

Expansion of CleanStar cooking solution to other cities in Sub-Saharan Africa

March 2012



The charcoal industry in Africa

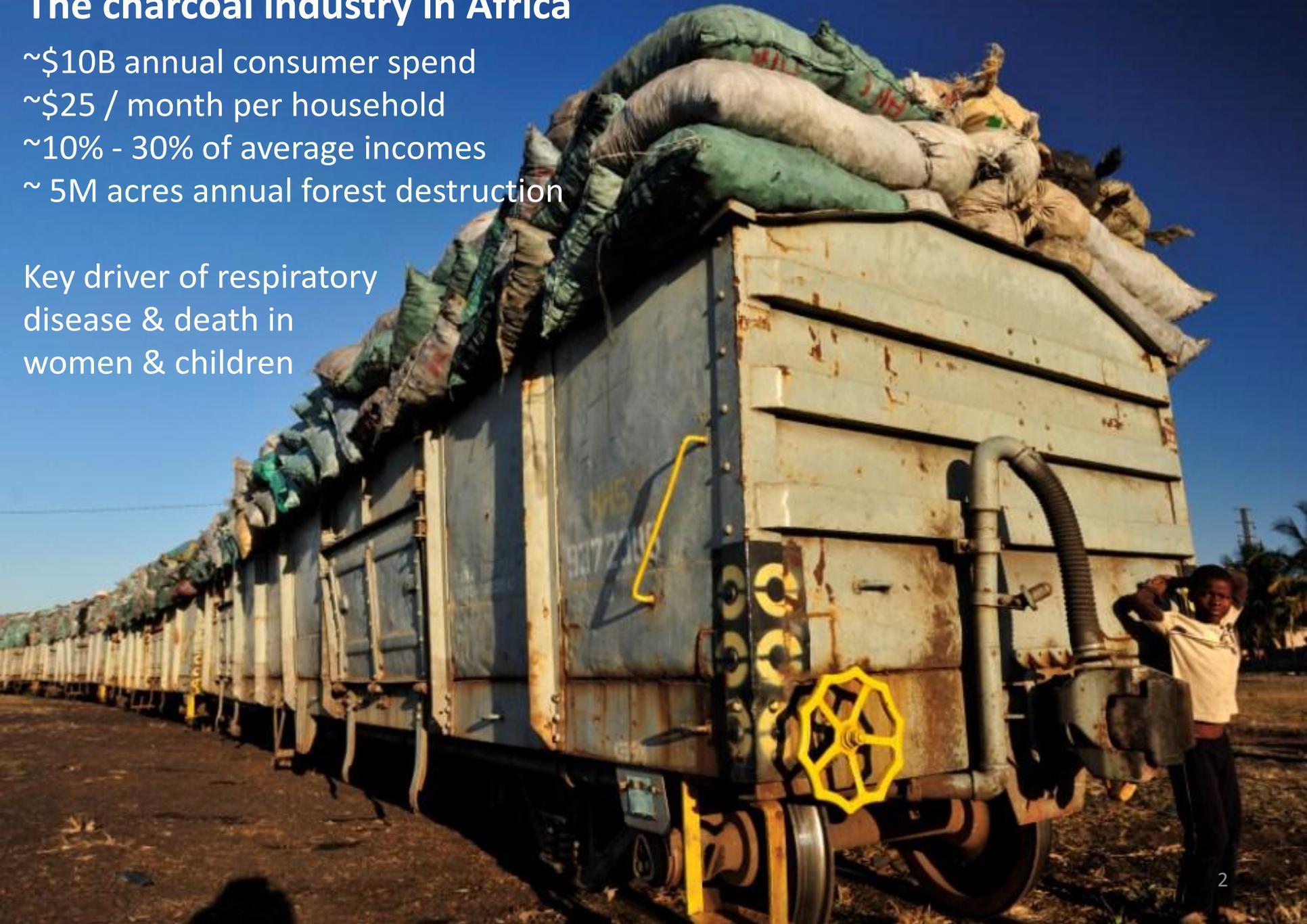
~\$10B annual consumer spend

~\$25 / month per household

~10% - 30% of average incomes

~ 5M acres annual forest destruction

Key driver of respiratory
disease & death in
women & children



CleanStar Mozambique was formed in 2009 to take entrepreneurial approach to addressing these challenges



Founders & Financiers



- Developer of commercial ventures with social and environmental impact
- Established based on work at Oxford Univ. Skoll Centre in 2004
- 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)

