Philips design - about us

We are one of the largest global design studios, committed to delivering competitive value to our clients. We create design solutions focused on personal growth, so people can exist in harmony with each other and with their environment.

We embrace technology, but as a means to an end. It is an enabler, a way of achieving a better quality of life. Our visionary approach - enriching design with human sciences, market research and always with a clear focus on people and their daily lives.
A sustainable design vision

How can design help address and generate solutions for some of the most important issues facing our planet and its people in the coming years?

In September 2005, Philips design global community came together in Eindhoven for a workshop entitled ‘A Sustainable Design Vision’ The event was all about envisioning products and services for the greater part of humanity living in developing nations under challenging living conditions. The main focus was on developing a co-creation processes to facilitate cooperation between diverse stakeholders such as end users, NGOs, local entrepreneurs and self-help groups for women.

With more than 1.6 million people dying annually due to smoke inhalation from indoor wood burning stoves, Philips Design came up with an idea to effectively tackle the problem. This was part of ‘Philanthropy by Design’ a program which looks at promoting social empowerment through knowledge sharing, creativity and co-design.

275 designers from 12 global Design branches
About 80 concepts delivered on 19 different topics
Guests reviewing ideas.

Initial chulha Idea

Low Smoke Chulha
Killer in the kitchen - IAP concern

Indoor air pollution (IAP), resulting from chulhas burning wood, coal and animal dung (biomass) as fuel, is claiming a shocking 500,000 lives in India every year, most of whom are women and children.

India accounts for 80% of the 600,000 premature deaths that occur in south-east Asia annually due to exposure to IAP. Nearly 70% of rural households in India don't even have ventilation. (WHO)

We have estimated that 80% of the expenditure of a rural household in India can go into health services. A simple mechanism promoting smokeless chulhas and improving ventilation can reduce the incidents of IAP deaths by half, which is our goal by 2015.“

Alex Hildebrand, WHO's environmental health adviser for South Asia
Overall goal and objectives

The objective is to provide a low smoke device:
Easy to access (locally produced and distributed), use and maintain
Able to reduce indoor pollution
Available at low cost

Challenges:
To design and test the most appropriate solutions for specific local cooking habits in rural/semi-urban contexts where the cooking is still done on firewood/ biomass.
Adaptability to different fuels (availability in different seasons and regions)
Adaptability to different culinary habits (ways of cooking, vessel shapes, food type e.g. In south steamed rice is cooked and in the north Chappati (breads) is preferred.
Process Overview

1. Premise
2. Context of Use
3. Contextual Study
4. Observation
5. Stakeholders Needs
6. Appropriate Technology
7. Co-design Workshop
8. Design Refinement

Steps:
- Research & Analysis
- Co-creation
- Evaluation

Key Phases:
- Contextual Study
- Observations
- Stakeholders Needs
- Appropriate Technology
- Co-design Workshop
- Design Refinement
- Prototyping, Testing & Feedback
Field research locations in India

MAHARASHTRA

Field Research Locations: Kerwadi, Phaltan, Maltan, Karad
Distance (approximate)  100 km
Field observations: (Rural)

- **Additional Fuel Stock & Barricade**
- **Cattle Shed**
- **Traditional Architecture (Vada)**
- **Modern Concrete Construction**
- **Open Passage for Washing and Drying Clothes**
- **Rear Entrance - Access to Toilet & Fuel Storage Area**
- **Bio Mass / Cow Dung Cakes Storage**
Field observations: Habits (Rural)

Squatting while cooking and preparing

Variety of Biomass fuel collection

Wall as storage

Pounding stone pit on the floor

Damages during use- maintenance and thermal stability of materials

Heavy monolithic stove + heavy and big chimney = added transportation cost
Field observations: Cooking spaces (Rural)

A. Outdoor Cooking
Makeshift setup. Avoid indoor smoke. Convenient. Near to biomass fuel storage

B. Indoor Modern Kitchen
Pucca House. Cement wall & Interiors. Well managed - shelving & storage space

C. Indoor Traditional Kitchen
Mud and clay plastering. Amorphous feel. Human touch.
Field observations: Rural

A perfect Sustainable Lifestyle

Bio Gas cooker in the kitchen  Smokeless Stove  Solar lantern  nursery

Understanding of benefits leads to acceptance of new technologies leading to a better life. Example of Bhosale Family (Pharandwadi).

