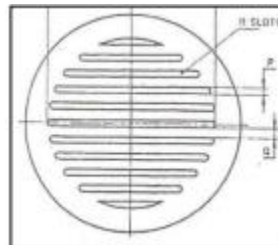


Diagram of Improved Cook Stove

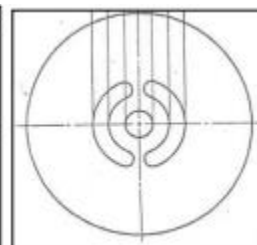
1. Top plate,
2. Screw,
3. Barrel,
4. Grate,
5. Bottom Plate,
6. Legs,
7. Aluminium Lining and
8. Rivet



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	<p>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.</p> <p>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.</p> <p>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.</p>
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	Thermal efficiency test carried out as per water Boiling Test Protocol specified as per IS13152 protocol.

measurement methods and procedures applied	
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	$Energy\ Saving = B_{y,saving} * NCV_{biomass}$ $= B_{old} * (1 - \eta_{old} / \eta_{new}) * NCV_{biomass}$ $= 1.469 * (1 - 0.1 / 0.2988) * 0.0150$ $= 0.01466$ 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
	03-October-2012 -02- October - 2013	24-11-2013 26-11-2013 05-12-2013 01-12-2013 08-01-2014 10-01-2014 12-01-2014 12-01-2014 14-01-2014 14-01-2014 10-01-2014 08-01-2014 06-12-2013 04-12-2013 02-12-2013 30-11-2013 28-11-2013 26-11-2013 24-11-2013	40	28.80%
	03-October-2013 -02- October - 2014	08-01-2015 26-11-2014 05-12-2014 01-12-2014 24-11-2014 10-01-2015 12-01-2015 12-01-2015 14-01-2015 14-01-2015 10-01-2015 08-01-2015 24-11-2014 26-11-2014 28-11-2014 30-11-2014 02-12-2014 04-12-2014 06-12-2014	40	28.11%
	03-October-2014 -02- October - 2015	12-01-2016 01-12-2015 08-01-2016 12-01-2016 10-01-2016 05-12-2015 24-11-2015 26-11-2015 10-01-2016 14-01-2016 08-01-2016 14-01-2016 06-12-2015 02-12-2015 30-11-2015 04-12-2015 28-11-2015 26-11-2015 24-11-201	40	27.52%
	03-October-2015 -02- October - 2016	05-12-2016 08-01-2017 24-11-2016 26-11-2016 01-12-2017 12-01-2017 10-01-2017 12-01-2017 06-12-2016	40	27.15%

	08-01-2017 04-12-2016 02-12-2016 14-01-2017 14-01-2017 10-01-2017 26-11-2016 24-11-2016 30-11-2016 28-11-2016																
	03-October-2016 -02- October - 2017	24-11-2017 10-01-2018 12-01-2018 02-12-2017 30-11-2017 28-11-2017 26-11-2017 24-11-2017 06-12-2017 04-12-2017 12-01-2018 26-11-2017 05-12-2017 01-12-2017 08-01-2018 14-01-2018 14-01-2018 10-01-2018 08-01-2018	40	26.93%													
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	<p> Heat utilized = $(n-1) \times (W \times 0.214 + w) \times (t_2 - t_1) + (W \times 0.214 + w) \times (t_3 - t_1)$ kcal Heat Produced = $[(X \times c_1) + (x \times d / 1000 \times c_2)]$ kcal Thermal Efficiency = Heat utilised / Heat Produced $\times 100$ </p> <p>Where</p> <table border="1"> <tbody> <tr> <td>w</td> <td>Mass of water in vessel, in kg</td> </tr> <tr> <td>W</td> <td>Mass of the vessel complete with lead and stirrer, in kg</td> </tr> <tr> <td>X</td> <td>Mass of the fuel consumed, in kg</td> </tr> <tr> <td>c₁</td> <td>Calorific value of wood in kcal/kg</td> </tr> <tr> <td>x</td> <td>Volume of the kerosene consumed, in ml</td> </tr> <tr> <td>c₂</td> <td>Calorific value of kerosene in kcal/kg</td> </tr> <tr> <td>d</td> <td>Density of kerosene, in g/ml</td> </tr> </tbody> </table>			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
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d	Density of kerosene, in g/ml																

	t ₁	Initial temperature of the water, in °C
	t ₂	Final temperature of the water, in °C
	t ₃	Final temperature of the water in the last vessel at the completion of the test, in °C
	n	Total number of vessels used
	0.214	Specific heat of aluminium in kcal/kg ⁰ C
Comments	<p>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 forty 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).</p> <p>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.</p> <p>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.</p>	

