01

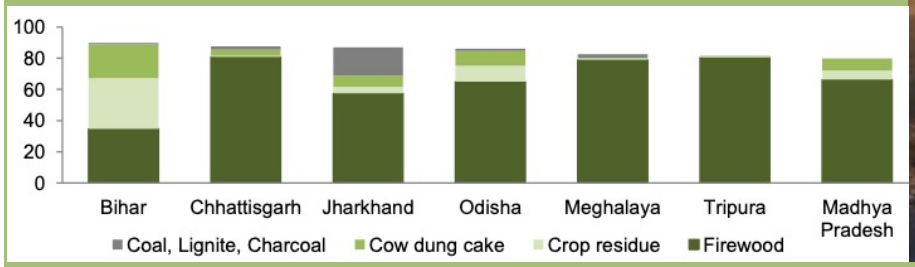
Ecosense Appliances Pvt Ltd

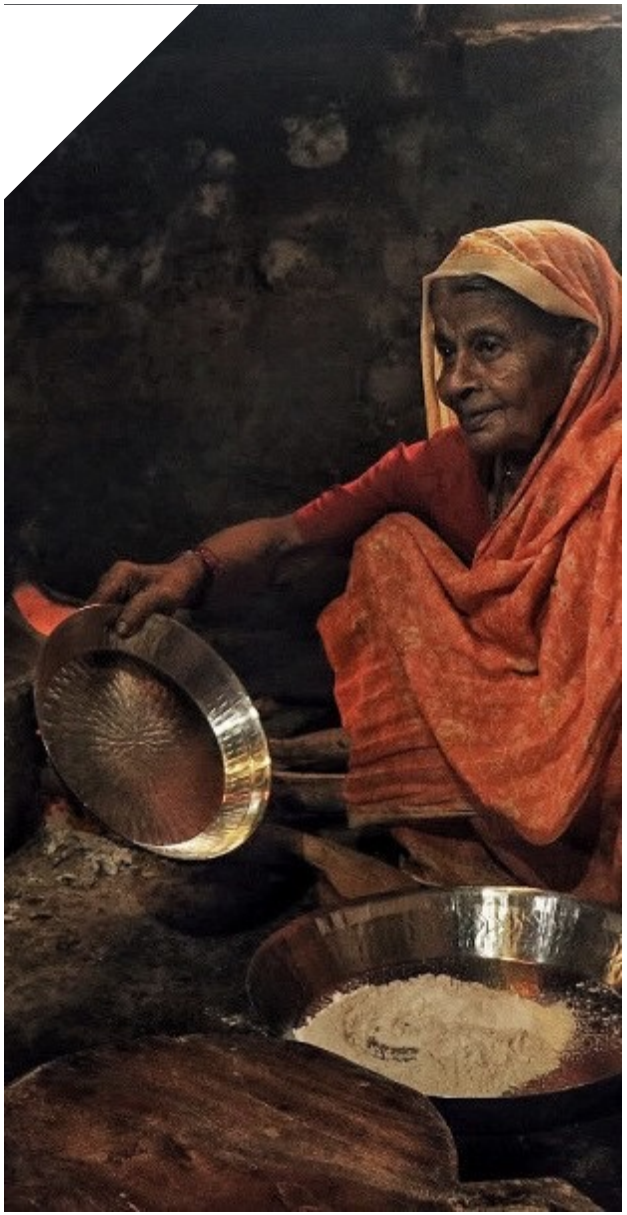
Journey So Far!

In a world of cell phones, satellites, and the Internet, it is often hard to believe that almost half the world's population still cooks food, boils water, and warms their homes by burning wood, dung, other biomass, and coal in open fires.

A little background..

- In India, 819 million people are without access to clean cooking fuel, the dependence on firewood is found high across the states like Jharkhand, Uttar Pradesh, Bihar, Odisha, Assam, and Meghalaya.
- Residential biomass burning has been found to be responsible for about 2,67,700 deaths in India, or nearly 25% of the deaths attributed to PM 2.5.
- 25% of Black carbon emissions come from household energy use & upto 34% of woodfuel harvested globally is unsustainable, contributing to forest degradation and climate change.





ecoSENSE™

EcoSense Appliances Pvt. Ltd.

Sanjay Group

SOLUTIONS WITH INNOVATIONS...

Where We Are Headed

2012

Ecosense was established.

2017

First Pilot project was started in Gujarat.

2018

Ecosense started development on briquette based forced draft institutional cookstove .

2020

Research based approach towards development of stoves.

2022

Development of biomass based bird incinerator.

Vision

Ecosense appliances is committed to provide best solution to societal problems with high energy efficiency, primarily focusing on clean cooking.

Mission

We believe in saving lives and cooking energy through developing appliances and providing clean enregy access to all.

Goals

819 million people in india are without access to clean cooking fuels, our goal is to provide clean cookstoves with high effeciency and less emission and focus on SDG 7: Ensure universal access to affordable, reliable and modern energy services.

