



Potential of Pellet Fuel a Clean Energy to Replace Charcoal on the Ghanaian Market

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Abellon CleanEnergy
The Future is Green...

Presented by
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Global Challenges

Population 9.6 bn by 2050

Poverty (half the world lives on < US\$2.50/day)

Global **Unemployment** rate 30%

Health & Hygiene (146 mn. people malnourished, 2.2 mn. children die/year from lack of immunization, 1.4 mn. die/year from lack of safe drinking water & sanitation)

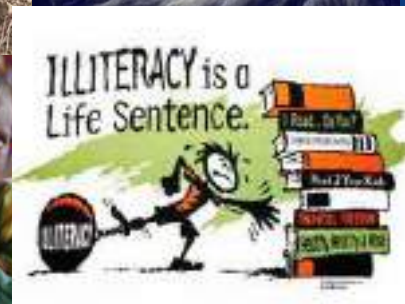
Illiteracy 2/3rds of world's adult population - 785 mn

Risk of a rise in global temperature of up to 6°C

Increasing GHG Emissions -- 35% rise by 2030 (45% rise of energy-related CO₂ emissions)

Rising Terrorism and Safety Concerns

Sources: International Energy Agency, Earth Policy Institute; US Census Bureau, CIA – The World Fact Book, WTO, UN, World Bank Reports (2008)



Millennium Development Goals

1



**ERADICATE
EXTREME POVERTY
AND HUNGER**

2



**ACHIEVE UNIVERSAL
PRIMARY EDUCATION**

3



**PROMOTE GENDER
EQUALITY AND
EMPOWER WOMEN**

7



**ENSURE
ENVIRONMENTAL
SUSTAINABILITY**

4



**REDUCE
CHILD MORTALITY**

5



**IMPROVE MATERNAL
HEALTH**

6



**COMBAT HIV/AIDS,
MALARIA AND OTHER
DISEASES**

8



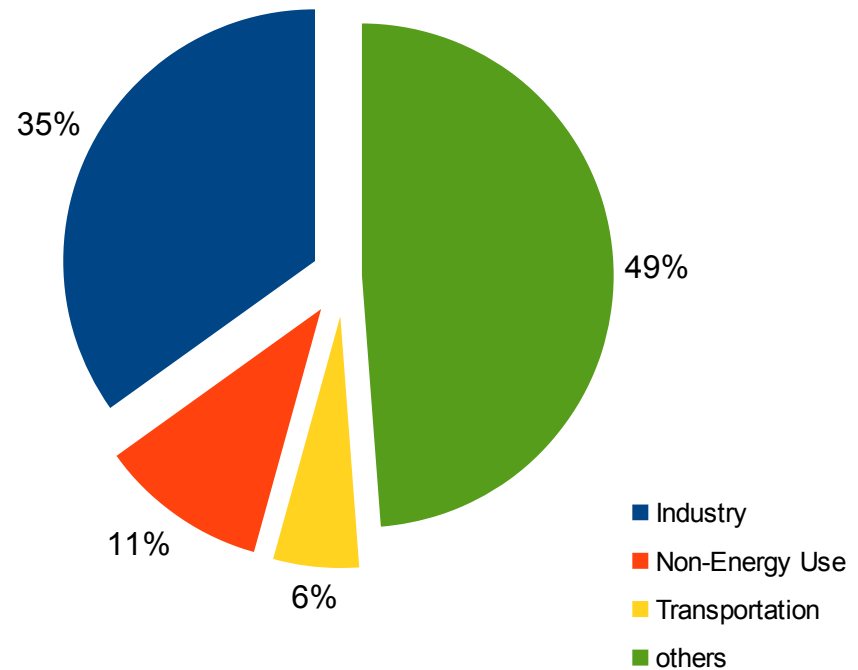
**A GLOBAL
PARTNERSHIP FOR
DEVELOPMENT**

Global Energy Scenario



Total energy consumption is 1266 Mtoe (Million of Tonnes of Oil Equivalent)