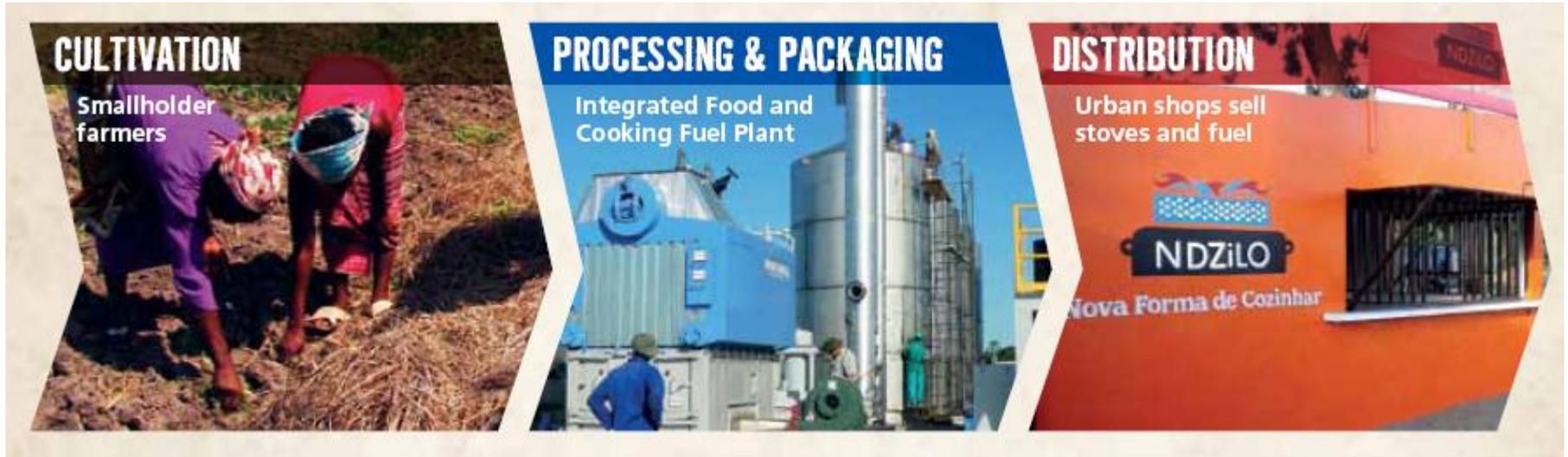
IIAM
(Mozambican Agri Research Institute)

Dometic
(Swedish cookstoves technology)

Impact Carbon
(Carbon Project Advisors)

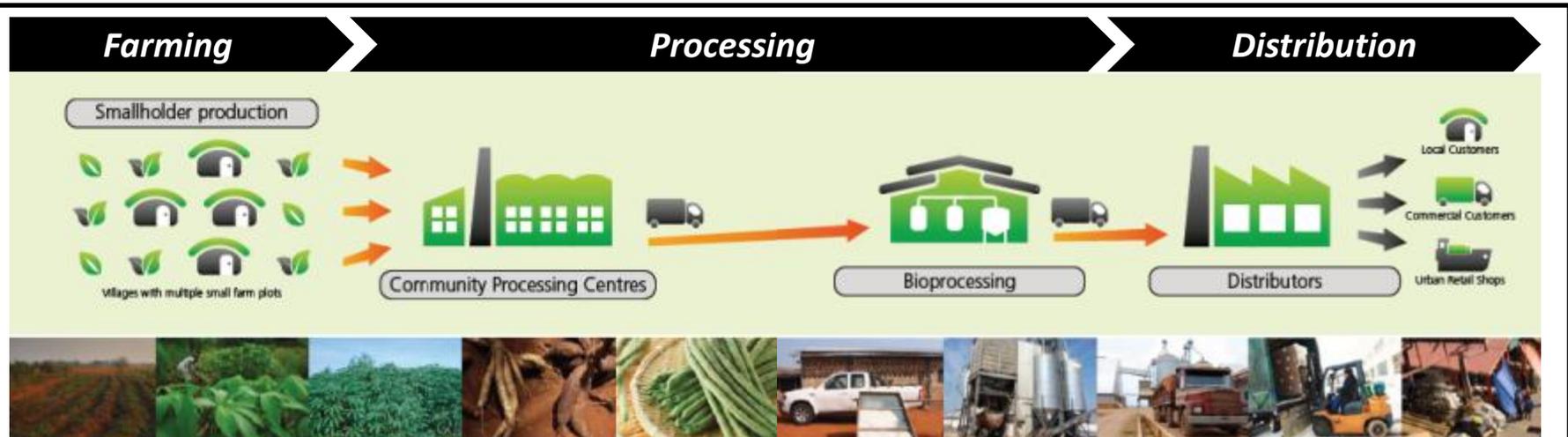
Cornell University
(Johnson School of Management)