How did we get started.

- We conducted research hand developed prototype with running trial at IISC Banglore's H.S. Mukunda, S. Dasappa. The development of stove was part of BP's First Energy Project in 2007.

- The Oorja stove was Biomass pellet based with TLUD technology and Forced draft (Fan from the bottom) with primary outlet from bottom and secondary holes on top.

- Ecosense appliances were responsible for manufacturing of stoves for BP and till 2009 around 2000 stove were produced per day.

Our approach was focusing on Forced Draft Methodology.

Fuel

Stove is based on biomass pellets manufactured from agricultural waste.

Feeding Approach

The biomass cookstove is a TLUD
(top-lit-up-draft)

Capacity

The stove is batch operated. The capacity is 600 grams per batch.

Combustion

The stove burn the pellets completely to ash.

Elegant.

Elegant cookstove was developed to burn pellets made from locally found raw material such as babul tree, garden waste, corn cobs etc. The pellets burn efficiently and smoke free in elegant which makes it safe and easy for women to cook food for family.

The ash tray at the bottom of the chamber collects the ash after combustion.

USP's of Elegant stove

REFRACTORY COMBUSTION CHAMBER

The chamber is made up of refractory

(a combination of ceramic material)

COOKING FOR FAMILY

Cooking on Elegant is easy and Food taste similar to food cooked on traditinal stoves

BIOMASS FUEL

The ignition of pellets is easy and quick which helps in faster cooking process

1. On-Body Battery :

6V Battery with backup of 1 week.

2. Fan Controlling unit :

The controlling unit has 2 modes of cooking.

3.Forced Draft Fan :

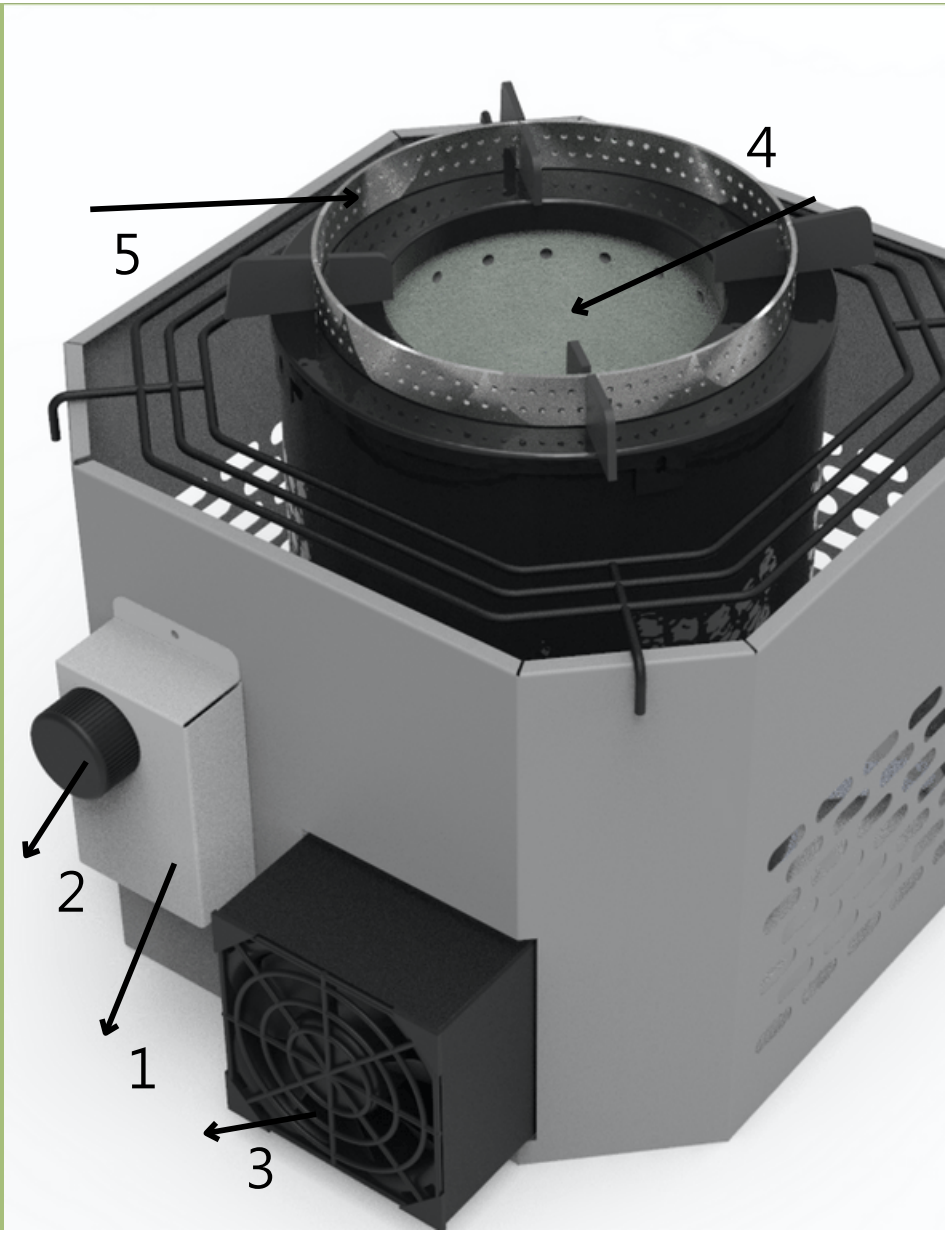
Different speed to circulate air for complete combustion.

