PELLET MANUFACTURING AND RENEWABLE HEAT APPLICATION IN COOKING
AT ECREEE BIOENERGY WEEK, GHANA
22 – 24 JUNE 2017
The Group

FUEL

FEED

HEAL

TEACH

Nation Building through Innovation
Reason for Being

Energy access is a key driver to create economic growth and to 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.

**Triple Bottom Line Approach:** Integrating sustainable development models, income and employment generation, no food-fodder-fuel conflict, and energy self reliance for the nation.
Abellon – Integrated Model

**RENEWABLE POWER**
- Solar Energy
- Waste to Energy
- Any-Source Biomass Power

**RENEWABLE HEAT**
- Biomass Pellets
- Pellets Based Appliances

**AGRI SCIENCES**
- Agroforestry
- Soil & Plant Nutrition
- Dairy Farming

**BIOMASS RESOURCES**
- Biomass Characterisation
- Biomass Collection
- Energy Farming

**TECHNOLOGY DEVELOPMENT**
- Equipment Development
- Pellet Torrefaction
- Energy Storage

**RENEWABLE FUELS**
- Lignocellulosic Ethanol
- Algae Biodiesel

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**BUSINESS VERTICALS**

**DEVELOPMENT VERTICALS**
Global Presence
Renewable Heat
Biomass Pellets and Based Appliances

Biomass Pellets

Pellet Based Appliances

Industrial Pellets

- Suitable for industrial heating applications worldwide.
Capabilities: India & Global

Pellet manufacturing facility, India

Pellet manufacturing facility, India

Pellet manufacturing facility, Ghana

Pellet operations, North America

Pellet operations, Europe
Abellon Agrisciences Sustainable Biomass
Over 5000 biomass samples successfully analyzed

Energy farming model ensuring uninterrupted supply of biomass with productive use of waste & marginal land.
Agroforestry Project

Over 120 acres of marginal land in Modasa, Gujarat for inter-cropping of energy & food crop plantation with best agriculture practices for specialty, high-yield crops
Agroforestry Project: India

Large scale Bamboo Plantation in 120 acres of land
Over 135,000 Bamboo planted till date
Solar Agro-Electric Model: India

- Efficient and sustainable resource management practices
- Dual use of land
- Dual use of water
- Harvesting solar radiation and agricultural produce
Agro Forestry: Food & Energy Crop

BioEnergy Crops – Bamboo

BioEnergy Crops Plus Food Crop – Bamboo + Banana, Papaya, Drumstick, Garlic, Ginger

Energy Materials as well as Food Materials
Ghana Pellet Manufacturing and Applications
Abellon CleanEnergy Ghana

– Pellet manufacturing facility: A pioneering effort for the country

– Value from waste model: Potential to utilize 100,000 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
Challenges in Ghana: Efficient Biomass Utilization

Widely practiced harmful and inefficient waste disposal

Unused potential of Biomass
Biomass Residue Sources – Small Sawmill Clusters

Sokoban Wood Village: 150 TPD

No. wood processing unit: 300

Understanding with Kumasi Metropolitan Assembly (KMA) for cleaning and collection of residue and save cost
Biomass Residue Collection – Small Sawmill Clusters

Wood Village Consist of Carpenters, Saw millers, Lumber cutters, Planners etc

Women stuffing biomass sacks

Biomass is ready in sacks to load

Truck to Load Biomass

Saw mill shed
Pellet Manufacturing Facility in Ghana
## Fuel Used for Cooking

<table>
<thead>
<tr>
<th>Fire Wood</th>
<th>Charcoal</th>
<th>Agri Residue</th>
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**80% of population** relies on traditional biomass, including fuel wood or charcoal, agricultural waste and animal dung to fulfill their daily energy needs.
Current Technologies for Cooking

3 Stone Fire
- Most common stove in Northern Ghana and rural areas
- Used with firewood and other biomass fuels which are collected
- Very poor fuel utilization
- Easily adaptable
- Ease of use: Minimal
- Availability: Low

Mud Stove
- Self-made stoves based on local materials
- Used with firewood and other biomass fuels
- Adaptable to cooking needs and pots
- Ease of use: Minimal
- Availability: Low