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
	03-October-2012 -02-October -2013	0	24-11-2013 26-11-2013 05-12-2013 01-12-2013 08-01-2014 10-01-2014 12-01-2014 12-01-2014 14-01-2014 14-01-2014 10-01-2014 08-01-2014 06-12-2013 04-12-2013 02-12-2013 30-11-2013 28-11-2013 26-11-2013 24-11-2013	160	3.13%	96.88%
	03-October-2013 -02-October -2014	0	08-01-2015 26-11-2014 05-12-2014 01-12-2014 24-11-2014 10-01-2015 12-01-2015 12-01-2015 14-01-2015 14-01-2015 10-01-2015 08-01-2015 24-11-2014 26-11-2014 28-11-2014 30-11-2014 02-12-2014 04-12-2014 06-12-2014	160	5.00%	95.00%
	03-October-2014 -02-October -2015	0	12-01-2016 01-12-2015 08-01-2016 12-01-2016 10-01-2016 05-12-2015 24-11-2015 26-11-2015	160	6.25%	93.75%

			10-01-2016 14-01-2016 08-01-2016 14-01-2016 06-12-2015 02-12-2015 30-11-2015 04-12-2015 28-11-2015 26-11-2015 24-11-2016			
	03-October-2015 -02-October -2016	0	05-12-2016 08-01-2017 24-11-2016 26-11-2016 01-12-2017 12-01-2017 10-01-2017 12-01-2017 06-12-2016 08-01-2017 04-12-2016 02-12-2016 14-01-2017 14-01-2017 10-01-2017 26-11-2016 24-11-2016 30-11-2016 28-11-2016	160	8.75%	91.25%
	03-October-2016 -02-October -2017	0	24-11-2017 10-01-2018 12-01-2018 02-12-2017 30-11-2017 28-11-2017 26-11-2017 24-11-2017 06-12-2017 04-12-2017 12-01-2018 26-11-2017 05-12-2017 01-12-2017 08-01-2018 14-01-2018 14-01-2018 10-01-2018 08-01-2018	160	9.38%	90.63%
	Number of Improved Cook stoves distributed – 14,182					
Monitoring equipment	-					
QA/QC procedures to be applied	<p>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.</p> <p>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).</p>					
Purpose of the data	For estimation of baseline emission					

Calculation method	Share of beneficiaries using Improved cookstoves = $\frac{160 - \text{no of partial users}}{160}$
Comments	<p>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.</p> <p>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.</p>

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	<p>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.</p> <p>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.</p> <p>Number of days of operation = $365 - \text{Average number of days the cook stove was non-functional}$</p> <p>The number of non-functional days is based on the number of days the cook stoves were under repair/replacement</p>		
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		
	03-October-2012 -02- October - 2013	14,182	0
	03-October-2013 -02- October - 2014	14,182	0

	03-October-2014 -02- October - 2015	14,182	0	365
	03-October-2015 -02- October - 2016	14,182	0	365
	03-October-2016 -02- October - 2017	14,182	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	<p>0</p> <p>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.</p> <p>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.</p>
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 - $= (365 - \text{Average number of days of traditional cook stove usage in all households}) / 365$

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	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

and procedures to be applied	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 distributed and under operation	Number of cookstoves replaced post end of life time	Number of cookstoves replaced due to defunct
	03-October-2012 -02- October - 2013	14,182	0	0
	03-October-2013 -02- October - 2014	14,182	0	0
	03-October-2014 -02- October - 2015	14,182	0	0
	03-October-2015 -02- October - 2016	14,182	0	0
	03-October-2016 -02- October - 2017	14,182	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.			