4. Refractory for combustion chamber :

The combustion chamber is made of ceramic material for prolonged life.

5. Flame arrester :

The flame arrester ring keeps flame inside the chamber and increases efficiency



Structural specification

1. Cut-out structure on body :

Helps to reduce the temperature from the body.

2. Temperature reducing Gap :

A distance of 15mm from combustion chamber, reducing temperature

3. Ash Tray :

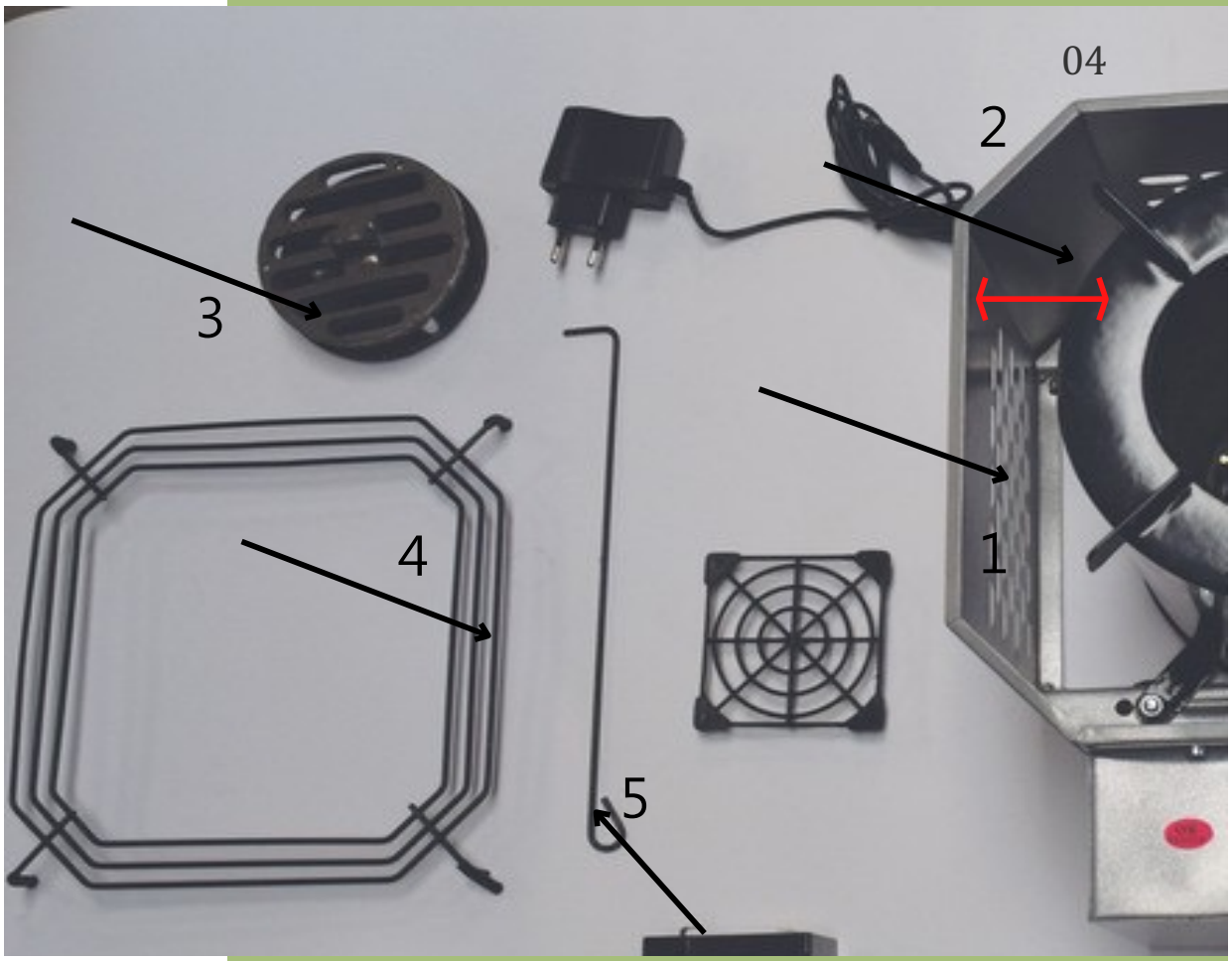
The try at bottom helps collect ash during combustion.

4.Safety Grill

The grill helps keep the food from falling i nside the stove.

