Pellets: An Alternate Cooking Fuel to Charcoal and Firewood
“INDEPENDENCE BEGINS AT THE BOTTOM...”

A society must be built in which...

Life will not be a pyramid with the apex sustained by the bottom... the outermost circumference will not wield power to crush the inner circle but will give strength to all within and derive its own strength from it.”
Reason for Being

Abellon’s core purpose is to increase energy access globally in a sustainable manner.

Energy access is a key driver to create economic growth and helps people emerge from poverty into the mainstream economy. This objective needs to be achieved in a manner that is environmentally and financially sustainable, promotes energy independence and is good for local communities. Abellon’s mission is to find innovative solutions achieving all these objectives by combining knowledge from diverse disciplines and aligning efforts with local stakeholders.
Pellet Operations: India & Global

Biomass Pellets manufacturing facilities in India

- Pilot Plant: 18,000 TPA (2009)
- GDM Plant: 36,000 TPA (2010)
- VTP Plant: 60,000 TPA (2012)

Biomass Pellets manufacturing facility, Canada

- Canada Plant: 130,000 TPA (2013)

Biomass Pellets manufacturing facility, Ghana

- Ghana Plant: 100,000 TPA (2014)

Pellet Operations, Europe

- Successful trials of cookstoves @Ghana

Biomass Pellet based appliances manufacturing facility in India

- Pellet Production: Scale up
Biomass Pellets and based Appliances

Biomass Pellets

Range of Biomass Pellets based Appliances

Cookstoves

CFS Turbo

Pearl Burners

CFS

Pellet Hot Water Generator

Green Burner

Industrial Burner
Abellon CleanEnergy Ghana

- Pellet manufacturing facility: A pioneering effort for the country
- Value from waste model: Potential to utilize 1,20,000 tons of wood based residues, generate revenues and energy self reliance for the country
- Member of the BCTA & Global Alliance for Clean Cookstoves
- Recently recognized as winner of the 2015 African Business Award for Innovation
Challenge in Ghana: Efficient waste utilization

Widely practiced harmful and inefficient waste disposal

Unused potential of wood waste

The solution is …

Sustainable Approach for Efficient Waste Utilization!
Value Chain from Source to Customer

1. Source of Biomass
   - Wood Village / Saw Mills

2. Biomass Collection and Sending to the Collection Hub
   - Biomass from different sources is gathered at Collection Hub

3. Collection & Loading of Biomass at the Collection Hub

4. Biomass from Collection Hub is Transported to Pellets Manufacturing Plants
   - Biomass is transported to Abellon's Pellets Manufacturing Facilities

5. State-of-the-Art Pellets Manufacturing
   - Abellon's state-of-the-art Facilities

6. Production of Pellets and Transportation to Ports

7. Distribution of Pellets to the End Users
   - Exports and Sales of Pellets

8. International Markets
Solid Biofuel Plant – Operation
Fuels used for Cooking…

- Charcoal
- Fire Wood
- LPG
- Kerosene
- Agricultural Residue

80% of population relies on traditional biomass, including fuel wood or charcoal, agricultural waste and animal dung to fulfill their daily energy needs.
And their implications...

- Safety and health concerns:
  1.6 million people, especially women and children, die prematurely each year from exposure to high levels of indoor smoke from home cooking and heating practices.

- Fluctuating cost of fuel

- Availability of fuel

- Deforestation

- Climate Change

- Subsidy burden on Government
The Need of the Hour.....

A sustainable approach towards tapping the full potential of Bio-Energy in Ghana to achieve economic, environmental and social transformation
Solid Bio-Fuel – Pellets

- **Pellets** are Eco-friendly carbon neutral, Solid Biofuel.

- **Pellets are alternate to Charcoal and Firewood.**

- Pellets are small "nuggets" of compressed agricultural and forest waste including wood waste.

- A wide variety of biomass can be utilized to make bio-pellets like cornstalks, straw, residual forest waste, etc.