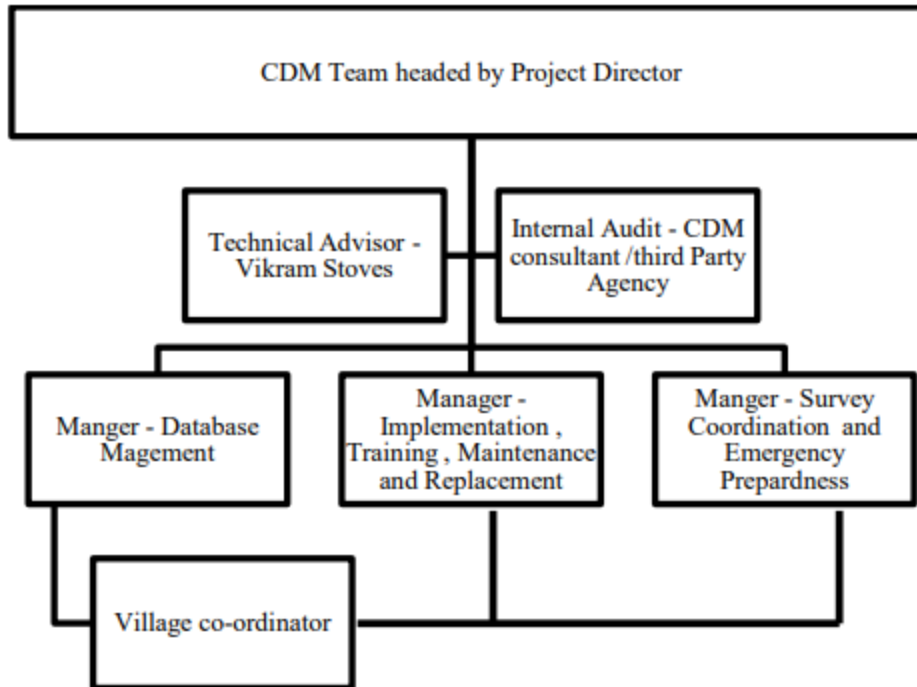
Data / Parameter	B_{y, savings}
Data unit	Tonnes/year/household
Description	Quantity of woody biomass that is saved through the project activity.
Source of data	calculated
Description of measurement methods and procedures to be applied	The quantity of woody biomass saved is calculated following the equation $B_{y, saving} = B_{old} * (1 - \eta_{old}/\eta_{new})$ 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	Period	Operational Efficiency considered	Estimated By savings/ ICS
	03-October-2012 -02-October -2013	28.84%	0.9590
	03-October-2013 -02-October -2014	28.14%	0.9464
	03-October-2014 -02-October -2015	27.59%	0.9353
	03-October-2015 -02-October -2016	27.20%	0.9278
	03-October-2016 -02-October -2017	26.94%	0.9235
	Monitoring equipment	-	
QA/QC procedures to be applied	The minimum tested efficiency of the representative samples or 29.88% is used for η_{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 (η_{new}). 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 stoves¹⁴. 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:

$$= (365 - \text{Average No. of days of traditional cook stoves usage in all households}) / 365$$

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 14,182.

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 –

$$n \geq 1.6452N * p * (1-p) / ((N-1) * 0.12 * p^2 + 1.6452 * p*(1-p))$$

Where,

N	=	Sample size
N	=	14,182
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, $n \geq 31$

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 $\pm 10\%$ 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:

Step 1: Estimation of the value of proportion (p)

$P = \text{number of success} / \text{number of cook stoves that were observed in the sample}$

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/14,182, i.e., 160/14,182. p = proportion, 90%

q = (1-p)

n = number of cook stoves that are observed in the sample

Step 3: Estimating of Precision

Proportion = $\pm z \text{ value} * \text{standard error of proportion}$

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

- Number of beneficiaries/households using traditional cook stoves is not within the specified limit of $\pm 10\%$ 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 $\pm 10\%$.

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 -

- The internal review is carried out in every six month for compliance check in accordance to the manual.
- 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.
- 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.

- The coordinator is provided with stand-by stove components for repair and/or replacement.
- Few numbers of cook stoves are stocked with the Panchayat Samity/ Block Development Office to reduce the down time of replacement.
- 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
$EF_{projected fossil fuel}$	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 13,420 tCO_{2e} /year.

