



DISTRIBUTION OF IMPROVED COOK STOVE - PHASE 23



Document Prepared By EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Purpose of the Project Activity

Purpose of the project activity is to facilitate clean cooking practices and reduce health risk due to indoor air pollution¹ along with household drudgery amongst the tribal households (ST) and families living Below the Poverty Level (BPL category²) in villages of Maharashtra through dissemination of improved cook stoves. The improved cook stoves through replacement of inefficient traditional cook stove will contribute towards reduction of Green House Gases emission and by-products of incomplete combustion like black carbon, conservation of fuel wood and prevent forest degradation. Successful operation of the project activity will encourage rural residents to shift from traditional cook stoves usage to the project improved and modern cook stove.

The improved cook stoves distributed are more efficient with thermal efficiency of 29.88% compared to traditional stoves with thermal efficiency of around 10% Use of efficient cook stove will result in fuel consumption reduction i.e. non-renewable biomass (since the demand of fire wood is considerably higher than the sustainable potential of fire wood extraction and there the wood available through unsustainable extraction is conceived as non-renewable biomass) through minimizing of thermal energy losses by facilitating complete combustion and thereby resulting in GHG emission reduction.

Baseline Scenario:

The higher efficiency portable, single pot cook stoves distributed and conceived under the project activity has replaced prevailing practice of using traditional cook stoves in rural areas across the state (research study reveals that out of 120 million of the total potential of biomass cook stove in India total number of cook stoves being distributed is around 14.904 million (WHO, UNDP 2009) Separate study report by ESMAP revealed that, improved cook stoves accounted for less than percent of the total biomass stoves used in rural areas. The report also refers to the latest national survey in India which indicates only 5 percent of rural households possess an improved stove (Zhang et al. 2006). The study also highlights over the fact that Maharashtra is one of those few states where, improved cook stoves were distributed under the National Programme of Improved Chulha (NPIC) since 1983-84. The

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.

The article depicts that Scheduled Tribes (47.4%) suffers the highest level of poverty across the country

distribution of cook stoves also continued after the end of NPIC programme. The distribution was facilitated through Rural Development and Water Conservation (RDWC) Department, Maharashtra Energy Development Agency and Khadi and Village Industries Commission. Even after prolonged period of distribution, around 85% of households in the villages of Maharashtra still rely on traditional cook stoves.

It is worthwhile to note that, Firewood and wood chips contributes as major cooking fuel amongst rural households in India. According to the NSSO 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 will result in substantial fuel wood saving as the section is the major consumer of fuel wood.

MPCE Groups	Percentage of Population using firewood
Rs. 0 – 235/-	79.2%
Rs. 235 – 270/-	93.8%
Rs. 270 – 320/-	90.0%
Rs. 320 – 365/-	87.2%
Rs. 365 – 410/-	86.2%
Rs. 410 – 455/-	84.2%
Rs. 455 - 510/-	82.8%

Technology Employed

The cook stove deployed under the project activity is single pot, portable, metallic, improved biomass cook stoves 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 1 standard. The design ensures complete combustion of biomass. The cook stove is tested for thermal efficiency of 29.88% as per water boiling test protocol specified in IS 13152, Part 1: 1991.

The project activity plans to disseminate the improved cook stoves over period of time amongst BPL (Below Poverty Line) and Scheduled Tribes (ST) households in rural areas of Raigad, Thane, Ratnagiri, Sindhudurg, Nashik, Dhule, Nandurbar, Jalgaon, Ahmednagar, Pune, Sangli, Satara, Solapur and Kolhapur districts which lies in Konkan, Nashik and Pune Division of Maharashtra. The project is to consider beneficiaries comprising of 14,400 Nos. of households to whom improved cook stoves are to be disseminated under the programme and has signed the end user Tripartite Agreement. The project through conservation of non-renewable biomass will result in annual average greenhouse gas emission reduction of 12,945 tCO₂e and total GHG emission reductions over the fixed crediting period of 129,450 tCO₂e.

Vikram Stoves and Fabricators (hereafter referred to as Vikram Stoves) is a MNRE (Ministry of New and Renewable Energy) approved manufacturer and distributor of improved cook stoves having operation network in Maharashtra. The agency is selected by the RDWC Department, Government of Maharashtra for distribution of improved cook stoves amongst identified beneficiaries. With an objective of wide spread dissemination (under limited annual budgetary support provision of the Ministry) of improved cook stoves and facilitate continual usage at beneficiary level; the manufacturer conceived VCS in its revenue model. The revenue was considered in deciding upon the capital cost as well as to meet up the cost towards imparting awareness and training, periodic maintenance and post lifetime replacement within the crediting period.

In the baseline scenario, the absence of the project would have led to underneath options for the purpose of cooking

1. Continuation of use of traditional stoves for the purpose of cooking
2. Use of kerosene for cooking
3. Use of LPG for Cooking
4. Use of biomass based improved cook stove

Use of the traditional cook stove is the most plausible baseline option for the target population.

Kindly refer section 1.13 for further details.

M/s. G K Energy Marketers Pvt Ltd (hereafter referred to as GKEMPL) is authorised as Project Participant by Vikram Stoves and the end users for development of VCS project activity for the cook stove dissemination. As a part of the project activity GKEMPL (Project Participant) along with Vikram Stoves will enter into contractual agreement with each beneficiaries by virtue of which the end user will confirm use of cook stove as well as transfer the CER right to the Project Participant.

1.2 Sectoral Scope and Project Type

The project activity falls under Sectoral Scope 3: Energy Demand

This project is not grouped project because there is no addition other project activity.

This is non-AFLOU type of project.

1.3 Project Eligibility

The project activity involves replacement of the traditional cook stoves by improved cook stoves. The improved cook stoves owing to its higher combustion efficiency of 29.88% in comparison to 10% efficiency of the traditional cook stoves results in efficiency improvement and same do not exceed equivalent of 20 Giga watt hour (GWh) (60 giga watt hour thermal

(GWhth))per year. As the cumulative energy saving from the project activity is less than 20 GWh/annum or 60 GWhth/annum and each of the independent sub-systems i.e. Improved cook stoves used in household only for the purpose of cooking results an estimated annual energy savings of 4.073 MWhth or 1.358 MWh which is well smaller than permissible limit of 600 MWh. Hence the project activity is eligible Sectoral scope 3 i.e. energy demand under the scope of the VCS Program.

The tripartite agreement submitted by the PP is between the end party user, Vikram stoves and G K Energy Marketers Private Limited. The agreement clear states that the rights of the VCU's rests with G K energy marketers private limited. The agreement has been signed by all the parties.

Hence as per Section 3.6.1 of the VCS Standard v4.1, the project owner is G K Energy Marketers Private Limited.

1.4 Project Design

The project activity plans to disseminate the improved cook stoves over period of time amongst BPL (Below Poverty Line) and Scheduled Tribes (ST) households in rural areas of Raigad, Thane, Ratnagiri, Sindhudurg, Nashik, Dhule, Nandurbar, Jalgaon, Ahmednagar, Pune, Sangli, Satara, Solapur and Kolhapur districts which lies in Konkan, Nashik and Pune Division of Maharashtra. The project is to consider beneficiaries comprising of 14,400 Nos. of households to whom improved cook stoves are to be disseminated under the programme and has signed the end user Tripartite Agreement. The project through conservation of non-renewable biomass will result in greenhouse gas emission reduction of 12,945 tCO_{2e} annually.

Eligibility Criteria

Not applicable to this project activity as this is not a grouped project.

1.5 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	+91-9970450000
Email	gopal@energymarketers.in

1.6 Other Entities Involved in the Project

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

1.7 Ownership

As per VCS Program Definitions version 4, the project ownership is the legal right to control and operate the project activities.

As per CDM Project Design Document section A.1, M/s. G K Energy Marketers Pvt Ltd (hereafter referred to as GKEMPL) is authorized as Project Participant by Vikram Stoves and the end users for development of VCS project activity for securing carbon financing for the cook stove disseminated. As a part of the project activity GKEMPL (Project Participant) along with Vikram Stoves has entered into contractual agreement with each beneficiaries by virtue of which the end user has confirm use of cook stove as well as transfer the CER right to the Project Participant

Based on above evidences, the project ownership is demonstrated and M/s. G K Energy Marketers Pvt Ltd is authorized project owner.

1.8 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.

1.9 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). The improved cookstoves distributions were carried out between 03-October-2012 to 06-December- 2012 amongst 14,400 beneficiaries.

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

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The project activity falls under small-scale project category since the annual average GHG emission reductions are less than 300,000 tCO₂e.