Studies of existing smokeless/ traditional/ improved devices helped formulate specifications
Field observations: Semi-urban

Positive signs of development
Idyllic lifestyle - best of both worlds

School building. Well turned out children, Water supply system. A symbol of good social action and civil society presence. Roads, communication and media infrastructure = Better awareness and civil society action + improved lifestyle = better consumption

Houses are spacious and well built. Very well kept and maintained. Utensils and kitchen tools are preserved immaculately. Kitchen are sometimes completely equipped with modern amenities. Firewood is bought rather than spending time and effort in collection. Most houses have access to water / tap connection.
## Key Stakeholders Identified

<table>
<thead>
<tr>
<th>ARTI - Appropriate Rural Technology Institute.</th>
<th>Technology research, integrator and provider to rural communities for employment generation and improving overall quality of rural life.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGO - Socio Economic Development Trust ( SEDT ).</td>
<td>Field implementation development program. Rural intelligence and people mobilization on field.</td>
</tr>
<tr>
<td>ENTREPRENEURS - Rural and Semi Urban - Individuals / Small Industrial Units.</td>
<td>Self motivated individuals. Driven by Economic + Social development in the long run.</td>
</tr>
</tbody>
</table>
# Understanding stakeholders concerns and needs

<table>
<thead>
<tr>
<th>Feature</th>
<th>END USER</th>
<th>SHG</th>
<th>ENTREPRENEUR</th>
<th>NGO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reliable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No smoke</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Economical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As economical as</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>my ‘stove’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Should radiate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy finance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Relevant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food habits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Fuels</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pan sizes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking habits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Easy to use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cleaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>soot, ash</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy to re-furbish</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Efficient</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lasting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance options</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits for the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifestyle upgrade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Awareness</strong></td>
<td></td>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td>Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Convincing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END USER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SHG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENTREPRENEUR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NGO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consistent and</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>accurate quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low cost of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ingredients and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Light weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy to install</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and repair</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safe and secure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economical and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>affordable for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the target</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needs based</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive to local culture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acceptance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low emission</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean village</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women and child-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low Smoke Chulha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Co-creation Workshop (ARTI office – Phaltan)

10 participants - ARTI
Program managers, trainers, field implementation staff, research assistants.

3 SHG members - Dhanalaxmi Bachat Gat- Entrepreneurs and users

3 Designers - Philips Design. Pune

Total 16 participants

The participants were briefed on the objectives and project outline.

Participants were encouraged to share their viewpoints through casual dialogues and unanimously identify each stakeholders issues and concerns.

Participants also engaged in imagining their idea of an ideal stove by describing it or visualizing it, solutions for improving efficiency of chulhas, basic principles, etc.,.
Concept directions

1. Compact
   - Fire Mouth
   - Ash pit

2. Accessible
   - Fire Mouth
   - Access to ash pit

3. Flexible
   - Chimney
   - Grate

4. Pride of ownership

5. Accommodative

6. New formats
Chulha variants: from concept to final design

Version 1

Version 2

Version 3 - Final

Saral

Saral

Saral

Sampoorna

Sampoorna

Sampoorna
Process - prototype and testing - stage 1

Design Development
- Development of the selected concepts.
- Foam models

Prototype
- Mould design
- Molds in Foam
- Casting the stoves
- Setting up

Testing Feedback
- Water Boiling test
- Chimney cleaning
- Usability test

- Performance
- Design
- Usability
- Cultural fit
- Marketability

* Names given after the feedback during the tests

Design 1: Sampoorna* (complete)

Sarai integrated stove

Design 2: Saral* (easy)