5. Ash removal handle

The handle removes the ash tray from chamber to empty after use.



Technical Specification

42%	Efficiency
50 kg	Load bearing capacity
12gm/min	Burn Rate
21 cm x 21 cm x 27 cm	Dimension
7 kg	Weight
600 Grams	Fuel Capacity
9min/1liter	Water Boiling

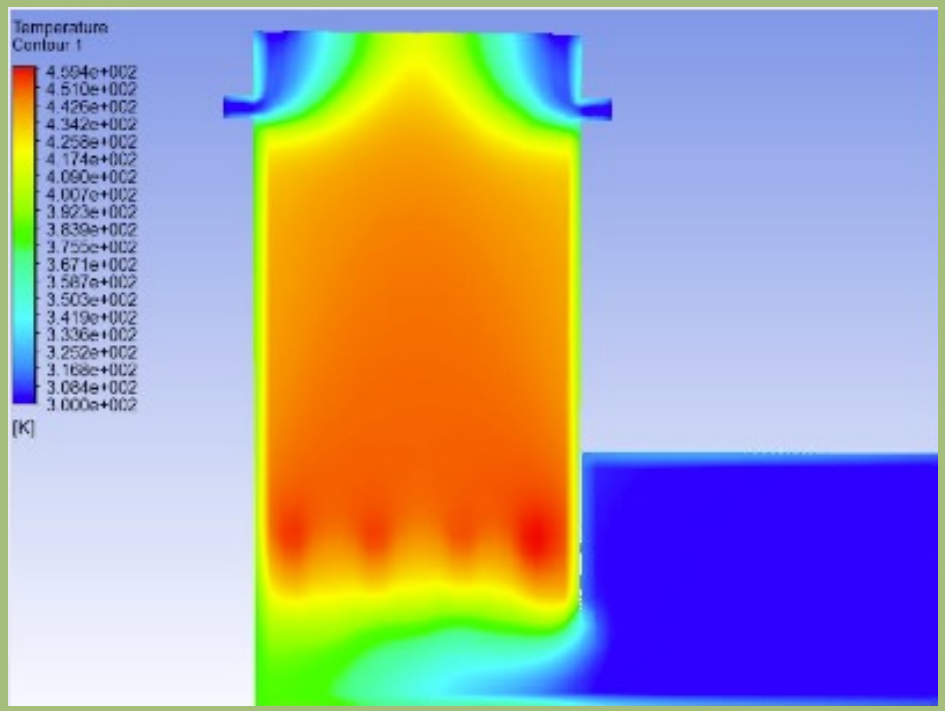
Stove Performance

Thermal Efficiency (%) : 42.01 (TIER 4) CO (g/MJd) : 3.39
PM(mg/MJd) : 0.4
Body Temperature : 35 degree Flame Temperature : 550 degree

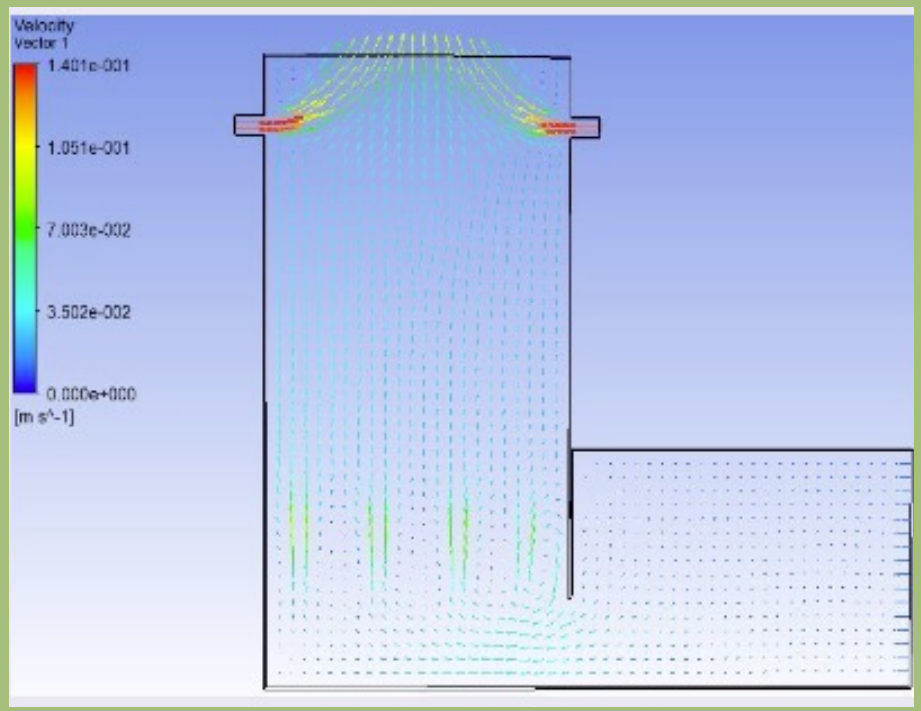
Computational Fluid Dynamic study of Biomass based cookstove

- Two Dimensional Analysis (Planner).
- Steady State Analysis.
- The wood combustion is represented as pyrolyzed volatiles burning, hence the working fluid is a mixture of volatiles and air.