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1 (03-October-2012 to 02-October-2013)	12,945
Year 2 (03-October-2013 to 02-October-2014)	12,945
Year 3 (03-October-2014 to 02-October-2015)	12,945
Year 4 (03-October-2015 to 02-October-2016)	12,945
Year 5 (03-October-2016 to 02-October-2017)	12,945
Year 6 (03-October-2017 to 02-October-2018)	12,945
Year 7 (03-October-2018 to 02-October-2019)	12,945
Year 8 (03-October-2019 to 02-October-2020)	12,945

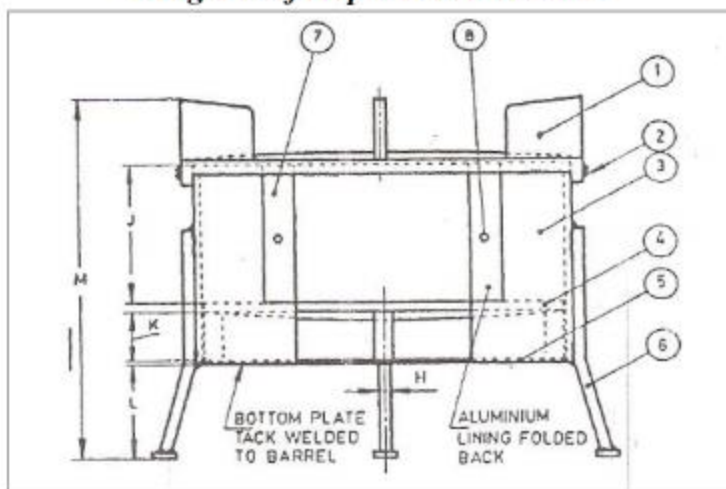
Year 9 (03-October-2020 to 02-October-2021)	12,945
Year 10 (03-October-2021 to 02-October-2022)	12,945
Total estimated ERs	129,450
Total number of crediting years	10
Average annual ERs	12,945

1.11 Description of the Project Activity

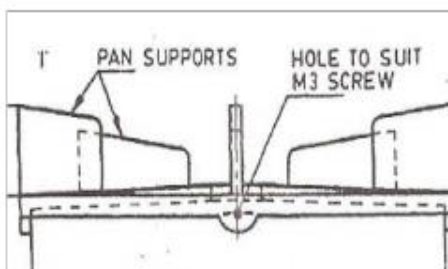
The improved cook stove conceived under the project activity is MNRE and BIS (Bureau of Indian Standard) approved state of art and environmentally sound technology. The improved cook stove is manufactured in accordance to IS13152 (Part 1): 1991 (Solid Biomass – Chulha Part 1(Metallic)). This Indian Standard was adopted by the Bureau of Indian Standard after the draft finalized by the oil burning Appliances Sectional Committee had been approved by Heavy Mechanical Engineering Division Council and hence there has no transfer of technology for the project activity. 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 the 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.

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.

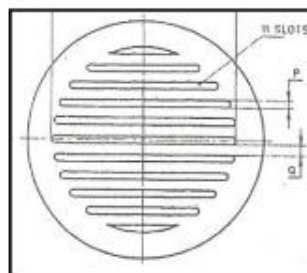
Diagram of Improved Cook stove



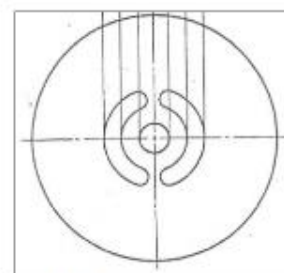
1. Top plate,
2. Screw,
3. Barrel,
4. Grate,
5. Bottom Plate,
6. Legs,
7. Aluminium Lining and
8. Rivet



Top Plate



Grate



Bottom Plate

Improved Cook stove



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

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 belong to 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) 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 cook stoves and are also least interested towards investment as wood is available for free. So, in absence of the cook stove the household would have continued with traditional cooking practice. 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 the cook stove will be distributed to non-baseline household. Therefore, identification of beneficiaries and distribution of the cook stoves comes under the preview of the Rural Development and Water Conservation Department.

1.12 Project Location

The project is located in state Maharashtra, India.

The list of division is given below:

Division: Konkan

District: Raigad, Thane, Ratnagiri, Sindhudurg

Division: Nashik

District: Nashik, Dhule, Nandurbar, Jalgaon, Ahmednagar

Division: Pune

Districts: Pune, Sangli, Satara, Solapur and Kolhapur

Division	District	Latitude	Longitude
Konkan	Raigad	17.51 - 19.80 °N	72.51 - 73.40 °E
	Thane	18.70 - 20.33 °N	72.75 - 73.80 °E
	Ratnagiri	16.30 – 18.00 °N	73.00 – 74.00 °E
	Sindhudurg	15.37 - 16.40 °N	73.19 - 74.18 °E
Nashik	Nashik	18.33 - 20.53 °N	73.16 - 75.16 °E
	Dhule	20.63 - 22.01 °N	73.83 - 75.18 °E
	Nandurbar	21.00 - 22.03 °N	73.31 - 74.32 °E
	Jalgaon	20.00 – 21.00 °N	74.92 - 76.47 °E
	Ahmednagar	18.20 - 19.90 °N	73.90 - 75.50 °E
Pune	Pune	17.90 – 18.52 °N	73.32 - 75.17 °E
	Sangli	16.87 - 17.10 °N	73.43 – 75.00 °E
	Satara	17.50 - 18.11 °N	73.33 - 74.54 °E
	Solapur	17.10 - 18.32 °N	74.42 - 76.15 °E
	Kolhapur	15.00 – 17.00 ON	73.00 – 74.00 OE