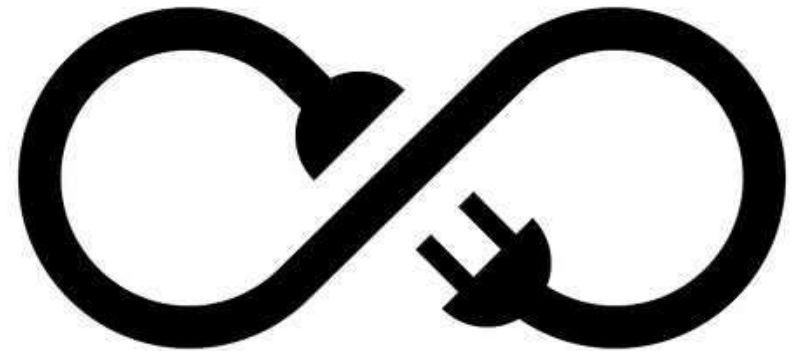
Others include agricultural, commercial, public service and residential consumption



Efficiency: A Major Concern



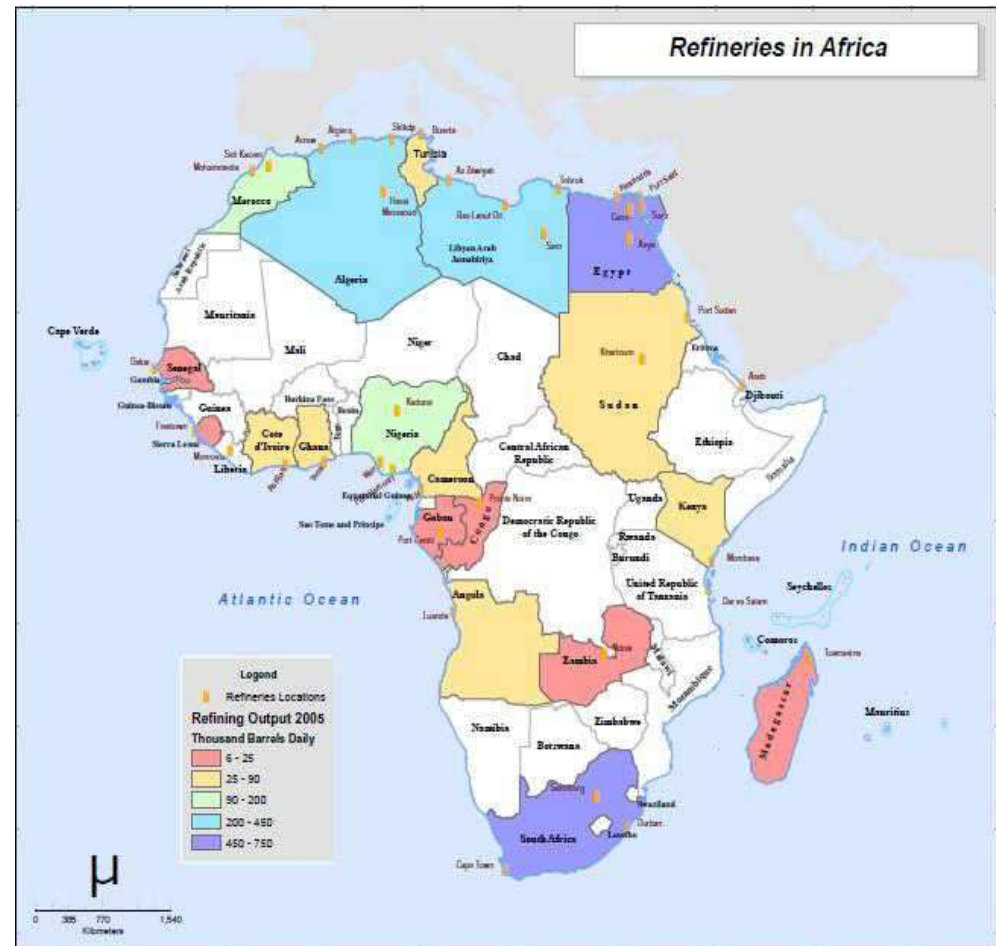
- With the depleting energy resources the world is looking for
 - Renewable sources of energy
 - Increasing usage efficiency
- New technologies for higher efficiency are being developed like
 - Super Critical Power Plant
 - Combined Heat and Power
- Cooking has remained ignored till now



Energy Consumption in Africa



- Low to negligible refining capacity
- Heavy dependence on imported fossil fuels for industrial use
- Around **60 % of total energy** comes from traditional biomass
- For Sub-Saharan Africa, **80 % of total energy** comes from combustible raw material and waste
- In some countries it goes as much as **95%...** And **90% of this energy** is used for residential purpose



Fuels used for Cooking...