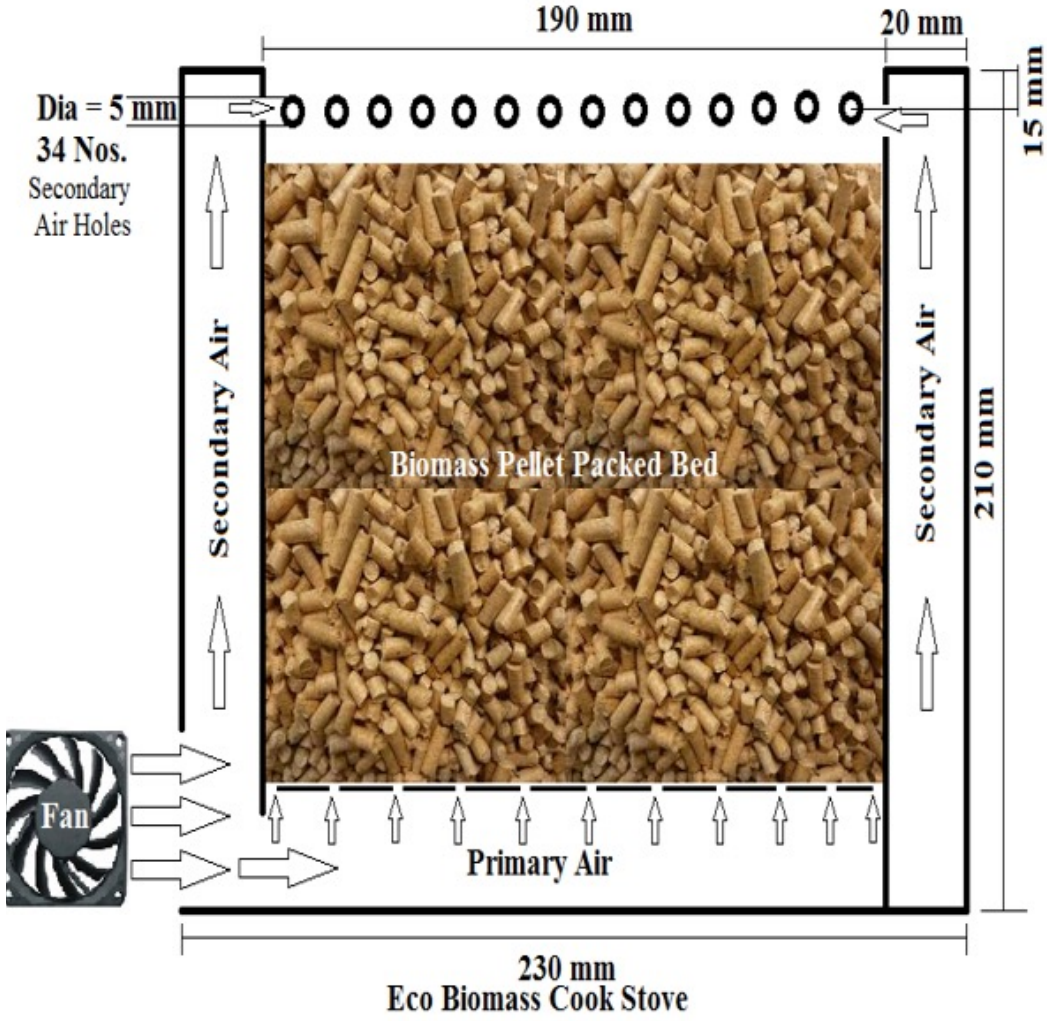
Temperature profile of biomass cookstove in CFD study