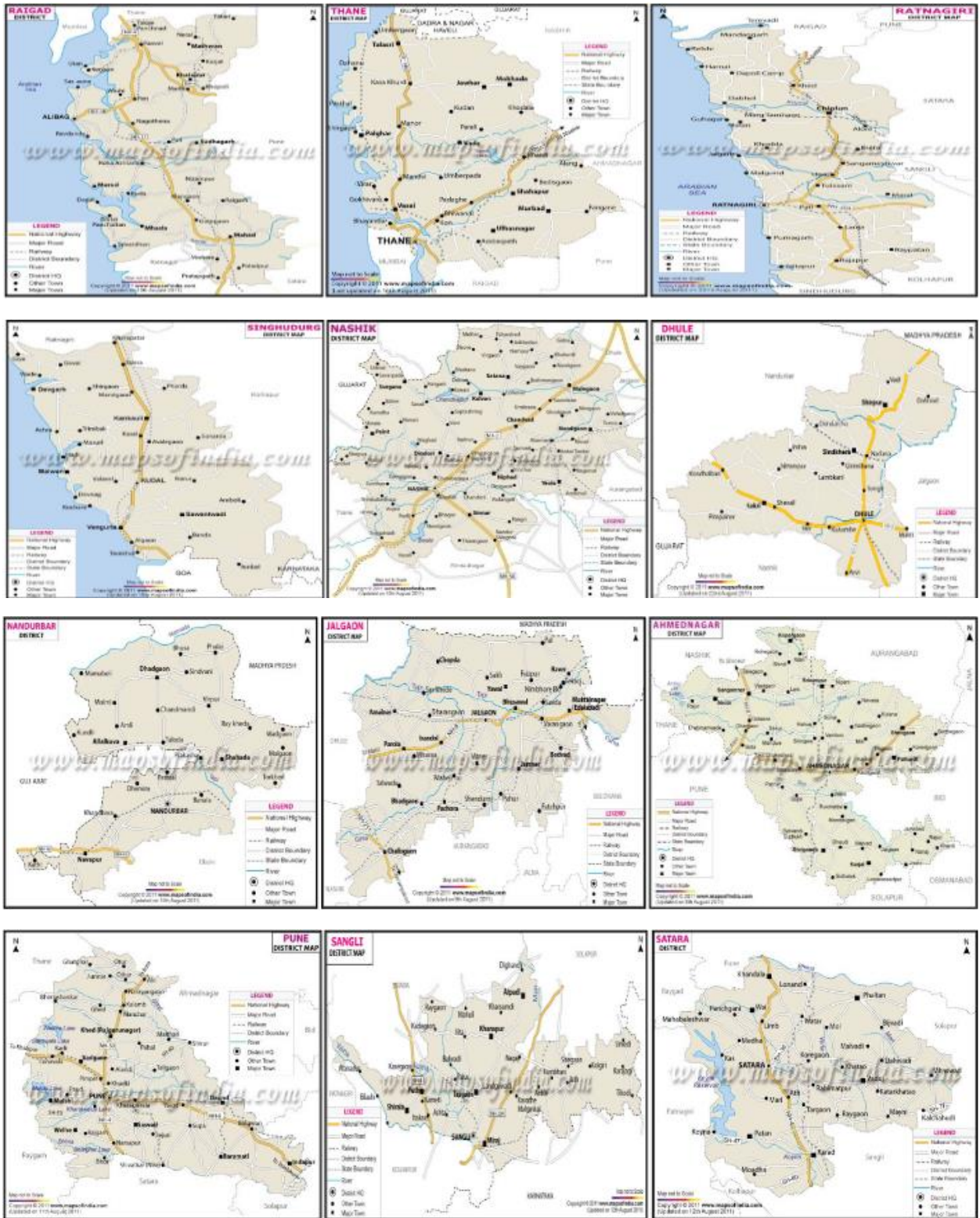
Map of India

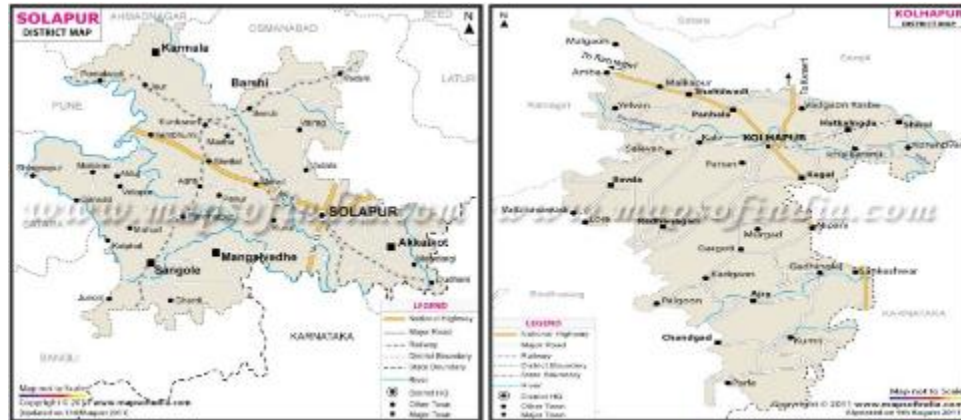


Map of Maharashtra



Map of Districts





District- Raigad			District- Thane		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Jambhivali	Panvel	1	Kushivali	Ambarnath
2	Jatade	Panvel	2	Manere	Ambarnath
3	Kalhe	Panvel	3	Mangrul	Ambarnath
4	Kaliwali	Panvel	4	Mulgaon	Ambarnath
5	Kanpoli	Panvel	5	Narhen	Ambarnath
6	Karade Bk	Panvel	6	Nevali	Ambarnath
7	Karade Kh.	Panvel	7	Pachon	Ambarnath
8	Karambeli Tarf Taloje	Panvel	8	Padirpada	Ambarnath
9	Karanjade	Panvel	9	Pali	Ambarnath
10	Karavale Bk.	Panvel	10	Pimploli	Ambarnath
11	Karnala	Panvel	11	Posari	Ambarnath
12	Kasal Khand	Panvel	12	Rahatoli	Ambarnath
13	Kasap	Panvel	13	Sagaon	Ambarnath
14	Kasar Bhat	Panvel	14	Sai	Ambarnath
15	Kelavane	Panvel	15	Sape	Ambarnath
16	Kevale	Panvel	16	Savare	Ambarnath
17	Khairwadi	Panvel			
18	Khanav	Panvel			
19	Khanavale	Panvel			
20	Kharkopar	Panvel			
21	Kherane Kh.	Panvel			
22	Kolkhe	Panvel			
23	Kon	Panvel			
24	Kondale	Panvel			
25	Kondap	Panvel			
26	Kopar	Panvel			
27	Koprol	Panvel			
28	Koral	Panvel			
29	Koyana Velhe	Panvel			
30	Kudave	Panvel			
31	Kundevahal	Panvel			
32	Ladiwali	Panvel			
33	Loniwadi	Panvel			
34	Machiprabal	Panvel			
35	Mahalungi	Panvel			

District- Raigad			District- Thane		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
36	Mahodar	Panvel			
37	Maldunge	Panvel			
38	Manghar	Panvel			
39	Moho	Panvel			

District -Ratnagiri			District - Sindhudurg		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Kirtanwadi	Guhagar	1	Golwan	Malwan
2	Kolavali	Guhagar	2	Gothane	Malwan
3	Koliwadi	Guhagar	3	Guram Nagari	Malwan
4	Kond Karul	Guhagar	4	Hadi	Malwan
5	Kondwadi	Guhagar	5	Hedul	Malwan
6	Kotluk	Guhagar	6	Hirlewadi	Malwan
7	Kudli	Guhagar	7	Hiwale	Malwan
8	Kumbharwadi	Guhagar	8	Jamdul	Malwan
9	Kutgiri	Guhagar	9	Juva Pankhol	Malwan
10	Madhal	Guhagar	10	Kalethar	Malwan
11	Malan	Guhagar	11	Kalse	Malwan
12	Mandav Karwadi	Guhagar	12	Kandalgaon	Malwan
13	Maruti Mandirwadi	Guhagar	13	Karlachavhal	Malwan
14	Masue	Guhagar	14	Katta	Malwan
15	Masue Bk.	Guhagar	15	Katvad	Malwan
16	Matalwadi	Guhagar	16	Kava	Malwan
17	Mohlawadi	Guhagar	17	Khand	Malwan
18	Mundhar	Guhagar	18	Khanjanwadi	Malwan
19	Mundhar Kh.	Guhagar	19	Kharare	Malwan
20	Muslondi	Guhagar	20	Khervand	Malwan
21	Nagazari	Guhagar	21	Khotale	Malwan
22	Naravan	Guhagar	22	Kirlos	Malwan
23	Navanagar	Guhagar	23	Koil	Malwan
24	Nigundal	Guhagar	24	Kolamb	Malwan
25	Nivatewadi	Guhagar	25	Kothewada	Malwan
26	Nivoshi	Guhagar	26	Kudopi	Malwan
27	Pabhare	Guhagar	27	Kumame	Malwan
28	Pabhare Kh.	Guhagar	28	Kumbharmath	Malwan
29	Pacheri Agar	Guhagar	29	Kumbharwadi	Malwan
30	Pacheri Sada	Guhagar	30	Kunkavale	Malwan
31	Padave	Guhagar	31	Kusarave	Malwan
32	Pali	Guhagar	32	Magvane	Malwan
33	Palkot	Guhagar	33	Mahan	Malwan
34	Palpene	Guhagar	34	Mala	Malwan
35	Palshet	Guhagar	35	Malandi	Malwan
36	Pangari	Guhagar	36	Malewadi	Malwan
37	Pangari	Guhagar	37	Malgaon	Malwan
38	Parchuri	Guhagar	38	Malkewadi	Malwan
39	Parchuri Kh.	Guhagar	39	Malond	Malwan
41	Pat Panhale	Guhagar	41	Margtad	Malwan
42	Pati	Guhagar	42	Masade	Malwan

District -Ratnagiri			District - Sindhudurg		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
43	Patilwadi	Guhagar	43	Masure	Malwan
44	Pere	Guhagar	44	Math Bk.	Malwan
45	Peth Anjanwel	Guhagar	45	Mhavlunge	Malwan
46	Pimpalwat	Guhagar	46	Mogarne	Malwan
47	Pimpar Kh.	Guhagar	47	Nagzar	Malwan
48	Pimper	Guhagar	48	Nandos	Malwan
49	Pomendi	Guhagar	49	Nandrukh	Malwan
50	Ramanewadi	Guhagar	50	Nhive	Malwan
51	Ranavi	Guhagar	51	Nirom	Malwan
52	Rohile	Guhagar	52	Ovaliye	Malwan
53	Sakhari Agar	Guhagar			
54	Sakhari Bk.	Guhagar			
55	Sakhari Kh.	Guhagar			

District -Nashik			District-Dhule		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Shirasgaon	Trimbakeshwar	1	Khairkhunda	Sakri
2	Shivaji Nagar	Trimbakeshwar	2	Khandbare	Sakri
3	Somnathnagar	Trimbakeshwar	3	Kharadbari	Sakri
4	Take Deogaon	Trimbakeshwar	4	Khargaon	Sakri
5	Take Harsha	Trimbakeshwar	5	Khatyal	Sakri
6	Talegaon Trimbak	Trimbakeshwar	6	Khori	Sakri
7	Talwade Trimbak	Trimbakeshwar	7	Khudane	Sakri
8	Thanapada	Trimbakeshwar	8	Kirwade	Sakri
9	Torangan	Trimbakeshwar	9	Kokale	Sakri
10	Torangan	Trimbakeshwar	10	Kokangaon	Sakri
11	Trimbakeshwar	Trimbakeshwar	11	Korde	Sakri
12	Umbharande	Trimbakeshwar	12	Kudashi	Sakri
13	Vadholi	Trimbakeshwar	13	Kuher	Sakri
14	Vaghera	Trimbakeshwar	14	Kuruswade	Sakri
15	Varasvihar	Trimbakeshwar	15	Kuttarkhamb	Sakri
16	Mohapada	Surgana	16	Kuttarmare	Sakri
17	Morchonda	Surgana	17	Lagalwal	Sakri
18	Mothamal	Surgana	18	Lakhale	Sakri
19	Murumdari	Surgana	19	Lavhartodi	Sakri
20	Nadagdari	Surgana	20	Lonkhede	Sakri
21	Nagshewadi	Surgana	21	Machmal	Sakri
22	Nawapur	Surgana	22	Mahir	Sakri
23	Nimbarpada	Surgana	23	Mahuband	Sakri
24	Palashet	Surgana	24	Maindane	Sakri
25	Palsan	Surgana	25	Malangaon	Sakri
26	Palvihir	Surgana	26	Malanjan	Sakri
27	Pangarne	Surgana	27	Malgaon Pr.warse	Sakri
28	Patali	Surgana	28	Malkhede	Sakri
			29	Malpur	Sakri
			30	Malyachapada	Sakri
			31	Mandane	Sakri
			32	Manjari	Sakri

District -Nashik			District-Dhule		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
			33	Mapalgaon	Sakri
			34	Mavajipada	Sakri
			35	Mhasale	Sakri
			36	Mhasdi Pr.ner	Sakri
			37	Mhasdi Pr.pimpalner	Sakri
			38	Mohagaon	Sakri
			39	Mohane	Sakri
			41	Nagaziri	Sakri
			42	Nagpur	Sakri
			43	Nagpur	Sakri
			44	Nandarakhi	Sakri
			45	Nandwan	Sakri
			46	Nawadane	Sakri
			47	Nawapada	Sakri
			48	Nawenagar	Sakri
			49	Nilgavhan	Sakri
			50	Ozarade	Sakri
			51	Pachale	Sakri
			52	Panchmauli	Sakri
			53	Pangan	Sakri
			54	Panhalipada	Sakri
			55	Pankheda	Sakri

