Value Chain in Development: Bamboo Charcoal

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History of bamboo charcoal in China

- Due to harsh deforestation to natural forest, suffering from heavy floods and disasters, government has national natural forest protection program, wood charcoal production was prohibited, now wood charcoal export is also prohibited.
- Some charcoal producers started and tried to produce bamboo charcoal to replace wood charcoal for their livelihood.
- Early stage, bamboo charcoal was only exported to Japanese market as no domestic market.
- Later more and more consumers are aware that bamboo charcoal’s functions, domestic market is booming up.
- Over 100,000 t bamboo charcoal production for a value of 1 bil US$, more and more uses.
4 Elements of bamboo charcoal value chain in China

- Production
  Brick kiln, metal kiln

- Marketing
  Fair/exhibition, advertisement, shop, supermarket, internet

- Research & innovation
  Uni & institutes, enterprises

- Products and use
  More than 8 series of products
Pressed rod from waste/residue from processing

carbonization

烧烤炭

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Bamboo charcoal

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Bamboo charcoal classification and uses

• Classification of bamboo charcoal
• Products classification based on uses
• 1. For humidity regulation in room
• 2. Charcoal particle for odor-absorbant, water purification
• 3. Charcoal mat etc. for daily life
• 4. Charcoal handicrafts
• 5. Charcoal for rechargeable battery
• 6. Charcoal for shade of electromagnetic wave
specific surface area
Wood charcoal
<20m²/g

Bamboo charcoal
200-600m²/g

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Deodorant for refrigerator

Water purification

Mattress for car

Dehumidify air in room

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Charcoal board & paper
Bamboo vinegar/coal tar & charcoal for hygiene/cosmetics, pesticide.

Bamboo charcoal soap

Vinegar for bathtub

Bamboo vinegar soap

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Charcoal for food

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Bamboo charcoal for waste water treatment

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Bamboo charcoal in Ethiopia

• Production
Metal and brick kilns for carbonization; hand tool and machine for briquette production

• Research & innovation
INBAR, EREDPC & FeMSEDA
Efficient stoves for charcoal, briquette and firewood

• Marketing
Direct sale, fair/exhibition;
Very good market for charcoal and stoves

• Products and use
Bamboo charcoal, briquettes (ball, honeycom etc)

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Some Facts about Ethiopia

• 80 mil population, >80% city residents using wood charcoal for cooking

• Due to continuous deforestation, forest cover <3% in 2005, short of fuelwood (firewood and charcoal)

• 1 mil ha bamboo forest in 1997, Bamboo (charcoal) could replace wood (charcoal) totally in a sustainable harvesting.

• INBAR has launched an EU & CFC funded bamboo biomass energy project 2009 in Ethiopia and Ghana

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Bamboo charcoal as fuelwood

- 30,000J/g, smokeless charcoal
- Substitute of wood charcoal
- Save natural forest
- 4 tons bamboo produces 1 ton charcoal
- Simple technology
- Low investment
- Technology transfer
Bamboo as sustainable biomass energy:
A suitable alternative for firewood and charcoal production in Africa
2009-2013
Technology transfer

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TRAINING USING THE METAL KILN

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BAMBOO CHARCOAL BRIQUETTE MAKING

Used for honeycomb briquette as well as the carbon rod with six-edge shape by changing the die.

Honeycomb briquette
Output = 40 briquettes/minute
Power = 7.5 kW
Dia. beehive briquettes = 100mm
Height of briquettes = 70-80 mm
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Comparison of wood charcoal products with bamboo charcoal products

<table>
<thead>
<tr>
<th>Type of biofuel</th>
<th>Volatile matter (%)</th>
<th>Calorific value(cal/gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bamboo charcoal</td>
<td>17</td>
<td>6959</td>
</tr>
<tr>
<td>Acacia charcoal</td>
<td>24</td>
<td>7780</td>
</tr>
<tr>
<td>Prosopis charcoal</td>
<td>27</td>
<td>6756</td>
</tr>
<tr>
<td>Bamboo charcoal briquette</td>
<td>13</td>
<td>7100</td>
</tr>
<tr>
<td>Cotton stalk charcoal briquette</td>
<td>18</td>
<td>4588</td>
</tr>
<tr>
<td>Chat stalk charcoal briquette</td>
<td>31</td>
<td>5100</td>
</tr>
</tbody>
</table>

Bamboo charcoal (briquettes) high heating value, as indicated by the calorific value, shows that it gives a good amount of heat per weight unit of fuel. This will result in efficient cooking, as long as the bamboo charcoal (briquettes) are burned using an appropriate stove, such as those introduced in Ethiopia and Ghana as part of the project.

The cause of smoke and pollution is moisture content and volatile matter. Moisture content does very much depend on the processing, not really on the resource used. The table represents figures for oven dried biofuels. Firstly the table illustrates that bamboo charcoal and briquettes are in general lower in volatile matter than other resources, which explains why bamboo biofuels burn cleaner.
More and more MSEs involved in bamboo charcoal and stove production and sale in Ethiopia

Bamboo charcoal MSEs:
• Adal bamboo charcoal factory (waste for charcoal briquette)
• Dar Biomass Briquette factory
• Green Charcoal Factory
• Stove MSEs:
  • Admass Fuel Saving Stoves and Metal Work Enterprise
  • Google Fuel Saving Stoves Producers and Metal work Enterprise
  • G.A.H Fuel Saving Stoves producers and metal Work Enterprise
  • Progress Tee (Over 30,000 for briquette and 5000 for firewood)
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Fair and exhibition

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Thank you
Vielen Dank
Merci
Gracias
谢谢!