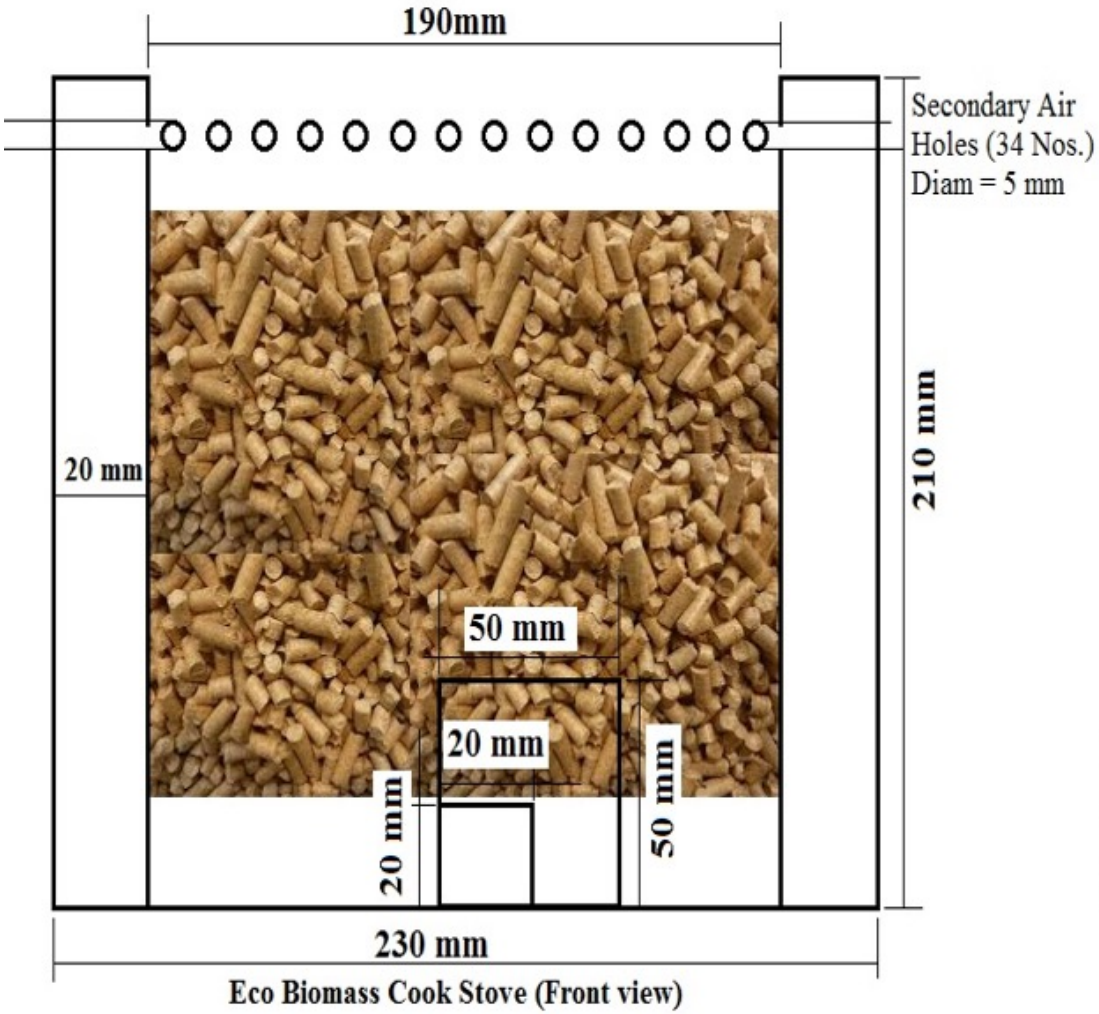


Velocity profile of biomass cookstove in CFD study



Structured pellets stove based approach





SELF SUSTAINING
ENERGY VILLAGE

Mauha, Kalsar, Gujarat

Pilot village

- The project was funded by Pedilite, Mumbai as part of their CSR activity.
- We setup a pellets manufacturing unit, distributed Biomass cookstoves with the self help women's group.

01

self sustaining village

PELLETISATION UNIT

The unit was installed, the raw material used was babul trees from the nearby forest, a shredder and Pellet machine were run 3-4 days/ week.

- Pelletization unit was installed at local NGO's office.
- Raw material was collected from nearby forest, permission from forest official were taken.

STOVE DISTRIBUTION

Biomass cookstove elegant were distributed and received good feedback , the self help group were responsible for sale.

- Self help group's office was developed to hold stock of pellets and stove.
- Women is self help group were trained for after sales service for stove.

02

Awareness activity conducted by locals

Awareness

Focused Group Awareness session were conducted targeting men and school girls

Demonstration

Various Demo for chulla were conducted.