CleanStar's commercial strategy in Africa



- Saves time and money versus charcoal
- Eliminates indoor air pollution
- Fuel spend drives rural development
- Our customers love it

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



- 5 communities in central Mozambique
- 5000 ha of farms:
 - 1000 distributed smallholder farms (2ha each)
 - 1000 grouped smallholder farms (2ha each)
 - 5x200ha company-managed farms

- 5 community processing centres close to farms
- Supply inputs & technical support
- Equipment for procurement & light processing

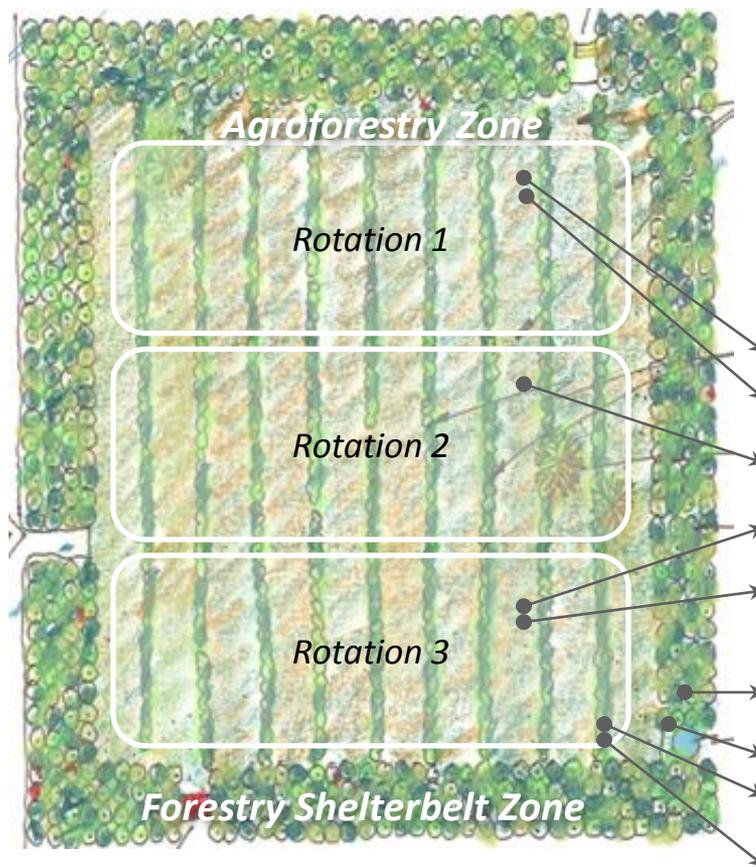
- 1 bio-processing plant off Beira Corridor in Dondo
- Parallel Ethanol Cooking Fuel, Diesel Fuel and Food processing lines
- Shared infrastructure & staff for efficiency

- Cookstoves & fuel shops in Maputo
- Warehouses in Maputo and Beira
- Direct distribution to commercial customers

Each farm follows a low-input agroforestry cultivation system

CleanStar Mozambique Smallholder Agroforestry Model

- CleanStar supplies planting material & guidance
- The **1 ha agroforestry zone** has rows of fast-growing leguminous trees/shrubs
- These rows are regularly pruned and leaves mulched to improve soil fertility
- Alleys are planted with annual crops rotations
- A **1 ha forestry belt** contains indigenous trees and Pongamia
- The forestry belt protects against wind & fire and enhances biodiversity
- Pongamia produces inedible oilseeds after 5-6 years



Mix of multi-purpose crops & trees

	Subsistence Food	Processed into Food Prod	Processed into Ethanol	Processed into Diesel Alt	Pruning as firewood/mulch	Ecosystem services (z)
Cassava	X	x	X			
Cowpeas*	X	X			x	x
Soyabean *	x	X				x
Sorghum	X	x	s		x	
Ground nuts*	X	X				x
Native trees*	x					X
Pongamia*	y			X	x	x
Lucaena*	y				x	X
Pigeonpea*	x				x	X

X : main uses; x : secondary uses; y : leaves can be used as fodder; z : e.g. cycle nutrients, pro-mote biodiversity, sequester CO₂, provide shade, retain moisture; s : if sweet variety of sorghum; * : leguminous /nitrogen-fixing

Charcoal reaches Maputo on trains from forest areas



Most low income households buy charcoal in small quantities



Charcoal stoves have low energy efficiency, are dirty and unsafe, and take time and effort to light and extinguish



Urban households are increasingly dependent on Asian rice, grains, and cooking oil



Ndzilo cookstove & cooking fuel solution

An affordable alternative to charcoal that is safer, cleaner and more convenient to use