District- Nandurbar			District- Ahmednagar		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Chinchpada	Nawapur	1	Nagalwadi	Shevgaon
2	Chitavi	Nawapur	2	Najik Babhulgaon	Shevgaon
3	Chorviher	Nawapur	3	Nandurvihire	Shevgaon
4	Chouki	Nawapur	4	Nimbe	Shevgaon
5	Dapur	Nawapur	5	Pingewadi	Shevgaon
6	Deolipada	Nawapur	6	Prabhuwadgaon	Shevgaon
7	Deolipada	Nawapur	7	Rakshi	Shevgaon
8	Deomogara	Nawapur	8	Ranegaon	Shevgaon
9	Dhanrat	Nawapur	9	Ranzani	Shevgaon
10	Dhavalipada	Nawapur	10	Raotale	Shevgaon
11	Dhong	Nawapur	11	Salwadgaon	Shevgaon
12	Dhulipada	Nawapur	12	Samangaon	Shevgaon
13	Dogegaon	Nawapur	13	Shahajapur	Shevgaon
14	Dudhave	Nawapur	14	Shahapur	Shevgaon
15	Gadad	Nawapur	15	Shahar Takali	Shevgaon
16	Gangapur	Nawapur	16	Shekte Bk.	Shevgaon
17	Ghodajamane	Nawapur	17	Shekte Kh.	Shevgaon
18	Ghogal	Nawapur	18	Shevgaon	Shevgaon
19	Gokul Nagar	Nawapur	19	Shingori	Shevgaon
20	Haldani	Nawapur	20	Shobhanagar	Shevgaon
21	Hirafali	Nawapur	21	Sone Sangavi	Shevgaon
22	Jamade	Nawapur	22	Sonviher	Shevgaon
23	Jamtalav	Nawapur	23	Sukali	Shevgaon

District- Nandurbar			District- Ahmednagar		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
24	Kadwan	Nawapur	24	Sule Pimpalgaon	Shevgaon
25	Kamod	Nawapur	25	Sultanpur Bk.	Shevgaon
26	Karanjali	Nawapur	26	Sultanpur Kh.	Shevgaon
27	Karanji Bk	Nawapur	27	Tajnapur	Shevgaon
28	Karanji Kh	Nawapur	28	Talani	Shevgaon
29	Karanjvel	Nawapur	29	Thakur Nimgaon	Shevgaon
30	Kareghat	Nawapur	30	Thakur Pimpalgaon	Shevgaon
31	Kasare	Nawapur	31	Thate	Shevgaon
32	Keli	Nawapur	32	Vijaypur	Shevgaon
33	Kelpada	Nawapur	33	Wadgaon	Shevgaon
34	Khadki	Nawapur	34	Wadule Bk.	Shevgaon
35	Khairve	Nawapur	35	Wadule Kh.	Shevgaon
36	Khalibardi	Nawapur	36	Wagholi	Shevgaon
37	Khanapur	Nawapur	37	Warkhed	Shevgaon
38	Kharje	Nawapur			
39	Khatgaon	Nawapur			
41	Khokarwada	Nawapur			
42	Khokase	Nawapur			
43	Kholghar	Nawapur			
44	Kholvihir	Nawapur			
45	Kokniwada	Nawapur			
46	Kolde	Nawapur			
47	Kothada	Nawapur			
48	Kotkhamb	Nawapur			
49	Kukaran	Nawapur			
50	Lakkad Kot	Nawapur			
51	Mahalkadu	Nawapur			
52	Malvan	Nawapur			

District- Jalgaon			District- Pune		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Kasarkhede	Muktainagar	1	Kamthadi	Bhor
2	Khamkhede	Muktainagar	2	Kanjale	Bhor
3	Korhale	Muktainagar	3	Kapurhop	Bhor
4	Kothali	Muktainagar	4	Karandi	Bhor
5	Kothe	Muktainagar	5	Karandi Bk.	Bhor
6	Kund	Muktainagar	6	Karandi Kh.	Bhor
7	Kurhe	Muktainagar	7	Karanje	Bhor
8	Loharkhede	Muktainagar	8	Karanjgaon	Bhor
9	Madhapuri	Muktainagar	9	Kari	Bhor
10	Mahalkhede	Muktainagar	10	Karnawad	Bhor
11	Malegaon	Muktainagar	11	Karnvadi	Bhor
12	Manegaon	Muktainagar	12	Karungan	Bhor
13	Manyarkhede	Muktainagar	13	Kasurdi	Bhor
14	Mehun	Muktainagar	14	Kasurdi	Bhor
15	Mel Sangave	Muktainagar	15	Kelawade	Bhor
16	Mendhode	Muktainagar	16	Kenjal	Bhor
17	Mondhalde	Muktainagar	17	Ketkavane	Bhor

District- Jalgaon			District- Pune		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
18	Morzira	Muktainagar	18	Khadki	Bhor
19	Muktainagar	Muktainagar	19	Khanapur	Bhor
20	Naigaon	Muktainagar	20	Khopi	Bhor
21	Nandwel	Muktainagar	21	Khulshi	Bhor
22	Narvel	Muktainagar	22	Kikavi	Bhor
23	Nimkhedi Bk.	Muktainagar	23	Kiwat	Bhor
24	Nimkhedi Kh	Muktainagar	24	Kolavadi	Bhor
			25	Kondgaon	Bhor
			26	Kondhari	Bhor
			27	Korle	Bhor
			28	Kudali Bk.	Bhor
			29	Kudali Kh.	Bhor
			30	Kudpanewadi	Bhor
			31	Kumbale	Bhor
			32	Kund	Bhor
			33	Kurungvadi	Bhor
			34	Kurunji	Bhor
			35	Kusagaon	Bhor
			36	Lavheri	Bhor
			37	Mahude Bk.	Bhor
			38	Mahude Kh.	Bhor
			39	Majgaon	Bhor

District- Sangli			District- Satara		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Antri Bk	Shirala	1	Abhepuri	Wai
2	Antri Kh	Shirala	2	Akoshi	Wai
3	Arala	Shirala	3	Ambedara	Wai
4	Asvalwadi	Shirala	4	Amrutwadi	Wai
5	Aundhi	Shirala	5	Anavadi	Wai
6	Bambavade	Shirala	6	Anpatwadi	Wai
7	Beldarwadi	Shirala	7	Asagaon	Wai
8	Belewadi	Shirala	8	Asale	Wai
9	Beradewadi	Shirala	9	Asare	Wai
10	Bhairewadi	Shirala	10	Badewadi	Wai
11	Bhashtewadi	Shirala	11	Balakavadi	Wai
12	Bhatshirgaon	Shirala	12	Baleghar	Wai
13	Bhatwadi	Shirala	13	Bavdhan	Wai
14	Bilashi	Shirala	14	Belamachi	Wai
15	Biur	Shirala	15	Bhirdachiwadi	Wai
16	Charan	Shirala	16	Bhivadi	Wai
17	Chikhali	Shirala	17	Bhivadi	Wai
18	Chikhalwadi	Shirala	18	Bhogaon	Wai
19	Chinchewadi	Shirala	19	Bhuinj	Wai
20	Chincholi	Shirala	20	Bopardi	Wai
21	Devwadi	Shirala	21	Bopegaon	Wai
22	Dhamavade	Shirala	22	Borgaon Bk.	Wai
23	Dhaswadi	Shirala	23	Borgaon Kh.	Wai

District- Sangli			District- Satara		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
24	Dholewadi	Shirala	24	Boriv	Wai
25	Gavalewadi	Shirala	25	Chandak	Wai
26	Ghagarewadi	Shirala	26	Chandvadi	Wai
27	Girajvade	Shirala	27	Chikhali	Wai
28	Gudhe	Shirala	28	Chindhawali	Wai
29	Hategaon	Shirala	29	Pargaon	Khandala
30	Ingrul	Shirala	30	Pimpore Bk.	Khandala
31	Jambhalewadi	Shirala	31	Pisalwadi	Khandala
32	Kadamwadi	Shirala	32	Rajewadi	Khandala
33	Kalundre	Shirala	33	Rui	Khandala
34	Kande	Shirala	34	Sangvi	Khandala
35	Kandur	Shirala	35	Shedgewadi	Khandala
36	Kapari	Shirala	36	Shekhmirwadi	Khandala
37	Karamale	Shirala	37	Shindewadi	Khandala
38	Karanguli	Shirala	38	Shirwal	Khandala
39	Kharale	Shirala	39	Shivajinagar	Khandala
40	Khed	Shirala	40	Sukhed	Khandala
41	Khirawade	Shirala	41	Tondal	Khandala
42	Khujgaon	Shirala	42	Vadgaon	Khandala
43	Khundalapur	Shirala	43	Wadwadi	Khandala
44	Kinarewadi	Shirala	44	Waghoshi	Khandala
45	Kokarud	Shirala	45	Wanyachiwadi	Khandala
			46	Wathar Bk.	Khandala
			47	Wing	Khandala
			48	Pulkoti	Man
			49	Rajavadi	Man
			50	Ranand	Man
			51	Ranjani	Man
			52	Sambhukhed	Man
			53	Satrewadi	Man
			54	Shenwadi	Man
			55	Shevari	Man