- It is a refined and densified biomass fuel that allows remarkable consistency and burning efficiency at substantially lower particulate emissions.
Eco-Pellets – A sustainable product

SUSTAINABLE

- Made from refined and densified leftover organic & forest residues
- Sustainable and Eco friendly Renewable fuel
- Replacement to conventional fossil fuels

CLEAN & ECONOMICAL FUEL

- Better and clean fuel with higher combustion efficiency
- Results in clean local environment as well as lesser human exploitation
- Significantly lower energy costs compared to other clean burning fuels like LDO and natural gas

EFFICIENT

- Remarkable consistency and burning efficiency
- High calorific value

USER FRIENDLY

- Highly safe: non-inflammable - no risk of explosion during transport/end use
- Widely utilized in different types of boilers and furnaces.
- Better compatibility with multiple technologies
- Varied applications – electricity & steam generation, heating and cooking
## Comparison with Charcoal

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Charcoal</th>
<th>Pellets</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk Density</td>
<td>200 kg/m³</td>
<td>650 k/m³</td>
<td>Large storage space required</td>
</tr>
<tr>
<td>Fixed Carbon</td>
<td>60-70%</td>
<td>15-20%</td>
<td>Possibility of incomplete combustion in absence of adequate air supply</td>
</tr>
<tr>
<td>Production</td>
<td>Traditional process</td>
<td>Modern scientific Technology</td>
<td>Inefficient production</td>
</tr>
<tr>
<td>Production Ratio</td>
<td>1 kg charcoal = 7 kg wood</td>
<td>1 kg pellet = 1.5 kg wood</td>
<td>High energy loss during production</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td>5%</td>
<td>25%</td>
<td>Inefficient utilization of energy</td>
</tr>
</tbody>
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## Comparison with Charcoal

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<td>Production Ratio</td>
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<td>1 kg pellet = 1.5 kg wood</td>
<td>Loss of Environmental resources</td>
</tr>
<tr>
<td>Raw material</td>
<td>Wood</td>
<td>Wood Waste / Agri Residue</td>
<td>Saving Deforestation</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Carbon</td>
<td>Yes</td>
<td>No</td>
<td>Reduced indoor air pollution</td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>Unorganized</td>
<td>Organized</td>
<td>Reduced labor exploitation</td>
</tr>
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**Comparison with Charcoal**

- **Environmental**
  - Production Ratio: 1 kg charcoal = 7 kg wood, 1 kg pellet = 1.5 kg wood
  - Effect: Loss of Environmental resources

- **Raw material**
  - Charcoal: Wood
  - Pellets: Wood Waste / Agri Residue
  - Effect: Saving Deforestation, Utilization of waste, Saving land degradation

- **Health**
  - Black Carbon: Yes, No
  - Effect: Reduced indoor air pollution, Improved maternal and Child health

- **Economic**
  - Industry: Unorganized, Organized
  - Effect: Reduced labor exploitation, Revenue loss to the government
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Charcoal</th>
<th>Ecopellet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition Time</td>
<td>20 min</td>
<td>5 min</td>
</tr>
<tr>
<td>Ignition</td>
<td>Lot of smoke</td>
<td>Smokless</td>
</tr>
<tr>
<td>Cooking</td>
<td>Slow</td>
<td>Fast</td>
</tr>
<tr>
<td>Flame control</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Fuel waste</td>
<td>Possible</td>
<td>NO</td>
</tr>
<tr>
<td>Fuel Quality</td>
<td>No Standard</td>
<td>Specific</td>
</tr>
<tr>
<td>Cooking Appliance</td>
<td>Need more appliance</td>
<td>Less Appliance</td>
</tr>
<tr>
<td>Food Application</td>
<td>Boiling, Frying, Roasting</td>
<td>Boiling, Frying, Roasting</td>
</tr>
</tbody>
</table>
## Gas Vs Ecopellet

<table>
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<tr>
<th>Parameter</th>
<th>LPG</th>
<th>Ecopellet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition</td>
<td>Instant</td>
<td>Slower than LPG</td>
</tr>
<tr>
<td>Ignition</td>
<td>Smokless</td>
<td>Smokless</td>
</tr>
<tr>
<td>Cooking</td>
<td>Fast</td>
<td>Fast</td>
</tr>
<tr>
<td>Flame control</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Fuel waste</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Food Application</td>
<td>Boiling, Frying</td>
<td>Boiling, Frying</td>
</tr>
<tr>
<td>Availibility</td>
<td>Limited/Scare</td>
<td>Available</td>
</tr>
<tr>
<td>Fire Hazzard</td>
<td>Blast Possible</td>
<td>Safe</td>
</tr>
</tbody>
</table>
Eco-Pellet Applications

Industrial
- Utility requirement for industrial units and Boilers
- Co-firing in Large thermal Power plants

Commercials / Institutions / SME
- Heating needs at community level and large spaces such as malls, educational institutions, etc.
- Cooking Needs at Schools, Chops Bars, Restaurants, Hotels.
- Agri Processing for Heating and Drying.