The Baseline Emissions achieved for this monitoring period is 64,041 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 – Year 1			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-10675	Lilabai Mahadev Khedkar	Gadchiroli	28.802%
GKEMPLPH-13-6254	Baburao Ayaji Umbarkar	Wardha	28.824%
GKEMPLPH-13-8967	Rohan Gopal Aygole	Chandrapur	28.837%

Third party assessment for monitoring period – Year 1			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-13513	Ramraj Karbhari Gholve	Gondia	28.843%
GKEMPLPH-13-7166	Baban Kashiram Rakhonde	Bhandara	28.846%
GKEMPLPH-13-5870	Bhagirathi Jaykumar Jain	Yavatmal	28.855%
GKEMPLPH-13-249	Shakil Chandbsha Hawaldar	Aurangabad	28.865%
GKEMPLPH-13-1119	Vaishali Balaji Theng	Jalna	28.878%
GKEMPLPH-13-4048	Tukaram Pandurang Mirgal	Akola	28.883%
GKEMPLPH-13-11810	Pandurang Baburav Darandale	Gadchiroli	28.919%
GKEMPLPH-13-9109	Shaikh Kachru	Chandrapur	28.929%
GKEMPLPH-13-5052	Kailas Dattatray Pagore	Amravati	28.942%
GKEMPLPH-13-13675	Vishnu Nivrutti Londhe	Gondia	28.946%
GKEMPLPH-13-11999	Indumati Dnyaneshwar Nagre	Gadchiroli	28.949%
GKEMPLPH-13-1733	Saravati Sonyabapu Borude	Hingoli	28.964%
GKEMPLPH-13-13668	Laxman Balabhau Jadhav	Gondia	28.974%
GKEMPLPH-13-3672	Kadu Bhaurao Kale	Buldhana	28.975%
GKEMPLPH-13-7707	Pramila Sarangadhar Dhore	Bhandara	29.007%
GKEMPLPH-13-458	Parameshwar Babasaheb Sarak	Aurangabad	29.010%
GKEMPLPH-13-2777	Manohar Himmat Lande	Nanded	29.044%
GKEMPLPH-13-9237	Safurabe Mohd Ajaz	Chandrapur	29.046%
GKEMPLPH-13-4485	Gangaram Kisan Rasal	Washim	29.118%
GKEMPLPH-13-6720	Devidas Shrikrushna Ghumse	Nagpur	29.138%
GKEMPLPH-13-7074	Dinkar Madhukarrao Bajad	Bhandara	29.257%
GKEMPLPH-13-5900	Devendra Subhas Cheke	Yavatmal	29.299%
GKEMPLPH-13-12669	Vishal Ramesh Rao Misal	Gondia	29.316%
GKEMPLPH-13-5694	Ravsahab Tukaram Patakal	Yavatmal	29.368%
GKEMPLPH-13-8625	Amol Ambadas Pakhare	Chandrapur	29.446%
GKEMPLPH-13-530	Jagannath Narayn Chindhe	Aurangabad	29.454%
GKEMPLPH-13-13667	Madhukar Laxaman Gandhale	Gondia	29.593%
GKEMPLPH-13-6163	Arvind Sahebrao Vairale	Yavatmal	29.661%
GKEMPLPH-13-2512	Mahadev Daulat Dakhore	Beed	29.682%
GKEMPLPH-13-8170	Pundalik Ramchandra Ghogare	Bhandara	29.696%
GKEMPLPH-13-11214	Tryambak Yashvant Devkar	Gadchiroli	29.711%
GKEMPLPH-13-1409	Pandurang Laxman Rasal	Parbhani	29.746%
GKEMPLPH-13-8613	Bhagwan Pandurang Shewale	Chandrapur	29.771%
GKEMPLPH-13-11438	Darvesh Rajabapu Shende	Gadchiroli	29.777%
GKEMPLPH-13-3359	Kusum Sudam Sonune	Latur	29.780%
GKEMPLPH-13-3298	Sonaji Gopala Ingle	Osmanabad	29.808%
GKEMPLPH-13-623	Abasaheb Ashok Shete	Aurangabad	29.862%