Modular stove
User test: feedback and validation - stage I

‘Sampoorna’ integrated smokeless cooker roasting + steaming (8 Euro estimation costs)

‘Saral’ modular smokeless cooker functional upgrading (5-8 Euro estimation costs)
User test: feedback and validation - stage I

A complete stove (Sampoorna)  An Easy to use stove (Saral)

Stove with a steam cooker  With two cooking pot holes and hotbox
Low smoke stove variants - prototype stage II

Both the stoves are modular in construction. This enables it to be easily transported, simple to install, Easily replaceable parts and convenient to maintain

**Sampoorna** (meaning *Complete*)

**Saral** (meaning *Easy*)

With Integral steamer

Hotbox
User feedback

The low smoke stoves were installed at 7+ households and were used on a daily basis over a period of time. Qualitative research was conducted with the help of ARTI.

**User (initial responses)**

“The stove is good for cooking regular meals”.
“The second pot is very helpful for boiling water / milk”.
“Most of the smoke goes out of the house”.
“The house used to be full of smoke but now it is much clear”.
“The chulha should last more than three years, but ideally as long as possible”.
“We like the way it looks”.
“I like working at it”.

Nirmala Shivdas Kshirsagar
Asha Suresh Limbhare
Mr. Akbar Umar Sheikh and family
Mrs. Saraswati Nivruti Limbhare
Mr. Dattareya Bahuso Bodare and family
07. Mr. Ramsing Rajput and family
Low smoke stove variants - Final design

**Sampoorna** (meaning *Complete*)

**Saral** (meaning *Easy*)

With Integral steamer

With Hotbox
Design for ease of fabrication, installation & maintenance

- Top cover FRP mould & cast piece
- Mid chamber FRP mould & cast piece
- Sampoorna tunnel FRP mould & cast piece
- Chimney chamber FRP mould & cast piece
Major improvements in final design

01. By pass duct for efficient draft

1. It ensures even heat distribution and right turbulence under the first pot resulting into better contact of pot with the heat and hence faster and even boiling.
2. Experiments show that this helps bring down the boiling time by 3 minutes > Standard stove boils between about 22 minutes, our previous design (without bypass) 13-14 mins. This arrangement helps bring the time to boil to 10-11 mins.
Major improvements in final design

02. Chimney connector for easy cleaning and installation

1. Conventional chimney needed to be cleaned from out-side (from roof top).
2. Earlier chimney design was splitting chimney in 3 parts. This created an issue of soot falling on the wall and surrounding from the fixed piece during cleaning.
3. This solution moves the joint up so that the top part of the pipe - connected to the roof - is smaller and the fixed pipe - connected to the chimney - is longer. The connection in-between holds the pipes and when from cover is opened can help cleaning the fixed part- ensuring all the soot falls in the chulha.
Major improvements in final design

03. Soot collector

1. Soot particles when cooled condense and stick to any surface. This is why one gets a lot of soot on the chimney pipe and the pipe tends to get clogged. Cleaning chimney pipe is a task as one needs to climb on the roof to clean the pipe or dismantle it partly or fully.
2. Soot can be collected by passing the gases through a zig-zag path in the chimney chamber at the stove level.
3. This path built as a separate assembly can be removed and scrubbed to clean the soot.
4. As soot is collected at the earlier point the frequency of cleaning chimney is reduced.
Common and Specific parts

Common parts

Sampoorna parts

Saral parts

Sampoorna stove

Saral stove
Chulha Installation

01. Kitchen corner  
02. Brick layout  
03. Chimney chamber

05. Hot box & tunnel  
06. + fire mouth chamber  
07. + Top cover

08. Chimney connector  
09. Base chimney pipe  
10. Chimney connector cover in place
Chulha Installation and firing.


Initial firing. Boiling water test.
Entrepreneur: Model for scaling up

Distribution and scale

De-centralized manufacturing and distribution

1-2 villages (50-60 households)

Local community insider

Hub-Spoke Model of manufacture and distribution

30-40 villages (~250 households)

Branded entrepreneur