Coal Pot
- Most popular charcoal stove, made of thick scrap metal
- Sold by retailers in different sizes based on need, easily available in public markets
- Lifetime between 2-4 years
- Ease of use: Minimal
- Availability: Low

Tire Rim
- Charcoal stove made from a used vehicle rim
- Very heavy to carry and not easily adaptable
- Lifetime between 3-5 years
- Ease of use: Minimal
- Availability: Low

Key:
- O Minimal
- ♦ Low
- ♦ Medium
- ♦ Medium-High
- ♦ High
Pellets: A Sustainable Source of Energy

**Efficient**
Their uniform shape and size ensure that Eco-Pellets offer remarkable consistency & burning efficiency. Eco-Pellets have low moisture and ash content, which further add to their performance.

**Safe**
Eco-pellets are absolutely safe to use and store as there is no risk of fire hazards.

**Smokeless Operation**
Eco-Pellets offer smokeless operation as well as clean and hygienic working environment.

**Cost Effective**
Customers can significantly lower their energy costs through use of eco-pellets.

**Sustainable & Eco Friendly**
Use of Eco-Pellets reduces emissions through utilization of biomass residue, and replacement to conventional fossil fuels.

**Easily Available**
Eco-Pellets are manufactured locally, within the country, using the abundant biomass resources available as a result of a thriving timber industry. Thus, unlike imported fuels such as LPG and Diesel, there is no fear of shortages, stock-outs, or undue price fluctuations.

**Convenient Pack Size**
Eco-Pellets are available in 15kg bags for small commercial, industrial and residential use. We can also supply pellets in bulk quantities for large scale industrial requirements.
Pellet based Gasification Application

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 Chops Bars, Restaurants, Hotels.
- Agri Processing for Heating and Drying.

Retails
- Use in pellet stoves in domestic / home heating and cooking
Time to Switch...Pellet Based Industrial Boilers

Converting Oil / Gas Based Boiler to Pellet Based Boiler – Upto Limited Capacity
Time to Switch...Pellet based Boilers

LPG Boiler

Biomass Pellet Based Gasifier Boiler

Save 25 – 30%
Customer are Saving 25% each month using Pellets
Bulk Cooking with Steam...

Save 20-25 % fuel cost just by switching over from Direct flame to Steam Cooking
Converting LPG Oven into Pellet Based Oven

Saving of 30%
Abellon Eco-Stove Models - Cooking

SMART - 15

Cooking capacity: 250-750 persons
Shell capacity: 15 kg
Heat Output: 24 kW - 72 kW
Suitable Pot Size: 40-50
For Rice making: Upto 60

SMART - 9

Cooking capacity: 250-500 persons
Shell capacity: 9 kg
Heat Output: 14.4 kW - 43.2 kW
Suitable Pot Size: 30-40
For Rice making: Upto 40
Abellon Eco-Stove Models - Cooking

SMART - 3

Cooking capacity: 50-100 persons
Shell capacity: 3 kg
Heat Output: 7.2 kW - 14.4 kW
Suitable Pot Size: 8-15
- For Rice making: Upto 20
Eco-Stove Segments & Availability

- Pellet Based Cooking Equipment.
- We are currently having 300+ customers available in 8 Cities of Ghana: Kumasi, Accra, Takoradi, Sunyani, Tamale, Obuasi, Wineeba and Odumasi.
EcoStove - 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.
- Adjustable in Existing Set up
- **Made in Ghana Product approved by Ghana Standard Authority.**

**Saving Against Gas**

- 1 Kg Gas = 2.6 Kg Eco-Pellets
- Ghs 4.5 Gas = Ghs 3.4 Eco-Pellets.
Eco-Stove Application in Cooking

- Rice Preparation.
- Cassava Boiling (Fufu)
- Kenkey Preparation
- All Type of Soups and Stews.
- Preparation of Cereals / Beans
- Fish, Chicken and Yam Frying
- Tom Brown and Porridge
## Challenges and Solutions: Pellet Manufacturing