Third party assessment for monitoring period – Year 2			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-12567	Vishnu Gorakshnath Kakade	Gondia	28.111%
GKEMPLPH-13-12029	Radha Mukund Marathe	Gadchiroli	28.124%
GKEMPLPH-13-9167	Godavari Bhanudas Gayke	Chandrapur	28.128%
GKEMPLPH-13-13326	Avinash Panditrao Bhendekar	Gondia	28.142%
GKEMPLPH-13-13125	Shahaji Baburao Survase	Gondia	28.151%
GKEMPLPH-13-806	Mohammad Rafiyoddin Kazi	Aurangabad	28.187%

Third party assessment for monitoring period – Year 2			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-3999	Shivanand Sheshrao Wayal	Akola	28.201%
GKEMPLPH-13-4379	Narayan Yadav Bhapkar	Washim	28.280%
GKEMPLPH-13-7470	Digambar Dhondiba Ugale	Bhandara	28.283%
GKEMPLPH-13-5271	Kashiram Harishchandra Baghele	Yavatmal	28.295%
GKEMPLPH-13-2339	Pandurang Mahadev Kamble	Beed	28.307%
GKEMPLPH-13-110	Anil Rama Ingale	Aurangabad	28.321%
GKEMPLPH-13-1301	Vijay Narayan Ratnaparkhi	Parbhani	28.340%
GKEMPLPH-13-10310	Sachin Purushottam Gawande	Gadchiroli	28.389%
GKEMPLPH-13-3229	Kalavati Yashvat Gille	Osmanabad	28.419%
GKEMPLPH-13-10050	Rajesh Chandrakant Patwardhan	Chandrapur	28.443%
GKEMPLPH-13-6088	Kisan Pandharinath Veer	Yavatmal	28.455%
GKEMPLPH-13-2022	Ramesh Namdev Surwade	Hingoli	28.475%
GKEMPLPH-13-6211	Dagadabai Kashinath Gagare	Wardha	28.535%
GKEMPLPH-13-7459	Rajendra Bhagaji Sonawane	Bhandara	28.547%
GKEMPLPH-13-10863	Panjabrao Hiranman Ambhore	Gadchiroli	28.666%
GKEMPLPH-13-7520	Kisan Chindhu Mudalkar	Bhandara	28.716%
GKEMPLPH-13-12629	Ganesh Kisan Gavhane	Gondia	28.717%
GKEMPLPH-13-5959	Vishnu Sitaram Datir	Yavatmal	28.722%
GKEMPLPH-13-887	Vitthal Ashok Kathwate	Aurangabad	28.730%
GKEMPLPH-13-8816	Rameshchand Mulchand Parikh	Chandrapur	28.733%
GKEMPLPH-13-3477	Kalyanappa Shivyogappa Hatture	Latur	28.738%
GKEMPLPH-13-13704	Ankush Shriram Gonde	Gondia	28.800%
GKEMPLPH-13-11371	Prakash Maroti Bharad	Gadchiroli	28.812%
GKEMPLPH-13-4554	Chandrakaant Kacharu Pakhare	Amravati	28.907%
GKEMPLPH-13-1211	Sukhdav Tukaram Solanke	Jalna	28.909%
GKEMPLPH-13-6862	Umesh Ramdas Kayande	Nagpur	28.924%
GKEMPLPH-13-2777	Manohar Himmat Lande	Nanded	28.938%
GKEMPLPH-13-3717	Bharat Ambadas Gunjal	Buldhana	28.970%
GKEMPLPH-13-357	Balasaheb Bhikaji Ghule	Aurangabad	28.989%
GKEMPLPH-13-10282	Pralhad Paraji Dighole	Gadchiroli	28.991%
GKEMPLPH-13-9405	Dashrath Uttam Nage	Chandrapur	29.003%
GKEMPLPH-13-6133	Vikram Rambhau Guthe	Yavatmal	29.005%
GKEMPLPH-13-8322	Uday Nitin Tambi	Chandrapur	29.007%
GKEMPLPH-13-7787	Vitthal Pralhad Bhanapure	Bhandara	29.067%

