

# Overview of CleanStar Group & Case Study

July 2012

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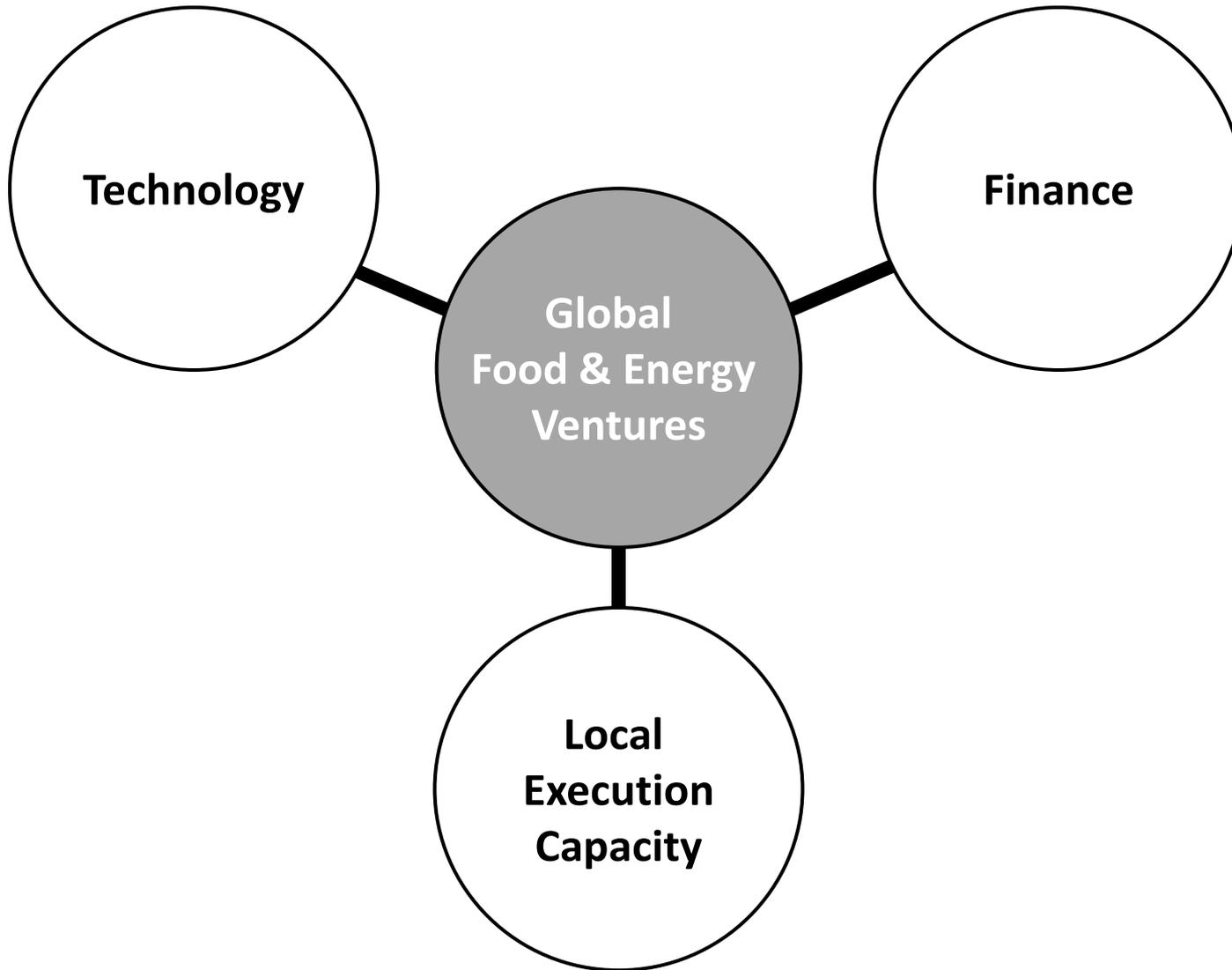
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CleanStar is an early-stage developer of sustainable food & energy ventures