Charcoal



Wood chips



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

– Deforestation



– Availability of fuel



– Subsidy burden on Government



Evolution in Cooking Practices



Traditional method for cooking in most part of the world using wood and agri waste



Improved cooking method to reduce pollution and increase efficiency



Improved Fuel to reduce human effort, increase efficiency and reduce pollution



Latest equipments designed specifically for pellet usage

Challenges 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 !



Ghana – Renewable Energy Potential

- Wood fuels contributes about 60% of total energy supply in Ghana
- 9.6 million hectares of savanna
- 8.2 million hectares of closed forest
- Quantity of Wood Residue from Timber Industry is **1 mn. M3** (approx.)
- **Forest Residue** in the form of offcuts, branches, tree trimming
- Quantity of Agriculture Residue from farms is **3 mn. Tonnes**
- **Average MSW generation** in the country would be between **150 – 200 kg per capita**
- Ghana has almost **300 days of clear sun**
- **Global Solar Irradiation of 4.5 - 6.5 Kwh/m2/day**
- Ghana Wind Potential Estimated around 2000 MW
- Bio-diesel and ethanol

* Source from SWERA Report

Source Ghana SNEP 2006 - 2020



Harnessing Residual Sources from Ghana



- **Industrial**

- Wood residue from timber industry



- **Agriculture**

- Leftover agri residue
- Waste from Palm, Cocoa, Cashew, Shea, Invader-bush
- Cultivation of short rotation energy crops
- Social forestation
- Bamboo, sunflower, Jatropha,



- **Forest**

- Leftover forest residue



Bio-Energy: A sustainable solution



Economic Processes

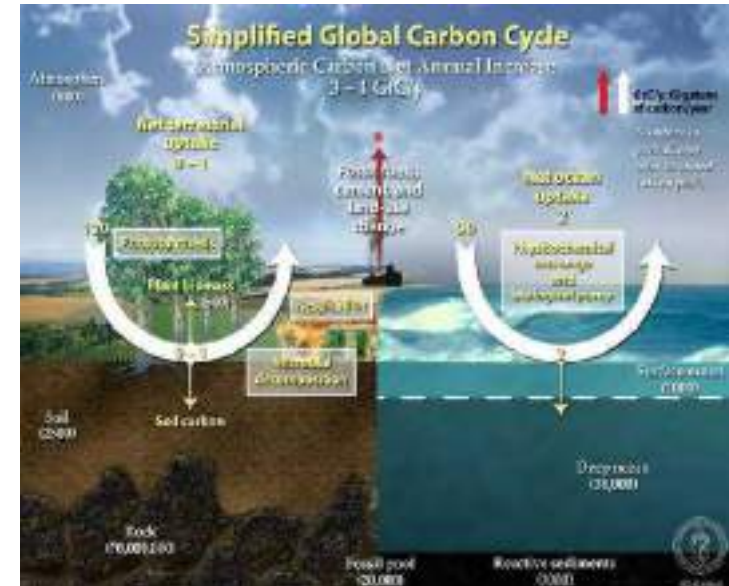
- Wealth from Waste
- Boost to rural economy
- Contribution to GDP growth
- Reduced energy dependence

Environment

- Substantially reduced GHG emissions, local pollutants
- Reduced deforestation
- No competition for land, nutrients, water

Society

- Grassroots rural employment & income generation
- Rural development



A carbon neutral, renewable energy source approved by UNFCCC
Entitlement for carbon credits
Mitigation and sequestration of CO₂ level

Pellets – An improved fuel

Pellets are Eco-friendly carbon neutral, Solid Bio-fuel

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.



