NEW DESIGN – A FACE LIFT

Bhutan EcoStove (BES)

Bhutan Multipurpose Stove (BMS)

Nar Bahadur Khatiwora
PIA, CCME, UNDP
OUTLINE OF THE PRESENTATION

- Background
- Comparison of Designs
- Material and Cost Savings
- Efficiency
1. BACKGROUND
History of ICS

Traditional Stoves
3 Stone Fire

Improved Cookstoves – Early 90s - NWAB
Intervention to Increase Efficiency

1st Intervention – 2002-2006 – DRE/ACO

Stoves tested in Austria – 11/8/2005

Modification – 2013 SRBE/DRE/UNDP

Pilot tested in Phobjikha – Nov. 2005
WHY TO DESIGN ...?
Considerations for Design …

• Mixed feedback from users & field observations

• SRBE Project doc/AWP 2015, activity 2.5: Carry out design modification

13 March, 2015 – Decision of the bilateral meeting between DRE and UNDP
How to go about ...?

- New Design
- Modify Existing Design
- Continue with Existing Design
Research Timeline

Task 1
Initiation of Research Work

Task 2
Made mud bricks using clay moulds

Task 3
Developed different metallic options

Task 4
Constructed 5 different prototype

Task 5
Best performing – Tested at Accredited Lab

Q1
Agreement

Q2
Bricks Making

Q3
Metallic Parts - Research

Q4
Prototype Development & Testing

Q1
Tender-Pilot Testing - 1,000 Nos.

Today
DESIGN OF DIFFERENT COMPONENTS
TOP PLATES

› Existing Design

› New Design

Saving of about 9 kg of metal
DOOR

- New Design
- Existing

Wt. 2.9 Kg
**FIRE GRATE**

- New Design
- 4.38 kg

**FLUE DAMPER**

- Existing Design
- 2.50 kg
BALANCING THE TWO ...
## Material and Cost

<table>
<thead>
<tr>
<th>SL #</th>
<th>Particular</th>
<th>Type of Stove</th>
<th>Existing Design</th>
<th>New Design</th>
<th>Difference</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weight [kg]</td>
<td>3-Pot Stove</td>
<td>42.67</td>
<td>23.49</td>
<td>19.18</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-Pot Stove</td>
<td>36.46</td>
<td>23.49</td>
<td>12.97</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fodder</td>
<td>13.15</td>
<td>0</td>
<td>13.15</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Cost (Nu.)</td>
<td>3-Pot Stove</td>
<td>6,270</td>
<td>3,850</td>
<td>2,420</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-Pot Stove</td>
<td>5,030</td>
<td>3,850</td>
<td>1,180</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fodder</td>
<td>1,233</td>
<td>0</td>
<td>1,233</td>
<td>100%</td>
</tr>
</tbody>
</table>
Want big impact?

EFFICIENCY...?
Use charts to explain your ideas
<table>
<thead>
<tr>
<th>Water Boiling Test ...WBT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Boiling Test</strong></td>
</tr>
<tr>
<td><strong>WBT</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Water</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;boil&lt;/sub&gt; -6degC</td>
</tr>
<tr>
<td></td>
<td>Fresh Water</td>
<td></td>
</tr>
</tbody>
</table>

**COLD START**

**HOT START**

**45 min. SIMMER**

**T<sub>boil</sub>**

**Water Temperature**

**T<sub>room</sub>**

**Time**
Fodder Stove

Multipurpose Stove
2-Pot Stove

Bhutan EcoStove (BES)
And tables to compare data

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>10</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Blue</td>
<td>30</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Orange</td>
<td>5</td>
<td>24</td>
<td>16</td>
</tr>
</tbody>
</table>
Maps

our office
89,526,124
Whoa! That’s a big number, aren’t you proud?
89,526,124 $
That’s a lot of money

185,244 users
And a lot of users

100%
Total success!
Our process is easy

FIRST  SECOND  LAST
Let’s review some concepts

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yellow</strong></td>
<td>Is the color of gold, butter and ripe lemons. In the spectrum of visible light, yellow is found between green and orange.</td>
</tr>
<tr>
<td><strong>Blue</strong></td>
<td>Is the colour of the clear sky and the deep sea. It is located between violet and green on the optical spectrum.</td>
</tr>
<tr>
<td><strong>Red</strong></td>
<td>Is the color of blood, and because of this it has historically been associated with sacrifice, danger and courage.</td>
</tr>
</tbody>
</table>
You can copy & paste graphs from Google Sheets
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Place your screenshot here
THANKS!

Any questions?
You can find me at:
@username · user@mail.me
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Carl Hiaasen