## History

- **2005:** Research started in India with help from USAID, WRI & local universities
- **2006:** Project opportunities & partners reviewed in 14+ countries
- **2007:** CleanStar Ventures Ltd established as holding company
- **2008:** Venture development commenced in Brazil, Mozambique, and Australia
- **2012:** Pan-African expansion

### USA

- Head office

### India

- R&D

### Brazil

- Biomass feedstock & conversion
- Livestock

### Mozambique / Pan-African

- Ethanol for Cooking

### Australia

- Biomass feedstock and aviation fuel

## Case Study: CleanStar Mozambique

### The market for Food & Energy is growing rapidly in Africa's cities

#### *Urban Cooking Fuel Demand*



- Charcoal prices rising as forests recede
- Urban families spend \$25/month on charcoal
- **Market is over ~\$10 billion across Africa**

#### *Urban Food Demand*



- Growing as cities expand
- Local food production is inadequate
- Families rely on expensive imports

...with adverse impact on the region's People & Forests

#### *Social & environmental impacts*

- Respiratory diseases
- Reduced disposable income
- Malnutrition
- Deforestation & GHG emissions
- Degradation of natural resource base

# CleanStar Mozambique was formed in 2009 to capture this opportunity

## Founders & Financiers



- Developer of commercial ventures with social and environmental impact
- Established based on research at Oxford Univ. Skoll Centre
- Focus on agro-forestry in India, Brazil, Australia & Mozambique



- Leading Danish industrial biosciences company
- \$2b revenue, 5500 employees, publicly listed
- Interested in commercial deployment of its advanced enzyme & microbial technologies in BoP markets



- US chemical and agri-process engineering company
- Family-owned



- Innovative Carbon project financier and trader

## Other Partners

**ZOE Enterprises**  
(Mozambican retailing partner)

**IIAM**  
(Mozambican Agri Research Institute)

**Dometic**  
(Swedish cookstoves technology)

**Impact Carbon**  
(Carbon Project Advisors)

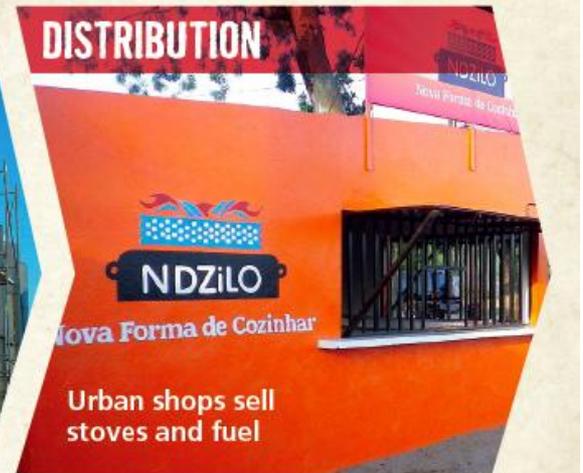
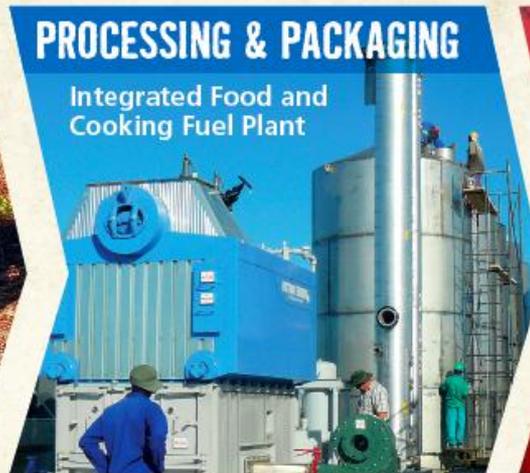
**Global Alliance for Clean Cookstoves**