Third party assessment for monitoring period – Year 3			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-9227	Shriram Natthuji Wankhede	Chandrapur	27.523%
GKEMPLPH-13-13540	Babasaheb Nilkant Patait	Gondia	27.542%
GKEMPLPH-13-1523	Mangal Arunkumar Sharma	Parbhani	27.581%
GKEMPLPH-13-2362	Akshata Sawant	Beed	27.589%
GKEMPLPH-13-7612	Dattu Baburao Munde	Bhandara	27.597%
GKEMPLPH-13-7466	Vinod Chandrabhan Pund	Bhandara	27.604%
GKEMPLPH-13-1716	Mathurabai Sudhakar Avhad	Hingoli	27.621%
GKEMPLPH-13-2941	Mangesh Bhanudas Machewar	Nanded	27.703%
GKEMPLPH-13-5851	Hari Pandurang Ghule	Yavatmal	27.717%

Third party assessment for monitoring period – Year 3			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-12882	Sitaram Santtram Kabade	Gondia	27.751%
GKEMPLPH-13-4053	Pratibha Chatusring Patil	Akola	27.777%
GKEMPLPH-13-6491	Appash Chandrakant Kanabase	Wardha	27.783%
GKEMPLPH-13-7294	Aniruddha Shivnarayan Gavhane	Bhandara	27.795%
GKEMPLPH-13-1165	Alkabai Jagannath Raut	Jalna	27.829%
GKEMPLPH-13-9796	Punam Paresh Changediya	Chandrapur	27.834%
GKEMPLPH-13-7546	Sai Maheboob Sai Rasul	Bhandara	27.848%
GKEMPLPH-13-10847	Kirti Pratik Jadhav	Gadchiroli	27.848%
GKEMPLPH-13-11168	Suresh Shrikrushna Gore	Gadchiroli	27.867%
GKEMPLPH-13-135	Alakabai Kashinath Tarkase	Aurangabad	27.869%
GKEMPLPH-13-213	Vinayak Ramchandra Kelasakar	Aurangabad	27.899%
GKEMPLPH-13-8662	Anusaya Rajratan Satpute	Chandrapur	27.901%
GKEMPLPH-13-12371	Sharad Panditrao Sarnaik	Gondia	28.036%
GKEMPLPH-13-4373	Ujwala Tryambak Bodkhe	Washim	28.046%
GKEMPLPH-13-684	Mandabai Kisan Bhand	Aurangabad	28.117%
GKEMPLPH-13-11105	Prashant Vilasrao Shelke	Gadchiroli	28.164%
GKEMPLPH-13-13977	Baban Sitaram Bakal	Gondia	28.168%
GKEMPLPH-13-14182	Murlidhar Dadarao Ghodke	Gondia	28.173%
GKEMPLPH-13-5407	Shankar Pundlik Kale	Yavatmal	28.211%
GKEMPLPH-13-11083	Mirzabeg Aminbeg Shaikh	Gadchiroli	28.234%
GKEMPLPH-13-3687	Somnath Maruti Adhat	Buldhana	28.248%
GKEMPLPH-13-3442	Ramdas Ganpat Wagh	Latur	28.259%
GKEMPLPH-13-6591	Muhammad Nasir	Nagpur	28.280%
GKEMPLPH-13-8300	Machhindra Eknath Junjar	Chandrapur	28.286%
GKEMPLPH-13-747	Sopan Vishwanath Lohakare	Aurangabad	28.325%
GKEMPLPH-13-5033	Gafur Sardar Shaikh	Amravati	28.365%
GKEMPLPH-13-10035	Sindhutai Shivnarayan Nakhod	Chandrapur	28.379%
GKEMPLPH-13-3126	Bandu Dagdu Kharat	Osmanabad	28.417%
GKEMPLPH-13-5610	Ramkisan Vishram Tanpure	Yavatmal	28.426%
GKEMPLPH-13-10223	Ranjana Bhaginath Funde	Gadchiroli	28.456%
GKEMPLPH-13-5728	Babita Vinayak Yadvar	Yavatmal	28.479%

Third party assessment for monitoring period – Year 4			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-12997	Subhadra Sayaji Jogadand	Gondia	27.145%
GKEMPLPH-13-5740	Akash Balasaheb Pawar	Yavatmal	27.147%
GKEMPLPH-13-6296	Pravin Prabhakar Dhurandhar	Wardha	27.157%
GKEMPLPH-13-5479	Revaji Kisan Shinde	Yavatmal	27.201%
GKEMPLPH-13-12901	Rustum Vitthal Tupe	Gondia	27.206%
GKEMPLPH-13-37	Mallinath Hanamant Rodgia	Aurangabad	27.228%
GKEMPLPH-13-7866	Vijaysing Shivvsing Rajput	Bhandara	27.250%
GKEMPLPH-13-7701	Sanjay Kisan Lade	Bhandara	27.250%
GKEMPLPH-13-12914	Sheshrao Ashruji Kale	Gondia	27.263%
GKEMPLPH-13-2335	Shridhar Bhivsan Wayal	Beed	27.277%
GKEMPLPH-13-4129	Keshav Dnyandev Gawande	Akola	27.289%
GKEMPLPH-13-12298	Saraswati Bansilalji Khandelwal	Gondia	27.289%