District-Solapur			District-Kolhapur		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Ghodeshwar	Mohol	1	Bamani	Kagal
2	Gotewadi	Mohol	2	Banage	Kagal
3	Haralwadi	Mohol	3	Bastavade	Kagal
4	Hingani	Mohol	4	Belawale Bk.	Kagal
5	Hivare	Mohol	5	Belawale Kh.	Kagal
6	Ichgaon	Mohol	6	Belewadi Kalamma	Kagal
7	Jamgaon Bk	Mohol	7	Belewadi Masa	Kagal
8	Jamgaon Kh	Mohol	8	Benikre	Kagal
9	Kamti Bk	Mohol	9	Bhadagaon	Kagal
10	Kamti Kh	Mohol	10	Bidri	Kagal
11	Katewadi	Mohol	11	Bolavi	Kagal
12	Khandali	Mohol	12	Bolaviwadi	Kagal
13	Khandobachiwadi	Mohol	13	Boravade	Kagal

District-Solapur			District-Kolhapur		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
14	Kharkatne	Mohol	14	Chaundal	Kagal
15	Khavani	Mohol	15	Chikhali Kasaba	Kagal
16	Khuneshwar	Mohol	16	Chimagaon	Kagal
17	Kolegaon	Mohol	17	Daulatwadi	Kagal
18	Kombadwadi	Mohol	18	Ekondi	Kagal
19	Konheri	Mohol	19	Galgale	Kagal
20	Korwali	Mohol	20	Gorambe	Kagal
21	Kothale	Mohol	21	Haladi	Kagal
22	Kuranwadi	Mohol	22	Haldavade	Kagal
23	Kuranwadi	Mohol	23	Hamidwada	Kagal
24	Kurul	Mohol	24	Hanbarwadi	Kagal
25	Lamantanda	Mohol	25	Hasur Bk.	Kagal
26	Lamboti	Mohol	26	Hasur Kh.	Kagal
27	Malikpeth	Mohol	27	Jainyal	Kagal
28	Mangaoli	Mohol	28	Kapashi	Kagal
29	Maslechaudhari	Mohol	29	Karanjivane	Kagal
30	Miri	Mohol	30	Kardyal	Kagal
31	Mohol	Mohol	31	Karnoor	Kagal
32	Morvanchi	Mohol	32	Kasari	Kagal
33	Mundhewadi	Mohol	33	Kaulage	Kagal
34	Najikpimpri	Mohol	34	Kembali	Kagal
35	Nalbandwadi	Mohol	35	Kenavade	Kagal
36	Nandgaon	Mohol	36	Khadakewada	Kagal
37	Narkhed	Mohol	37	Kurni	Kagal
38	Jeurwadi	Akkalkot	38	Kurukali	Kagal
39	Kadabgaon	Akkalkot	39	Lingnoor Kapshi	Kagal
40	Kajikanbas	Akkalkot	40	Lingnur Dumala	Kagal
41	Kalappawadi	Akkalkot	41	Madyal	Kagal
42	Kalegaon	Akkalkot	42	Malage Bk.	Kagal
43	Kalhipparage	Akkalkot	43	Malage Kh.	Kagal
44	Kalkarjal	Akkalkot	44	Mangnoor	Kagal
45	Kantehalli	Akkalkot	45	Metage	Kagal
46	Karajagi	Akkalkot	46	Mhakave	Kagal
47	Karjal	Akkalkot	47	Mugali	Kagal
48	Kegaon Bk	Akkalkot	48	Nandhyal	Kagal
49	Kegaon Kh.	Akkalkot	49	Nindhori	Kagal
50	Khairat	Akkalkot			
51	Khanapur	Akkalkot			
52	Kini	Akkalkot			
53	Kiniwadi	Akkalkot			
54	Kirnalli	Akkalkot			
55	Kolekarwadi	Akkalkot			

1.13 Conditions Prior to Project Initiation

In accordance to the Paragraph 4 of the chosen methodology, AMS - II.G; “Energy Efficiency measures in thermal applications of non-renewable biomass”, EB 68, Version 04: baseline of the project activity is “the use of fossil fuels for meeting similar thermal energy needs”. In

absence of the project activity the beneficiaries could have opted for the underneath options for the purpose of cooking

1. Continuation of use of traditional stoves for the purpose of cooking
2. Use of kerosene for cooking
3. Use of LPG for Cooking
4. Use of biomass based improved cook stove

Use of all the above options for purpose of cooking is permitted as per the regulation of the host country. However, use of few of the fuel options stated above faces barriers as their use in the rural areas are concerned and are depicted below.

As per the study by “National Institute of Science, Technology & Development Studies (NISTADS), CSIR, New Delhi” it is highlighted that poor rural household could not afford and also not willing to opt for the improved cook stoves since wood are available for free. The household that opts for the improved stoves only opts for subsidy hence the use of biomass based cook stoves is not a pertinent or plausible scenario. The percentages of population relying on different fuel type in rural areas of Maharashtra for the purpose of cooking are as follows³ –

	Firewood	LPG	Kerosene	No cooking arrangement	Others
Percentage of population	78%	15%	1%	3%	2%

From above figures it is quite evident that, the percentages of population depending on firewood in the rural areas are quite high in the state. Publication titled “Household Energy and the Environment”⁴ depicts that, although nationally there has been a decrease in the share of traditional fuels, as biomass is being increasingly substituted by commercial fuels, the shift to commercial fuels has been negligible in rural areas. The energy consumption in rural areas is guided by the availability and accessibility of local biomass resources; the competing uses for biomass; availability of commercial energy sources; the cost of commercial fuels such as LPG and kerosene (NCAER 1985); absence of an effective supply especially in the rural areas (TERI 1998); and inadequate production and refining capacity of LPG (Ravindranath and Ramakrishna 1997). Over and above the above barriers the issues of affordability of commercial fuel is quite a bigger issue amongst the populations conceived under the project activity and hence the use of commercial fuel is not usual scenario amongst the BPL and ST population. Therefore, use of LPG or Kerosene is not the plausible baseline option.

From above it can be concluded that the use of biomass in the traditional cook stove is the most plausible baseline option for the target population.

The methodology identifies the baseline and suggests for baseline emission factor therefore, the same is considered as precedence and assessment of alternatives is not carried out for the purpose of determination of baseline and emission factor. According to Paragraph 5 of the applicable methodology, default emission factor of 81.6 tCO₂e/TJ is considered for estimation of emission reduction. Emission reductions would be calculated as:

³ TERI Energy Data Directory & Yearbook 2010

⁴ Preeti Malhotra, http://www.hedon.info/BP42_EnvironmentalImplicationsOfTheEnergyLadderInRuralIndia

$$ER_y = B_{y,savings} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projectedfossilfuel}$$

Where:

ER_y	Emission reductions during the year y in tCO ₂ e
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projectedfossilfuel}$	I Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO ₂ /TJ ³

$$B_{y,savings} = B_{old} * (1 - \eta_{old}/\eta_{new})$$

Where,

$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes
B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes
η_{old}	A default value of 0.10 may be optionally used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney.
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.

Determination of Bold:

According to Paragraph 7 of the chosen methodology; Bold is determined by using the Option (a) "Calculated as the product of the number of systems multiplied by the estimated average annual consumption of woody biomass per appliance (tonnes/year). This can be derived from historical data or a survey of local usage."

According to the Wood Fuel Trade in India – Food and Agricultural Organisation of the United Nation, July 2001; per capita per day biomass consumption is 1.52 kg and per household per day fuel wood consumption is 5.60 kg. Annual consumption per household per day is therefore estimated at 2.044 tonnes.

Further, following the TERI Energy Data Directory and Yearbook 2010; per capita per month consumption of fire wood in Maharashtra is 25.51 kg⁵. With average population size of 4.8 person/ household⁶ (the population size of 4.8 persons per household is obtained from the secondary literature publication that indicates the average number of personnel per household in rural areas of Maharashtra as 4.8); annual consumption of firewood is estimated at 1.469 tonnes.

Being the annual household fuel consumption data estimated on the basis of the TERI Energy Data Directory is most conservative the value of 1.469 tonnes/household/year is considered. Therefore,

⁵ Ref: TERI Energy Data Directory and Year book 2010

⁶ Ref: Pg.No. -3 of A Report on "Morbidity & Health Care Based on Data Collected in Central, State & Pooled Samples of 60th Round of National Sample Survey Jan - Jun2004"

$B_{old} = 1.469$ tonnes/ household/ year.

Determination of η_{old}

Since, the project is replacing traditional cooking system⁷ with no improved combustion air supply or flue gas ventilation system therefore, efficiency of the system being replaced is chosen as per Alternative 2 of Option 2 of Paragraph 6 as default value of 0.10.

Determination of η_{new}

Efficiency of the system being deployed in the project activity is chosen as 29.88%⁸ following the Performance Test of Improved Cook stove done by Department of Renewable Energy Sources, Maharana Pratap University of Agriculture & Technology.

$$\eta_{new} = 29.88\%$$

$f_{NRB,y}$ is determined as follows:

According to Paragraph 8 of the chosen methodology, "Project participants shall determine the shares of renewable and non-renewable woody biomass in Bold (the quantity of woody biomass used in the absence of the project activity) the total biomass consumption using nationally approved methods (e.g., surveys or government data if available) and then determine $f_{NRB,y}$ ".