Pellets: A better fuel for Ghana



Parameter	Charcoal	Pellets	Effect
Technical			
Energy Efficiency	5%	25%	Maximum Energy Utilization
Production Ratio	1 Kg Charcoal = 7 Kg Wood	1 Kg Pellet = 1.5 Kg Waste Wood	No Energy Loss During Production
Bulk Density	200 Kg / M3	650 Kg / M3	Saving of Storage Space
Fixed Carbon	60 - 70%	15 - 20%	Complete Combustion Due to Higher Volatile Matter
Production	Traditional Process	Modern Scientific Technology	Highly efficient production process
Health			
Black Carbon / Soot	Yes	No	Reduce Indoor Air Pollution
			Improved maternal and Child health

Pellets: A better fuel for Ghana



Parameter	Charcoal	Pellets	Effect
Environmental			
Production Ratio	1 Kg Charcoal = 7 Kg Wood	1 Kg Pellet = 1.5 Kg Waste Wood	Saving of Environmental Resources
Raw Material	Large Wood Pieces	Any Wood Waste / Agri Residue	Max. Forest Recovery
			Utilization of Waste
			Saving Land Degradation
Economic			
Industry	Unorganised	Organized	Reduced labor exploitation
			Saving of revenue loss to the government

Technology for Pellet utilization



- Various technology are available in the market which can effectively use pellets
 - Pellet heating systems
 - Pellet based boilers
 - Pellet burners
- There is a scope of improvement where technology used in industry can be utilized for increased efficiency
 - Gasification system
 - Efficiency improvement through boiler technology



Introducing Eco-equipments: A modern bio-energy based heating and cooking solution for Residential, commercial, Institutional and Industrial application



- Reduced Fuel cost
- Enhanced Efficiency
- Lower maintenance

Economic Benefits



Environmental Benefits

- Uses carbon neutral solid biofuel
- Replaces use of fossil fuels

- Less smoke in the kitchen
- Keeps the cooking area clean

Health & Hygiene

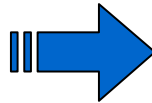
Other Benefits

- Higher cooking capacities
- Low noise

Eco-equipment: Benefits

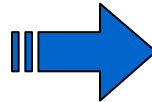


Cost Saving



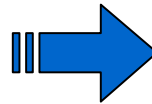
20 - 30%

Hygienic



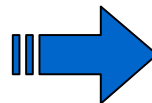
No smoke pollution

Safe



No risk of fire hazard

Convenient



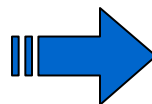
Easy to use

Battery Backup

Movable & Flexible

Adjustable in Existing
Technology

Efficiency



45%

Introducing Abellon Eco-stove: A modern bio-energy based cooking solution



- A community cooking stove
- Uniquely designed for large scale cooking applications
- Uses a clean, economical and Eco-friendly fuel
- An energy efficient appliance that is easy to use and safe
- Application: Can be used in Residential, Commercial and Institutional (ex: Hotels, Restaurants, Canteens and Chop bars) for their frying and continuous cooking applications.

Residential



Commercial



Institutional



Continuous Feeding Stove



Smart

Eco-Stove - Cooking Applications



Suitable for All Cooking Applications



Introducing Abellon Eco-burner: A modern bio-energy based heating solution for Industrial application

- Applicable in the industries like
 - Food processing Industries
 - Breweries
 - Cocoa processing Industries
 - Paint Industries
 - Soap Manufacturing Industries
 - Packaging Industries
 - Mining Industries

Pellet Burners



Green Burner



Industrial Burner

Pellet Hot Water Generator



Eco-stove: Success Stories in Ghana



Eco-stove: Success Stories in GHANA



Development: The Way Ahead



Phase 1 (Current): A stove with

- 45 % efficiency (Comparable to LPG stove)
- Easy to use
- Safe, hygienic and smokeless



Phase 2: An improved stove

- Higher efficiency with heat recovery from flue gas



Phase 3: A life style product

- A complete lifestyle product with 80-85% efficiency



Advantage Of Pellets

- Low Capital investment for Production
- Contribute to the development of mini / medium size entrepreneurs
- Rural employment
- Benefits of low temperature cooking
 - Higher nutrients
 - Saving in oil consumption
- Growth in country's GDP
- Value out of Waste





Perfect

Example of

Light

Leading to

Exponential

Transition to

GROWTH

Abellon CleanEnergy...

The Future is GREEN...

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.





"Independence begins at the bottom..."