Our aim is to create an innovative, profitable and scalable system for food & energy production that can be replicated across the continent

### *Strategy*

- 1. Design & implement commercial venture that delivers superior, competitively-priced products to underserved markets in Mozambique:***
  - Packaged food products*
  - Household cooking solution*
- 2. Scale up and replicate this “proof-of-concept” across sub-Saharan Africa***

### *Business Scope*



# Our product mix is targeted towards deep and attractive markets

## Food Business Strategy

### 1. Food

### 2. Household Cooking

### 3. Carbon Credits

**PRODUCT** : Protein and nutrient-rich packaged foods

High quality fortified flour (Cassava with Soya)

Cowpeas (Nhemba)

Pigeon Pea

Sorghum flour

Groundnuts

Soya cooking oil & meal (poultry feed)



**TARGET** : Local wholesale buyers of bulk packaged foods (2012-13):

- UN World Food Program, urban distributors, food processors

Direct sale of retail size pre-cooked food packages (2014 onward)

- Via CleanStar's own shops in Maputo

- Quickly re-heatable on ethanol stove

- Local style dishes; fortified baby food



**POSITIONING** : Superior quality locally-produced food

**PRICING** : Competitive with food imports

**PARTNERS** : Intl Inst of Tropical Ag (IITA), Mozambican Ag Research Inst (IIAM)

Novozymes (products to improve soil fertility and nutrient uptake)

# Our product mix is targeted towards deep and attractive markets

1. Food

2. Household Cooking

3. Carbon Credits

## Cooking Fuel Business Strategy

**PRODUCT** : Ethanol-based Cookstove & Cooking Fuel



**TARGET** : Working women from BoP households  
20% of TAM = 80,000 households

**POSITIONING** : Affordable modern cooking solution that is easier, cleaner and safer to use than Charcoal



**PRICING** : Fuel priced competitively with Charcoal (\$25/month)  
Stove priced comparably with LPG stove, mobile phones (\$30/stove)

**PARTNERS** : ICM, Inc. - Processing plant  
Novozymes - Enzyme technology  
Zoe Lda - gel stove retailer; 7 shops  
Dometic - Swedish stove designer  
Prometal - local stove production  
Impact Carbon – GHG emissions



# Our product mix is targeted towards deep and attractive markets

## 1. Food

## 2. Household Cooking

## 3. Carbon Credits

### ***Carbon Business Strategy***

#### **CARBON CREDITS FROM FUEL-SWITCHING**

- Use of ethanol-based fuel reduces emissions by **4 tons** CO<sub>2</sub>e/hh-yr vs. Charcoal
- A Certified Emissions Reduction stream can be created under the Clean Development Mechanism
  - Multiple small-scale “projects” utilising methodology **AMS-I.E. : “Switch from Non-Renewable Biomass for Thermal Applications by the User”**
- Monetization of Carbon value can reduce price of durable, high-quality stove for target households (\$60 stove sold for \$30)