The fraction of woody biomass saved due to the project activity that can be established as non-renewable is estimated as –

$$f_{NRB,y} = NRB / (NRB + DRB)$$

Where,

NRB: Non Renewable Biomass (NRB) is the quantity of woody biomass used in the absence of the project activity (Bold) minus the DRB component.

According to the Paragraph 9 of the applicable methodology; Demonstrably Renewable woody Biomass (DRB) is justified by satisfying the condition no. (1) in following manner –

The wood extracted from forest land in a sustainable quantity is considered as renewable. The wood extracted from forest land in a sustainable quantity is considered as renewable. Further, to demonstrate the woody biomass is renewable the following conditions as per paragraph 9, are satisfied.

1. Land Area Remain a Forest: The forest area (also termed as recorded forest area and represents the total area of land as per the Government records) in Maharashtra across the last five years is as follows –

Study Period	Total area under forest (sq.km)	Reporting Year (Economic Survey Report)
2010-11	61,939	2011-12
2009-10	61,939	2010-11
2008-09	61,939	2009-10
2007-08	61,939	2008-09
2006-07	61,939	2007-08

The table above represents the total area of land under forest in Maharashtra and confirms that, the land under forest continued to remain under forest.

⁷ Traditional cookstove is being used among all households prior to the project activity as per the baseline survey.

⁸ Thermal Efficiency Test Report of Improved Cook stove tested at Biomass Cook stove Testing Centre, Dept. of Renewable Energy Sources, Udaipur

Therefore, it is evident from above information that, the land area under forest continued to remain under forest.

2. Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting). Sustainable management practices like afforestation, reforestation, preservation and conservation of forest land is undertaken in the country as a part of the National Forest Policy, 1988 by Ministry of Environment & Forests, Govt. Of India. The National Mission for Green India is one of the eight Missions of National Action Plan on Climate Change; that calls for forest conservation policy as policy decision to be implemented by the state government.

In order to prevent illicit cutting of trees and following the request of the government of India, the Maharashtra State had taken an important and pioneering decision regarding forest management with the active participation of the rural people⁹. The Joint Forest Management/Forest Protection Committee has selected forest land including degraded and barren forest land and similar other land in rural areas for sustainable management.

3. Any national or regional forestry and nature conservation regulations are complied with. According to the Circular No. FLD/1000/CR 243/F-3 of Government of Maharashtra, the forest land under the state of Maharashtra is abided by Forest Conservation Act 1980. The Forest (Conservation) Act, 1980 and amended in 1988¹⁰ was enacted with a view to check further deforestation which ultimately results in ecological imbalance; and therefore, the provisions made therein for the conservation of Forests and for matters connected therewith, must apply to all forests irrespective of the nature of ownership or classification thereof. This definition of forest covers all statutorily recognized forests, whether designated as reserved, protected or otherwise for the purpose of section 2 (i) of the Forest (Conservation) Act. The Forest Conservation Act vide paragraph 2 also impose restriction on the de-reservation of forests or use of forest land for non-forest purpose.

Since, the woody biomass originating from land area under forest fulfils the specified conditions the same is considered to be renewable.

Fuel Wood Demand

The demand of fuel wood in context of Maharashtra is estimated from percentage share of the rural population relying on fire wood and average per-capita fuel wood consumption. The demand of fire wood in the state is estimated as follows:

Particulars	Data	Unit	Reference
Rural Population	55,778,000.00	Nos.	Economic Survey of Maharashtra 2010-11 (Pg.No.-3)

⁹ <http://www.iifm.ac.in/databank/ifm/mahfdres.html>

¹⁰ <http://www.moef.nic.in/legis/forest/forest2.html>

Percentage of households reliant on biomass for cooking	78.00	%	Teri Energy Data Directory & Yearbook 2010(Pg. No. 294) Although study by NSSO depicts higher percentage of dependency of the rural population in lower strata of MCPE group the conservative figure is used for the purpose of calculation
Population Dependent on the Fuel Wood	43,506,840.00	Nos.	Calculated
Per capita fuel wood consumption for cooking	25.51	kg/ month	Teri Energy Data Directory & Yearbook 2010(Pg. No.-293)
Fuel Wood requirement	13,318,313.86	tonne /year	Calculated

Supply of Fire Wood

Forest is the major source of fire wood supply followed by Tree outside Forest. The amount of fire wood that can be sustainably extracted from the forest and Tree outside Forest land is estimated from the area under different forest type and sustainable rate of extraction from forest and plantation. The same method is applied for estimation of sustainable extraction potential from Tree outside Forest.

As a conservative approach, the land under open forest and scrub are also included.

Sustainable Fuel wood Extraction From Forest Area				
Particulars	Data	Unit	Reference	Remarks
Very Dense Forest	8,736	sq. km.	Pg. No. -173, Ch -9.16. of India State of Forest Report 2011 - FSI	Land with forest cover having canopy density above 70%
Medium Dense Forest	20,815	sq. km.	Pg. No. -173, Ch -9.16. of India State of Forest Report 2011 - FSI	All Lands with forest cover having a canopy density of 40%- 70%
Open Forest	21,095	sq. km.	Pg. No. -173, Ch -9.16. of India State of Forest Report 2011 - FSI	Land with forest cover having density between 10- 40%
Scrub	4,157	sq. km.	Pg. No. -173, Ch -9.16. of India State of Forest Report 2011 - FSI	Degraded forest land with canopy cover less than 10%
Total area under forest	54,803	sq. km.		Calculated
Forest Cover In Different Forest Type				
Tropical dry deciduous forest	57.40%		Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI	FSI Report Title: India State of Forest Report 2011 By: Forest Survey of India Link: www.fsi.nic.in Report No: 12th
Tropical moist deciduous forest	29.85%		Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI	
Tropical semi evergreen	7.72%		Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI	

Sustainable Fuel wood Extraction From Forest Area				
Tropical thorn forest	1.02%	Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI		Data Period: October2008 - March 2009
Sub-tropical broad leaved hill forest	1.54%	Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI		
Littoral and Swamp	0.09%	Pg. No. -174, Ch -9.16. of India State of Forest Report 2011 –FSI		
Tropical dry deciduous forest		31,457	sq. km.	Calculated
Tropical moist deciduous forest		16,359	sq. km.	Calculated
Tropical semi evergreen		4,231	sq. km.	Calculated
Tropical thorn forest		559	sq. km.	Calculated
Sub-tropical broad leaved hill forest		844	sq. km.	Calculated
Littoral and Swamp		49	sq. km.	Calculated
Sustainable Rate Of Extraction From Forests And Plantation				
Tropical dry deciduous forest	0.22	tonne /ha/yr	Pg. No. 254 of Forestry for sustainable biomass production and carbon sequestration in India- N. H. Ravindranath (Centre for Ecological Sciences, IISc, Bangalore), P. Sudha (Centre for Ecological Sciences, IISc, Bangalore), Sandhya Rao (Dept. of Civil Engineering IIT Delhi)	
Tropical moist deciduous forest	0.27	tonne/ha/yr		
Tropical semi evergreen	0.39	tonne /ha/yr		
Tropical thorn forest	0.24	tonne/ha/yr		
Sub-tropical broad leaved hill forest	0.36	tonne /ha/yr		
Littoral and Swamp	0.36	tonne /ha/yr		
Renewable Biomass Extraction From Forest Area				
Tropical dry deciduous forest		692,052	tonne /year	Calculated
Tropical moist deciduous forest		441,684	tonne /year	Calculated
Tropical semi evergreen		165,000	tonne /year	Calculated
Tropical thorn forest		13,415	tonne /year	Calculated
Sub-tropical broad leaved hill forest		30,382	tonne /year	Calculated
Littoral and Swamp		1,775	tonne /year	Calculated
Total Renewable Biomass Extractionfrom Forest		1,344,308	tonne /year	Calculated
Sustainable Extraction from Plantation and ToF				
Plantation /Tree Outside Forest	1,304	sq. km	India State of Forest Report 2011 - FSI (Calculated considering the area under Plantation/ToF as 2.38%)	
Sustainable Extraction rate from plantation	2.00	tonne /ha/yr	Pg. No. 254 of Forestry for sustainable biomass production and carbon sequestration in India - N. H. Ravindranath (Centre for Ecological Sciences, IISc, Bangalore), P. Sudha (Centre for Ecological Sciences, IISc, Bangalore), Sandhya Rao (Dept. of Civil Engineering IIT Delhi)	

Estimation of f_{NRB}

Total Renewable Biomass Extraction from Plantation/ ToF	260,862.28	tonne /year
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Total Sustainable biomass available	1,605,170.28	tonne /year
Fuel Wood requirement	13,318,313.86	tonne /year
NRB	11,713,143.58	tonne /year
f_{NRB}	87.90%	

Following the Paragraph 10 of the applicable methodology, the f_{NRB} estimation is estimated as above and also two supporting indicators are established through the following –

- Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area.
- Increasing trends in fuel wood prices indicating a scarcity of fuel-wood

1. Depletion of Carbon Stock

According to the India State of Forest Report by Forest Survey of India, Ministry of Environment & Forests, Govt. of India there has been a conversion of the dense and moderately dense forest, to open forest due to felling, pruning or thinning of trees in the forest areas. An increase in the area of open forest is related to diversion of very dense and moderate dense forest to open forest. As per the Government of India Sustainable Forest Management Policy Land converted to open forest are taken up for plantation activity or promote natural or artificial regeneration. In this context it is also worthwhile to note that, the department of forest is undertaking initiatives towards plantation activity.