Retails
- Use in pellet stoves in domestic / home heating and cooking
EcoPellet - Benefits

Health & Environment
- No Indoor Air Pollution

Safe
- No risk of fire hazard

Convenient
- Easy to USE
- Adjustable in Existing Technology
- Movable & Flexible

Efficiency
- 35 - 40%

Cost Saving
- 15 - 20%
EcoPellet - Benefits

- Consistent and uniform flame
- Flame Regulator like Gas
- Clean and hygienic environment
- Smokeless and noiseless operation
- Safe - no risk of fire / Blast
- Better Work and Health Condition.
- Made in Ghana Product approved by Ghana Standard Authority.

Saving Against Gas

- 1 Kg Gas = 2.6 Kg Eco-Pellets
- Ghs 3.8 Gas = Ghs 3 Eco-Pellets.
EcoPellet Application in Ghana

- Groundnut Soup
- Palm nut Soup
- Goat / Chicken Soup
- Rice Preparation.
- Cassava Boiling (Fufu)
- Kenkey Preparation
- All Type of Soups and Stews.
- Preparation of Cereals / Beans
- Tom Brown and Porridge
- Any Other Boiling / Frying Application
Some Success Stories
MINISTRY OF POWER

20th April, 2016

LETTER OF INTRODUCTION AND SUPPORT

Abellon CleanEnergy, is a company registered in Ghana and headquartered in Ahmedabad, Gujarat, India with operations in Italy and Canada. Abellon is an integrated sustainable energy service provider with a vision to contribute to clean energy generation through focus on bioenergy; including bio-pellets, bio-fuels, bio-power and waste management as well as other forms of clean energy generation.

Abellon CleanEnergy Ghana Limited has established a Solid Biofuels Plant (Wood Pellets) in Asaago, near Kumasi in the Atwima Kwanwoma District of the Ashanti Region that utilizes wood and agri waste generated by sawmills, the Sokoban Wood Village and timber processing mills for the production of wood pellets for use in Abellon Eco-Stove.

Under the Sustainable Energy for All (SE4ALL) Country Action Agenda, Ghana is seeking to promote the use of efficient biomass stoves for commercial cooking (agro-processing and cooking) and have at least two (2) million households adopt clean cookstoves by 2020. Government’s commitment to this course is not only to save our forest but also reduce the exposure to harmful smoke emission especially in the case of women and children.

Abellon CleanEnergy Ghana Limited wishes to support this initiative through the introduction of Abellon Eco-Stove and Abellon Eco-Pellets on the Ghanaian market.

The Ministry of Power hereby endorses the activities of Abellon CleanEnergy Ghana Limited and will be grateful if you could extend to them the necessary courtesies to help government achieve the set targets.

SOLOMON ASGALI
AG. CHIEF DIRECTOR
FOR: MINISTER

GHANA STANDARDS AUTHORITY

THE AUTHORITY HEREBY GRANTS TO

ABELON CLEAN ENERGY GHANA LIMITED

of KUMASI, ASHANTI REGION

Licences are granted subject to the Ghana Standards (Certification Mark) Rules, 1979 (L.1663) as amended in respect of the Mark and to any undertakings into which the Licensee has been required to enter with the Authority prior to the grant of the Licence and it shall be binding upon the Licensee to observe and perform all the said Rules and Undertakings.

Signed for and on behalf of the Authority

Date of Issue 2016-01-26
Date of Expiry 2017-01-27

SCHEDULE

Mark of Uniformity Certificate of suitability to the use of Mark is granted
SASB 1399: 2007 (AS GUIDE) - WOOD PELLETS

Abellon CleanEnergy | Ghana
Awards & Accolades

- Zayed Future Energy Price 2014
- Ashden Award 2011
- African Business Awards 2015
- Renewable Energy India Awards 2015
- Energy Globe Award 2015
- Dubi Internation Award 2014
- Project of the Year 2013
- Parivartan Award 2013
- Buckminster Award 2013
- Land for Life Award 2013 & 2014
- Renewable World Award 2012 & 2013
- World Bioenergy Award 2012 (semi-finalist)
- Golden Peacock Award 2011
- AREA Award 2009 & 2010
Thank You!!