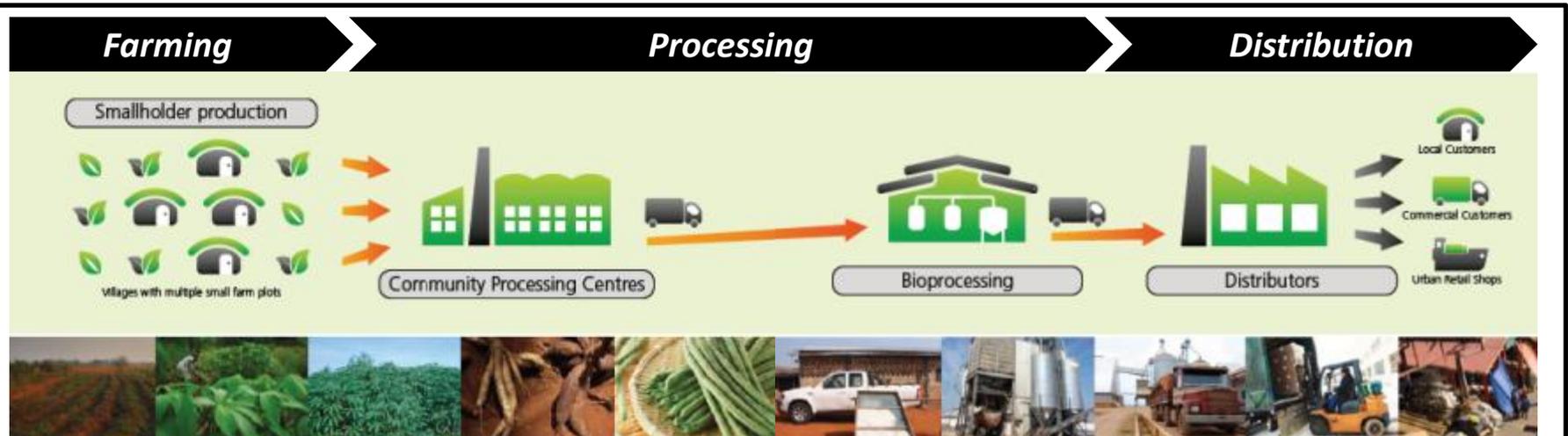


#### **CARBON FINANCE**

- BAML has purchased option to buy a fixed volume of CSM’s cookstoves carbon credits upon issuance
- Key terms of deal signed Nov 2011 between CSM and BAML
  - Significant upfront option premium paid by BAML
  - Profit sharing if CER market price rises above certain threshold
  - Remainder of CERs to be traded for CSM by BAML at market rate
- Agreement covers replication of ethanol cookstoves program in other African cities



# Our processing and logistics infrastructure maximizes operating efficiency, flexibility and traceability



- 5 communities in central Mozambique
- 5000 ha of farms:
  - 1000 distributed smallholder farms
  - 1000 grouped smallholder farms
  - 5x200ha company-managed farms
- 5 community processing centres close to farms
- Supply inputs & technical support
- Equipment for procurement & light processing
- 1 bio-processing plant off Beira Corridor in Dondo
- Parallel Ethanol Cooking Fuel, Diesel Fuel and Food processing lines
- Shared infrastructure & staff for efficiency
- 80,000 cookstoves sold in Maputo
- 100 shops selling food & fuel
- Warehouses in Maputo and Beira
- Direct distribution to commercial customers

# Photos from CleanStar Mozambique (Jun2012)

RETAIL



CleanStar NDZILO brand launched



NDZILO sales begin in Maputo



NDZILO warehouse in Maputo

PROCESSING



Cooking fuel plant construction site office



Plant assembly completed



Commissioning underway with help from ICM

FARMING



Community Processing Center #1



Nursery and farmer training



Over 250 farmers engaged so far

## Lessons learned in Mozambique (and beyond)

### 1. Large, attractive opportunities do exist in emerging markets

- Premium markets, currently underserved → Small Islands Dev. States
- Favorable policy environments exists or forming → E.g. Carbon in LDCs
- Foundation exist for biomass feedstock supply chains → Brazil ag, pulp/paper
- Diverse feedstock sources possible
  - Many different crop & trees
  - Fast biomass growth rates
  - Ag wastes and MSW often poorly managed → Brazil ag; SIDS
- Local & international capital looking for projects

### 2. Techno-economic considerations can be quite different from North America & Europe

- Different economies of scale → lower breakeven points
- Older/lower-risk technologies may have greater viability in these markets
- Technical capability diffusing rapidly world-wide

### 3. Building up local execution capacity & government relationships is key

- Leverage strong personal networks, bi-cultural staff, diaspora
- Build relations with right local business groups / families but CAREFULLY
- Work through international agencies (UN, GBEP, Global Alliance, etc.)

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