Third party assessment for monitoring period – Year 4			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-8821	Machhindra Laxman Patare	Chandrapur	27.290%
GKEMPLPH-13-6062	Pramod Shridhar Pawaskar	Yavatmal	27.358%
GKEMPLPH-13-15	Nilesh Bapusaheb Ovhal	Aurangabad	27.359%
GKEMPLPH-13-10532	Gulab Shekoji Khade	Gadchiroli	27.361%
GKEMPLPH-13-3675	Parubai Parasram Jadhav	Buldhana	27.362%
GKEMPLPH-13-697	Mukund Laxuman Pandit	Aurangabad	27.477%
GKEMPLPH-13-11770	Goraksha Govind Dhavan	Gadchiroli	27.496%
GKEMPLPH-13-7483	Shankar Ayaji Akhade	Bhandara	27.543%
GKEMPLPH-13-12255	Pradip Ashok Bajad	Gondia	27.623%
GKEMPLPH-13-9143	Chandrabhan Dhondiba Gadhade	Chandrapur	27.624%
GKEMPLPH-13-1004	Prabhakar Vishnu Dhande	Jalna	27.676%
GKEMPLPH-13-353	Shilabai Kachru Athkhil	Aurangabad	27.701%
GKEMPLPH-13-11357	Kashibai Vishvajit Birajdar	Gadchiroli	27.734%
GKEMPLPH-13-2868	Ramesh Rajaram Nagolkar	Nanded	27.756%
GKEMPLPH-13-6997	Gajanan Jagannath Jawanjal	Bhandara	27.807%
GKEMPLPH-13-9388	Kisan Shankar Sable	Chandrapur	27.809%
GKEMPLPH-13-1251	Samindrabai Piraji Shelke	Parbhani	27.817%
GKEMPLPH-13-10815	Vijay Rajabhau Kharat	Gadchiroli	27.834%
GKEMPLPH-13-6668	Nandkishor Shriram Kedar	Nagpur	27.840%
GKEMPLPH-13-3497	Kavita Mane	Latur	27.849%
GKEMPLPH-13-3184	Shilabai Ghonge	Osmanabad	27.898%
GKEMPLPH-13-4690	Kaushalya Motisingh Parihar	Amravati	27.907%
GKEMPLPH-13-11537	Suresh Uttam Sonone	Gadchiroli	27.910%
GKEMPLPH-13-4246	Rajesh Vinayak Sawant	Washim	27.938%
GKEMPLPH-13-2204	Shamrao Punjaji Daberao	Hingoli	27.947%
GKEMPLPH-13-8317	Mangesh Gangaram More	Chandrapur	27.976%
GKEMPLPH-13-5612	Vijay Vilas Kotkar	Yavatmal	27.985%
GKEMPLPH-13-9231	Ahok Pralhad Bangar	Chandrapur	28.029%

Third party assessment for monitoring period – Year 5			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-10585	Bhaga Kamaji Nimase	Gadchiroli	26.932%
GKEMPLPH-13-7649	Anil Narayan Ambhore	Bhandara	26.934%
GKEMPLPH-13-12495	Baliram Sambhaji Gavhane	Gondia	26.938%
GKEMPLPH-13-9794	Ramesh Bhikaji Sarkate	Chandrapur	26.944%
GKEMPLPH-13-2053	Digambar Rangnath Khaire	Hingoli	26.978%
GKEMPLPH-13-5291	Jayshing Natha Budhawant	Yavatmal	26.997%
GKEMPLPH-13-10100	Datta Namdev Bhagat	Chandrapur	27.019%
GKEMPLPH-13-5313	Dadasaheb Ramdas Shendage	Yavatmal	27.033%
GKEMPLPH-13-2833	Ek Nath Bhaguji Dhanapune	Nanded	27.074%
GKEMPLPH-13-6244	Nilesh Sukumar Mate	Wardha	27.081%
GKEMPLPH-13-5605	Santosh Baburao Khanvilkar	Yavatmal	27.082%
GKEMPLPH-13-3865	Janardhan Dayaram Atole	Akola	27.089%
GKEMPLPH-13-1476	Vinayak Supagir Giri	Parbhani	27.125%
GKEMPLPH-13-3213	Veena Mangesh Gite	Osmanabad	27.138%
GKEMPLPH-13-4371	Bhau Saheb Sonyabapu Kangune	Washim	27.156%