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Changing traditional practices of burning/decomposition/landfill disposal of waste/biomass</td>
<td>Assigning value to waste: Providing incentive economic value for waste supplied</td>
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<tr>
<td>Diversity and spread of biomass availability</td>
<td>Generating awareness of income and employment opportunities from waste, ill effects of traditional biomass disposal</td>
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<tr>
<td>Seasonal variations in biomass supply</td>
<td>Mapping of biomass species and their characteristics: over 300 species mapped Globally</td>
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</table>
| Collection and processing of biomass | Decentralized Biomass Collection Model:  
  > Tie ups with rural community for biomass collection within 50km radius  
  > Partnerships with organized players for process biomass |
| Quality of biomass: moisture and ash content | Agro forestry model promoting bamboo as an energy crop.  
  > Sample project covering 120 acres of land set up in Modasa, Gujarat |
Challenges and Solutions: Pellet Manufacturing

**Challenge: Technology**
- Pelletization technology at nascent stage in developing countries of Asia and Africa.
- Finding the right technology partner is a challenge

**Solution: Technology**
- Tie-up with leading global pelletization technology suppliers
Challenges and Solutions: Sales & Service

Challenge: Uninterrupted supply of Pellets to customers
- Ensuring 24x7 availability of pellets to customers

Solution
- Own state of the art pellet manufacturing facilities at strategic locations
- Future plans including decentralized manufacturing through containerized projects closer to customer location
- Strong sales & distribution network: e.g., 90 sales & service people supported by 70+ distributors, covering 20 states in India.
  20 Sales & Service people supported by distributors covering 8 cities of Ghana and Ecowas.

Challenge: After sales service support

Solution
- Dedicated service teams: e.g., over 45 members responsible for product installations, training and hand-holding of customers in India
- Detailed Product Information Manuals and Videos
- Post installation training and hand holding
- Provision for Annual Maintenance Service Contract (AMC) for preventive and break-down maintenance services
- 24 x 7 help line service
Challenges and Solutions: Others

Challenge: Acceptance of BioEnergy

- Low awareness of bioenergy at end user level
- Need for a systematic approach at policy level
- Changing mindsets of people to adopt new and renewable based technology
- Subsidy led and highly influenced residential sector
- Pressure to achieve economics

Solution

- Awareness spreading through multiple mediums such as industry conferences & exhibitions, trials and demonstrations, case studies, paper presentations, etc.
- Representations at global and local level forums specially targeting policy makers
- Promoting strength of the model through national and global award participation and certifications.
- Targeting commercial and industrial segments for sales in the first phase to build economies of scale
- Wide range of equipment that can cater to a diversity of cooking and heating applications
- Proven viability: Can deliver 15-20% savings over fuels such as LPG, Diesel, FO
Learning

- **Biomass:**

  Multiplicity of biomass; seasonal variation and availability; ability to tackle logistical hurdles; need for ensuring long term sustainability of supply

- **Technology:**

  Non availability of indigenous technology; need for global sourcing capability

- **Business:**

  New business model with teething issues; awareness and acceptance building play a critical role; importance of targeting multiple customers/applications to ensure viability in initial phase

- **After sales support:**

  Continuous customer support and service – an integral key to success
Conclusion

• Biomass Pellets are locally made fuel
• It is available and sustainable
• Biomass Pellet Gasifying technology is available and adoptable
• Suitable for large, medium and small scale cooking and heating
• It is clean & environment friendly
• It is economical
• It is safe
• It can be stored without any prior permission

There are already customers using biomass....
Awards & Accolades

Zayed Future Energy Prize 2014
Ashden Award 2011
African Business Award 2015

Dun & Bradstreet Award 2015
Renewable Energy India Award 2015
Recognition for Biomass Sourcing Model

UN Land for Life Award 2013-14 (Semi Finalist)
Power Gen Project of the Year (Reader’s Choice) 2013
World Biogas Award 2012 (Semi Finalist)

Energy Globe Award 2015
(Green Gujarat)
(Golden Peacock Award 2011)

Dubai International Award 2014

AREA Award 2009-2010

and more...
Independence begins at the bottom...

A society must be built in which every village has to be self sustained and capable of managing its own affairs. It will be a free and voluntary play of mutual forces. In this structure composed of innumerable villages, there will be ever widening, never ascending circles.

Life will not be a pyramid with the apex sustained by the bottom. But it will be an oceanic circle whose center will be the individual. Therefore, 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.

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Thank you