*"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."*

Abellon – The Group



Business Initiatives



Abellon CleanEnergy



Abellon Agrisciences



Abellon EPC



Xcelris
SOLUTIONS

Social Initiatives



xcellon
institute
redbricks education




POORNAKUMBHA

Abellon – Integrated Model



Biomass based Energy

Biomass Pellets
Biopower Generation



Biomass Pellet based Appliances

Cookstoves
Pellet Burners
Pellet Hot Water Generators



Power Trading

Through Bilateral Agreement
Through Energy Exchange
REC
Green Power



Waste Management

Waste to Energy
Fly Ash Bricks
Waste Water Utilization



Solar Energy

Solar Power Generation
Solar Agri-Electric Model



Agrisciences

Organic Soil & Plant Nutrition
Agro Forestry
Biomass Sourcing
Bamboo Farming



Poornakumbha

Decentralized Biomass Collection
Wasteland Development Programs
Interventions for Sustainable Agriculture
Environment Education

R&D

Tissue-Culture & Genomics
Advanced Generation Biodiesel
Ligno-Cellulosic Bioethanol
Biomass Torrefaction
Carbon Capture & Sequestration



Infra & EPC

Engineering, Procurement
& Construction
Project Management



Abellon

Our Global Presence



Our Global Projects



Biomass Pellets and based Appliances: India & Global

Biomass Pellets manufacturing facilities in India



Biomass Pellet based appliances manufacturing facility in India (Upcoming)



Biomass Pellets manufacturing facility, Ghana

Biomass Pellets manufacturing facility, Canada



Successful trials of cookstoves @Ghana



Pellet Operations, Europe



Our Global Projects



Power Operations: India

Biomass Power project, India



Biomass based Co-Gen facility, India



Waste to Energy plant, India (Under Development)



Solar Power, India



Solar Agro-Electric Model, India



Abellon @ Ghana



**BUSINESS
CALL TO
ACTION**



Phase 1

Pellet Production: 100,000 tons per annum

Sales of Eco-Stove and Burners.

Phase 2

Plantation: 4000 acres



Initiatives in Ghana



Initiatives in Ghana



Accolades



Abellon CleanEnergy RECOGNIZED FOR GREEN LEADERSHIP

Abellon has won the Asia Responsible Entrepreneurship Award (AREA) for Green Leadership...
Ashden was the only Indian company to receive this prestigious award.

Abellon CleanEnergy wins The Green Oscars



Mr. Aditya Handa & Mr. Parikaj Patel receiving award from Mr. Greg Barber, MP



Mr. Aditya Handa & Mr. Parikaj Patel with HRH The Prince of Wales

Ashden Award 2011 for sustainable Solid Biofuel Production and Ploomakumbha - our social initiative

The Ashden Awards for sustainable energy

The Future is Green...

Abellon | Claris

Win accolades for at Copenhagen Climate Convention

'Circle of Light' - Our short film wins 2nd position at UNFCCC/CDM International Video Contest on "Changing Lives"

- The video centres around 'Kalka' in the village of Gujrat where children go from home to home, collecting waste of light bulbs.
- These lamps are placed in a 'circle of light' with in the village square where the entire village gathers to celebrate the victory of light over darkness.
- Gujrat is the largest producer of incandescent bulbs in India, contributing about 20% to the country's energy production.
- The business based co-generation facility at our pharmaceutical manufacturing complex, is a Clean Development Mechanism project approved by UNFCCC, that provides the mix of waste to distill into clean energy feedstock.
- The project meets about 30% of the company's energy generation needs, and has the capacity to reduce 69,000 MT CO₂ equivalent carbon emissions.



36 SOME ENDORSMENTS

Working very well!

It is really good news for the waste management industry!

Working very well as a business model. It is a good idea. It is a good idea to have a lamp which is made of waste. It is a good idea to have a lamp which is made of waste. It is a good idea to have a lamp which is made of waste.

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Abellon CleanEnergy

wins again!



Accolades



*Golden Peacock Award
2011*



*World Bio-energy Award
2012*



*Renewable World Award
2013*



*Land for Life Award 2013
(semi-finalist)*

Abellon Wins Zayed Future Energy Prize 2014

One of the World's Most Prestigious Clean Energy Awards



*AREA Award
2009 & 2010*



*Parivartan Award 2013
(semi-finalist)*





Thank You...