The table below represent the area under different forest cover:

All area in km ²				
Year	Very Dense	Moderately Dense	Open Forest	Total
2011	8,736	20,815	21,095	50,646
2009	8,739	20,834	21,077	50,650
2005	8,747	20,847	21,067	50,661

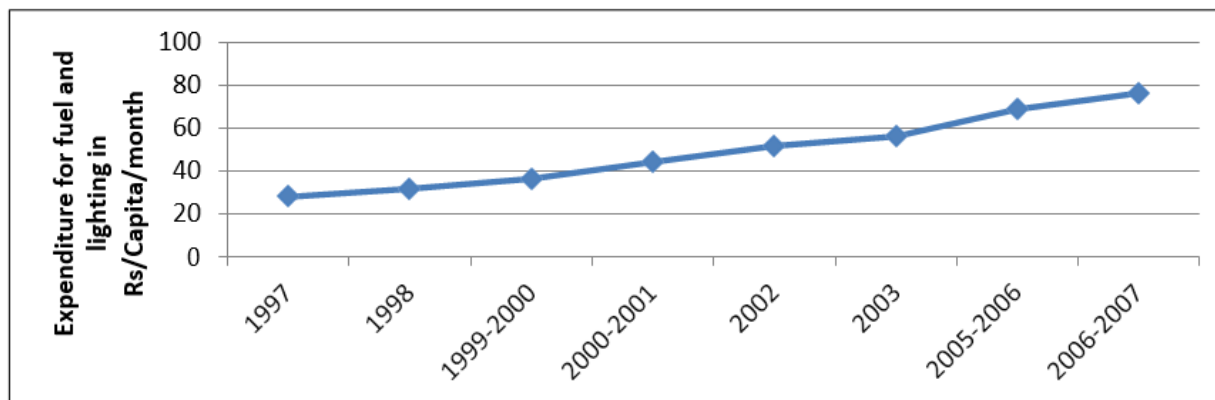
In accordance to the **Population Pressure and Deforestation in India- Population Research Centre, Institute of Economic Growth – Delhi**; the forest's growing stock reflects the quality of forest cover in terms of crown densities. The study exhibits the depletion in the forest stock in 1997 over 1989. Considering the dense forest growing stock is 67.6 cubic metre/hectare and open forest growing stock as 28.5 cubic metre/hectare; the volume of the growing stock in 1989 is estimated to be 227,592,000 cubic metres which is lowered to 223,516,000 cubic metres in 1997. The reduction in the volume of growing stock is estimated at 2% from 1997 in compared to 1989.

State	Volume of growing stock in 1989 (cubic metres)	Volume of growing stock in 1997 (cubic metres)	Percentage change in volume of growing stock
Maharashtra	227,592,000	223,516,000	-2%

2. Increase in fuel wood price trend

As per the consumer expenditure survey carried out by National Sample Survey Organisation in 2004; it has been portrayed that 54% of the total consumption expenditure for cooking and lighting in rural areas pertains to fuel wood consumption. The expenditure across the year is presented as follows:

Year	1997	1998	1999-2000	2000-2001	2002	2003	2005-2006	2006-2007
Average Monthly Per Capita Expenditure (Rs.)	27.97	31.79	36.45	44.14	51.70	56.20	68.77	76.20



Since expenditure on fuel wood comprises of 43% of the total expenditure on fuel and lighting (considering 2004-05 data) it can be assumed that the cost of fire wood will increase in line with the increase in expenditure on fuel and light. Moreover the fact is also established from the mean annual increase in the price of the different energy products use for cooking and lighting and is as follows:

The trend in depletion of the carbon stock and rise of the fuel wood price is mainly due to increased demand and supply gap and unsustainable extraction or felling thereof. With the increase in demand of fire wood owing to population pressure and –limited and decreased potential for supply gap of fuel wood due depletion of carbon stocks (forest cover) the price is increasing. As the total biomass availability is unable to cater the demand of unsustainable extraction and pilferage is on the way towards depletion of the forest cover. The depletion of the carbon stock is due to the unsustainable extraction of biomass from the forest land and not due to any national policy. The national policy is aimed towards increasing of the forest area as the total area of forest at present is lower than the projected and required forest area as stipulated by the Govt. of India. Therefore, depletion of carbon stock or rise of the fuel wood price is not due to any national and Sectoral regulations but due to the stiffening of the gap between the demand and supply of fire wood in the region.

Please refer to section B 4 of PDD of the UNFCCC registered CDM project with Ref No. 9501 through the web link

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There has been no policy regulation or legal enforcement that promotes deforestation of forest degradation in host country as well as in the region. National forest policy 1988, Government of India, Ministry of Environment and Forest, points out the requirement of forest conservation in the light of forest depletion in the country. Revenue and Forest Department, Government of Maharashtra vide circular no. FLD/1000/CR 243/F-3 16-December-2004,

paragraph 3 has directed to prevent further deforestation in line with section 2 of the Forest Conservation Act 1980. The National mission for Green India, one of the eight Missions on National Action plan on Climate Change has also pointed out use of efficient biomass stoves as a measure towards preventing forest degradation.

The trend in depletion of the carbon stock and rise of the fuel wood price is mainly due to increased demand and supply gap and unsustainable extraction or felling thereof. With the increase in demand of fire wood owing to population pressure and –limited and decreased potential for supply gap of fuel wood due depletion of carbon stocks (forest cover) the price is increasing. As the total biomass availability is unable to cater the demand of unsustainable extraction and pilferage is on the way towards depletion of the forest cover. The depletion of the carbon stock is due to the unsustainable extraction of biomass from the forest land and not due to any national policy. The national policy is aimed towards increasing of the forest area as the total area of forest at present is lower than the projected and required forest area as stipulated by the Govt. of India. Therefore, depletion of carbon stock or rise of the fuel wood price is not due to any national and Sectoral regulations but due to the stiffening of the gap between the demand and supply of fire wood in the region.

The design of the cook stove is certified by Bureau of Indian Standards relating to its appropriateness to, IS 13152 (Part1). The standard was adopted by Bureau of Indian Standard after the draft finalized by the oil burning Appliances Sectional Committee had been approved by Heavy Mechanical Engineering Division Council.

The Project has received necessary approvals for development and commissioning for cook stove project from the state Nodal agencies and is in compliance to the local laws and regulations.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

Project has been registered with UNFCCC under Clean Development Mechanism program, Registration reference number is 9501.

1.15.2 Projects Rejected by Other GHG Programs

The Project is not rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

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 9501. Project Proponent has submitted undertaking that they

will not claim same GHG emission reductions of the project from CDM and VCS. PP would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. PP has also submitted an undertaking stating that they will not take REC benefits for the same Emission Reductions.

1.16.2 Other Forms of Environmental Credit

Project has been registered with UNFCCC under Clean Development Mechanism program. Registration reference number is 9501. 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.

1.17 Additional Information Relevant to the Project

Leakage Management

Not applicable to this project activity.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

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:

- 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 would help in spending more time in productive activities such as education, employment etc.
- Improves overall health (particularly diseases related to respiratory system) of women and children by reducing smoke in the kitchen.

Environmental benefits:

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

Economic benefits:

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

Technological benefits:

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

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

Further Information

There are no information or incidents that will have bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

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 14/09/2006; 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

Please refer to sections E 1 and E 2 of PDD of the UNFCCC registered CDM project with reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

2.3 Environmental Impact

Please refer to sections D1 of PDD of the UNFCCC registered CDM project with reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

2.4 Public Comments

The commenting period for the Project Activity was from 22-March-2021 to 21-April-2021. No comments have been received during this period.

2.5 AFOLU-Specific Safeguards

Not Applicable

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Consolidated baseline methodology for “Energy efficiency measures in thermal applications of non-renewable biomass”; AMS II-G, Version 04.0.0 Sectoral Scope: 03, EB 68.

3.2 Applicability of Methodology

The project activity involves replacement of traditional cook stoves by improved cook stoves. The improved cook stoves owing to its higher combustion efficiency of 29.88% in comparison to the 10%¹¹ efficiency of the traditional cook stoves results in energy efficiency improvement and same do not exceed the equivalent of 60 giga watt hour thermal (GWhth) per year of energy savings. The project is selected for applying small scale methodologies under Type II. As the cumulative energy saving from the project activity is less than 20 GWh/annum or 60 GWhth/annum and each of the independent subsystems i.e. Improved cook stove used in household for the purpose of cooking results an estimated annual energy savings of 4.073 MWhth or 1.358 MWh (detailed calculation presented in section B.5 of the PDD) which is well smaller than the permissible limit of 600 MWhth. Therefore, the project is consider appropriate to be developed under micro small scale guidelines. The applicability criteria of

¹¹ Traditional cookstove is being used among all households in the baseline as per the survey, thus thermal efficiency is considered 10% for traditional stove according to the methodology.

the chosen methodology AMS-II. G. (Version 04) is satisfied by the project activity in following manner:

Criteria 1

This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency biomass fired cook stoves or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.