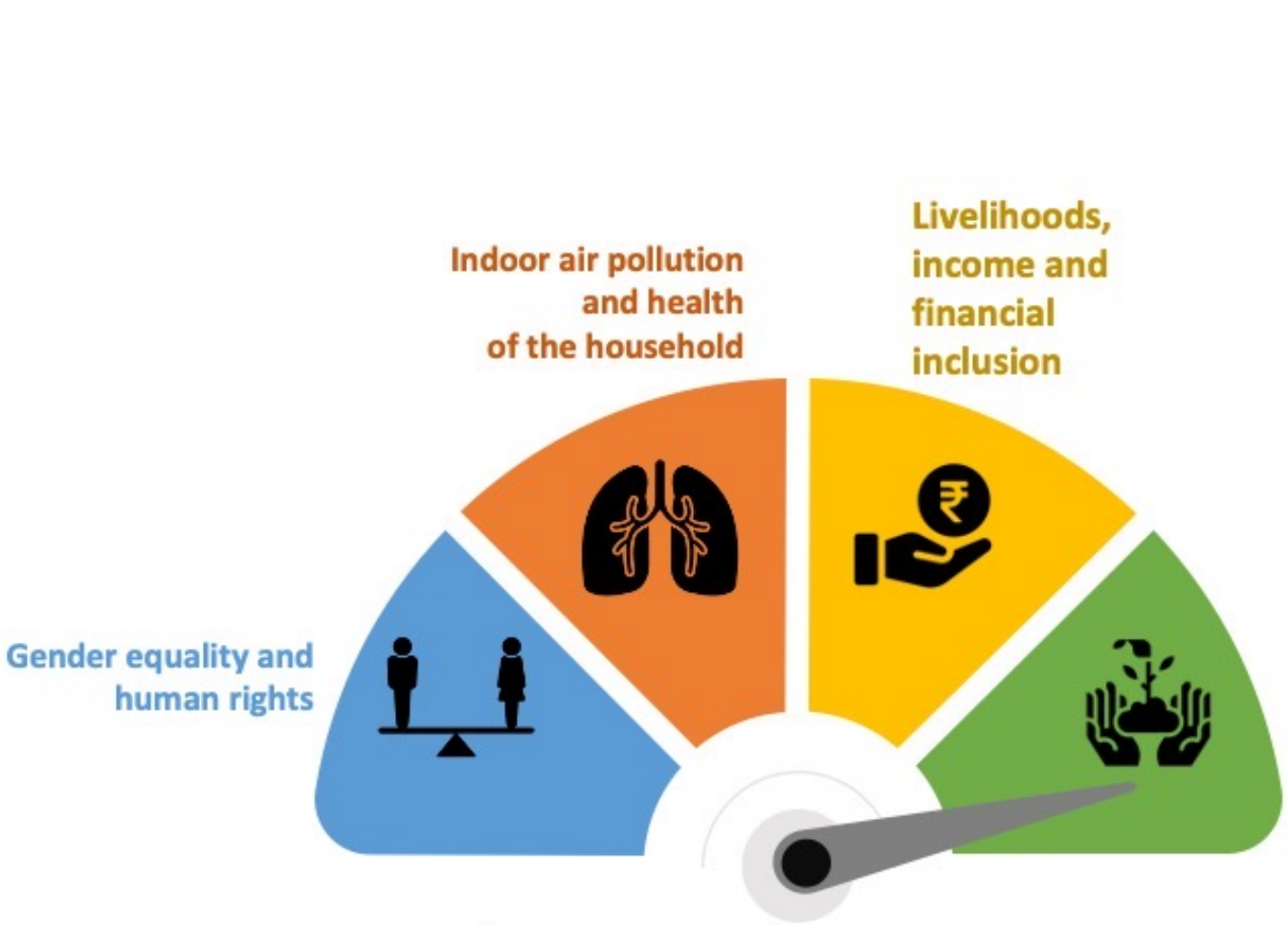
03 Elegant Impact

Health : Improvement in health of women and children in the village, reduction in hospital visits.

Climate : Reducing usage of firewood for cooking resulted in saving 2,500 mature trees/ year . Successful installation of one pellet manufacturing unit

Household : Time collecting firewood is saved each day that can be used for earning livelihood or social activity. The kitchen and vessel are cleaner with the use of Improved stove.

Women empowerment : Women in self help group became sale's agent for elegant in village, conducting awareness sessions and demos to new customers.



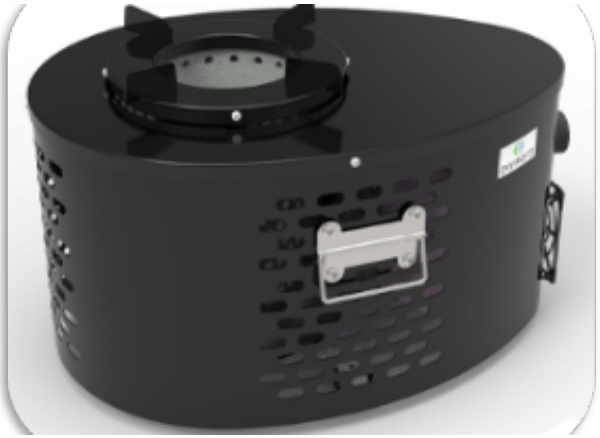
Save 5,00,000 hrs of labor per year in collecting firewood.

9600rps saved per family/year of medical expenses.

200 rps commission for sale of product.

saving 2500 mature trees from being cut each year per cluster.