Third party assessment for monitoring period – Year 5			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-13-5953	Gopal Deochand Purushottam	Yavatmal	27.178%
GKEMPLPH-13-12863	Dadarao Panduran Dhote	Gondia	27.235%
GKEMPLPH-13-8047	Kakasaheb Dagdu Alhat	Bhandara	27.263%
GKEMPLPH-13-8900	Amol Rajesh Thorat	Chandrapur	27.313%
GKEMPLPH-13-13051	Khandu Sonaji Survase	Gondia	27.330%
GKEMPLPH-13-10754	Tejrao Bajirao Gayakwad	Gadchiroli	27.361%
GKEMPLPH-13-589	Navnath Gorksha Khandagale	Aurangabad	27.365%
GKEMPLPH-13-1233	Kishor Prakash Raut	Jalna	27.374%
GKEMPLPH-13-11674	Kailas Ramdas Avhad	Gadchiroli	27.503%
GKEMPLPH-13-12022	Amol Anandrao Wavhal	Gadchiroli	27.523%
GKEMPLPH-13-24	Digambar Danvvel Katarnavare	Aurangabad	27.547%
GKEMPLPH-13-7082	Madhav Rambhau Chavhan	Bhandara	27.563%
GKEMPLPH-13-225	Prabhakar Vishram Sawant	Aurangabad	27.630%
GKEMPLPH-13-10571	Ramling Ambadas Chougule	Gadchiroli	27.655%
GKEMPLPH-13-70	Rahul Somnath Patekar	Aurangabad	27.749%
GKEMPLPH-13-5084	Kiran Motiram Jadhav	Amravati	27.758%
GKEMPLPH-13-7125	Parag Subhash Joshi	Bhandara	27.789%
GKEMPLPH-13-3688	Godavari Vasanta Dhote	Buldhana	27.853%
GKEMPLPH-13-6588	Sayyed Sirajoddin	Nagpur	27.859%
GKEMPLPH-13-9252	Lata Dinkar Pawar	Chandrapur	27.871%
GKEMPLPH-13-2627	Kisan Dhansing Rathod	Beed	27.876%
GKEMPLPH-13-12853	Maharudra Yashvant Yede	Gondia	27.916%
GKEMPLPH-13-3470	Amol Sitaram Thorat	Latur	27.949%
GKEMPLPH-13-13349	Shahaji Lahanu More	Gondia	27.963%
GKEMPLPH-13-9119	Ravindr Bhimrao Zamre	Chandrapur	27.982%

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 ₂ e /cook stove/ year
Leakage emission due to use of traditional cook stove usage (assuming 0 for ex-ante)	0	tCO ₂ e /cook stove/ year
Leakage emission, (LE _y , per cook stove)	0.053	tCO ₂ e /cook stove/ year

Therefore, the total leakage emission (LE_y) for the project activity assuming 90% of 14,182 Nos. cook stove distributed is 672 tCO₂e /year.

The leakage emissions achieved for this monitoring period is 3,203 tCO₂e /year.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
03-Oct-2012 - 02-Oct-2013	11,261	0	563	10,697
03-Oct-2013 - 02-Oct-2014	13,717	0	686	13,031
03-Oct-2014 - 02-Oct-2015	13,377	0	669	12,708
03-Oct-2015 - 02-Oct-2016	12,917	0	646	12,271
03-Oct-2016 - 02-Oct-2017	12,769	0	639	12,130
Total	64,041	0	3,203	60,837

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
03-Oct-2012 -02-Oct-2017	60,837	63,740	-4.77%