Justification: The project activity involves dissemination of higher efficiency biomass fired cook stoves use as household appliances (29.88% as tested from MNRE approved centre) for cooking purpose⁶⁸. This will contribute in reduction of non-renewable biomass consumption which would have been otherwise consumed by less efficient cook stoves. Since, it is an introduction of high efficiency cook stove the above condition is justified.

Criteria 2:

Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.

Justification: Use of non-renewable biomass is established through demonstration of gap between the demand of fire wood and silviculturally permissible production of biomass from forest and tree outside forest. The fact is established using published literature referring to the following studies:

Food and Agricultural Organisation of United Nation - Regional Wood Energy Development Programme in Asia

The literature highlights gap in demand and supply of fuel wood across the country as well as across the state of Maharashtra. In accordance to the study, fuel wood consumption in real terms is much higher than the recorded production of about 30%; thus, leaving a wide gap leading towards unsustainable extraction of fire wood. Moreover, on account of population pressure, demand for firewood has outstripped natural regeneration and planting, so much so that in some areas there is food to eat but not enough wood is available to cook it (Mathur, 1987)". The report also highlights the statistics from Forest Survey of India (FSI 1988:46) which estimated a gap of 130 million tonne between the demand and internal production of firewood in the country in 1987. The study also highlight demand for fuel-wood across Maharashtra in 1980 around 17 million cu. m. as against the production of 1.5 million cu. m. from the recorded forest (Pethiya & Luthra, 1991). The quoted demand supply gap of fire wood is also highlighted in the finding of the National Council for Applied Economic Research (NCAER).

State of Forest Report 1987, MoEF, Govt. of India

The report highlights gap between the demand and production of fire wood as major cause of deforestation. The reported consumption and production across the country within silviculturally permissible limit across the following years is indicated as follows -

Year	Consumption in million tones	Recorded Production in million tonnes
1953-54	86.3	6.49
1960-61	99.6	8.15
1965-66	109.3	9.16
1970-71	117.9	11.62
1975-76	133.1	19 m. from forest and 30 m. from tree outside forest

In accordance the gap between demand and production is met through pilferage leading to continuous depletion of forest land.

Wood Fuel Trade in India: Food and Agricultural Organisation of United Nation

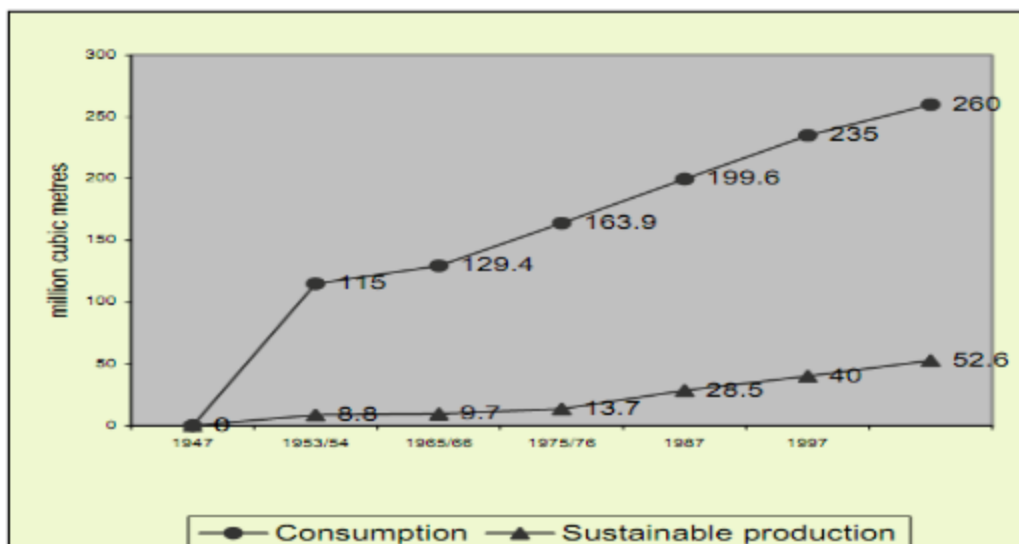
The report outlines demand- supply gap which has referred the expert committee report of MoEF dated 30.01.1998 as below –

In million cubic metre			
Year	Consumption	Sustainable Production	Gap
1953-54	115.0	8.8	106.2
1965-66	163.9	13.7	150.2
1975-76	199.6	28.5	171.4
1987-88	235.0	40.0	195.0

Rural energy data sources and estimations in India - TERI

The report refers to gap between consumption and recorded production of fuel-wood has however increasing, indicating seriousness of the fuel-wood scarcity in India.

Fuel wood consumption and sustainable production since 1947



Conclusion:

Therefore, it is established from the above studies that, a staggering gap exists between the demand and potential for sustainably extractable fuel wood from forest land. While the first three studies refer to the fuel wood supply scenario and the gap that were precedent before 1989; the study by TERI highlight the widening of gap between the demand and supply of biomass after 1989. The widening of the gap has been both due to the increased population pressure as well as the conversion of dense forest to medium dense, scrub and open type forest land due to unsustainable extraction even after the government's initiative towards promotion of afforestation. Thus, it can therefore be concluded that the gap exists from and before 1989 and continued thereafter, forcing the population in using biomass extracted in un- sustainable manner which is identified as non-renewable component.

As demonstrated above, the project activity satisfies qualifying criteria of the selected methodology AMS

- II.G. Hence, the choice of the methodology is justified.

3.3 Project Boundary

According to the Paragraph 3 of approved methodology AMS-II.G., "The project boundary is the physical, geographical site of the efficient systems using biomass".

The project boundary is therefore, encompasses physical, geographical sites of all 14,400 individual households possessing efficient cook stove in Raigad, Thane, Ratnagiri, Sindhudurg, Nashik, Dhule, Nandurbar, Jalgaon, Ahmednagar, Pune, Sangli, Satara, Solapur and Kolhapur districts of Konkan, Nashik and Pune Divisions of Maharashtra. Based on the methodology, GHG included for the baseline and project scenario, leakage for the project activity is CO₂.

Source		Gas	Included?	Justification/ Explanation
Baseline Emission	Emission from combustion of fuel wood in traditional cook stove	CO ₂	Included	This is the major Green-house gas emitting from combustion of fuel wood in the baseline scenario.
		CH ₄	Excluded	Not applicable as per the applicable methodology.
		N ₂ O	Excluded	Not applicable methodology as per the applicable methodology.
Project Emission	Emission from consumption of fuel wood in efficient cook stoves	CO ₂	Excluded	Not applicable methodology as per the applicable methodology.
		CH ₄	Excluded	Not applicable methodology as per the applicable methodology.
		N ₂ O	Excluded	Not applicable methodology as per the applicable methodology.
Leakage Emission	Leakage related to the use/ diversion of non-renewable woody biomass saved under the project activity by non – project households/users	CO ₂	Included	Baseline fuel wood consumption is multiplied by a net to gross adjustment factor of 0.95 to account for leakages.
		CH ₄	Excluded	Not applicable as per the applicable methodology.
		N ₂ O	Excluded	Not applicable as per the applicable methodology.
	Leakage related to if equipment utilised under the project activity is transferred from outside the boundary	CO ₂	Excluded	Not applicable as the equipment is new and not transferred from outside the boundary.
		CH ₄	Excluded	Not applicable as the equipment is new and not transferred from outside the boundary.
		N ₂ O	Excluded	Not applicable as the equipment is new and not transferred from outside the boundary.

3.4 Baseline Scenario

Please refer to section B 4 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

3.5 Additionality

Please refer to section B 5 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

3.6 Methodology Deviations

Not Applicable, as there are no methodological deviations for this project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Please refer to section B 6.1 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

4.2 Project Emissions

Please refer to section B 6.1 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

4.3 Leakage

Please refer to section B 6.1 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

4.4 Net GHG Emission Reductions and Removals

Please refer to section B 6.4 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1 (03-October-2012 to 02-October-2013)	13,627	0	682	12,945
Year 2 (03-October-2013 to 02-October-2014)	13,627	0	682	12,945
Year 3 (03-October-2014 to 02-October-2015)	13,627	0	682	12,945
Year 4 (03-October-2015 to 02-October-2016)	13,627	0	682	12,945
Year 5 (03-October-2016 to 02-October-2017)	13,627	0	682	12,945
Year 6 (03-October-2017 to 02-October-2018)	13,627	0	682	12,945
Year 7 (03-October-2018 to 02-October-2019)	13,627	0	682	12,945
Year 8 (03-October-2019 to 02-October-2020)	13,627	0	682	12,945
Year 9 (03-October-2020 to 02-October-2021)	13,627	0	682	12,945
Year 10 (03-October-2021 to 02-October-2022)	13,627	0	682	12,945
Total	136,270	0	6,820	129,450

5 MONITORING

5.1 Data and Parameters Available at Validation

Please refer to section B 6.2 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

5.2 Data and Parameters Monitored

Please refer to section B 7.1 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>

5.3 Monitoring Plan

Please refer to section B 7.3 of PDD of the UNFCCC registered CDM project reference no. 9501.

The web link of the same is given below:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356978179.26/view>