The Product Basket



Oval model

Fuel capacity : 600 grams (Pellets)

Burn Time : 60 min

Efficiency : 42%

Jyoti Model

Fuel capacity : 2.5kg (Pellets)

Burn Time : 70 min

Efficiency : 39%

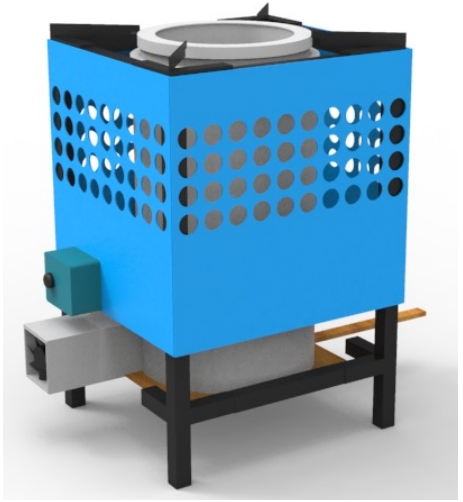
The Product Basket

Ujjwal Model

Fuel capacity : 5kg (Pellets)

Burn Time : 120 min

Efficiency : 36%



Bhuurja Model

Fuel capacity : 10kg (Pellets)

Burn Time : 160 min (Continuous feeding)

Efficiency : 41%

Pellet manufacturing unit

The machine Specification are :

Capacity: 300-500 Kg/day
(it varies with raw material)

Power required :
7.5kw/10hp

Dimension:
1150*560*750mm
Weight: 250 Kg

1

2

3

4

5

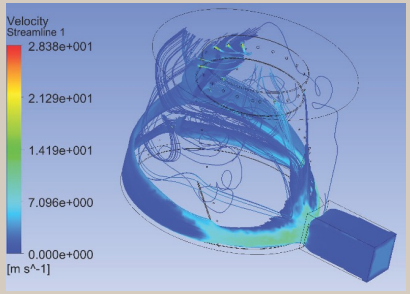
Wood/Agricultural waste
Saw dust, corn cobs, groundnut shell, cotton stalks etc…

→ **Shredding** → **Pelletizing** → **Biomass pellets** → **Clean cooking using Ecochulla**

- Renewable
- Economical
- Easy to use
- Clean
- Eco Friendly
- Energy Efficient

Briquettes based cookstoves

Developing a stove to burn briquettes with forced draft method for community kitchen.

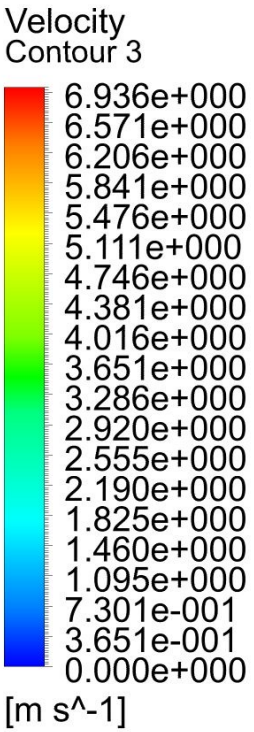


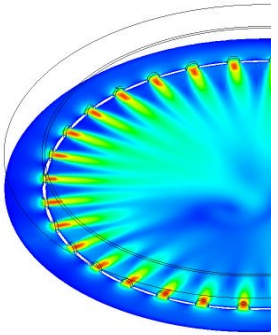
CFD analysis to study the combustion of TLUD stoves.

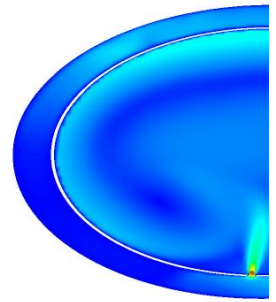
Conducting CFD study to understand the air to fuel ratio and air flow and mixing at secondary hole level.

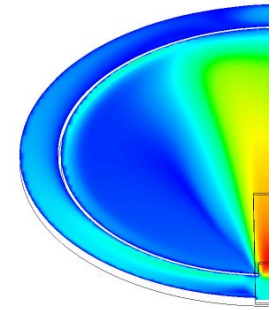
High altitude cooking stove

Developing a stove for higher Himalayan region, conducting survey, monitoring the emission from traditional stoves in each household.









Institute Association

Majority of our research projects are associated with India's prestigious Institutes.

1. Institute of Chemical Technology since 2010
   - Study of cookstove with CFD models
2. NEERI since 2018
   - Development of sustainable appliances for Indian market
3. Indian Institute of Technology, Delhi since 2021
   - Starter Pellet
4. MIT, Manipal since 2019
   - Survey regarding the use of biomass in Rajasthan region.
   - Development of mobile emission sensor.
5. UPES, Dehradun and MIT D –labs (US)
   - Development of cookstove for Himalayan region.

Research Publication

- Review paper on biomass cookstove part 1 : Hydrodynamic study

Institution associated – ICT, Mumbai
Research Publication – I and DC

- Review paper on biomass cookstove part 1 : heterogeneous study

Institution associated – ICT, Mumbai
Research Publication – I and DC

- DEVELOPMENT OF IGNITION PELLETS FOR BIOMASS COOKSTOVES :

Institution associated – Indian Institute of Technology, Delhi
Research Publication - 7th Thermal and Fluids Engineering Conference (TFEC) The American Society of Thermal and Fluid Engineers.

Bird Incinerator

Birds	Poultry sector
Highly efficient	Combustion chamber
40kg/batch	Capacity
20 kg	Fuel Capacity
Mist spray	Smoke quenching to reduce smoke

Thank you.

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