CleanStar-owned outlet in Mavalane neighborhood of Maputo



Integration of components shipped from USA by ICM - Jan 2012



Community processing center site in Savane



Community processing center nursery



Smallholder farming program



Smallholder farming program

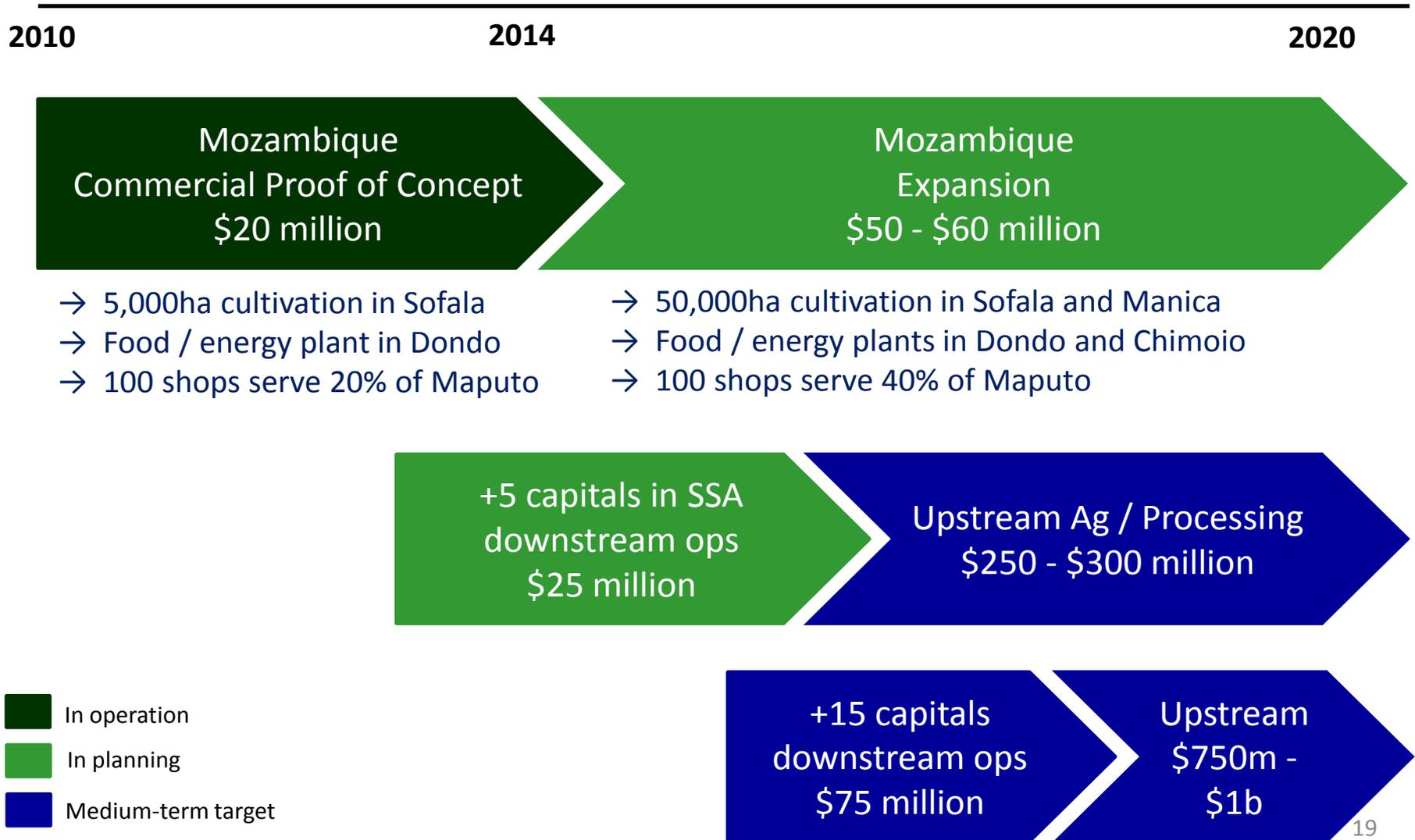


The venture will achieve profitability in 2014 and then expand in Mozambique & beyond



<i>Start of 2012</i>	<i>by end of 2014</i>	<i>2015+ (not modeled)</i>
<p>Rural areas (Sofala province)</p> <ul style="list-style-type: none"> • 2 community-level pre-processing centres under development • Agroforestry extension underway (250 farmers, 2 company farms, R&D plots & multiplication sites) • 2m litre cooking fuel plant being assembled in Dondo <p>Urban (Maputo):</p> <ul style="list-style-type: none"> • Cookstove assembly started in Maputo • Soft launch underway in one Maputo neighborhood 	<p>Rural:</p> <ul style="list-style-type: none"> • 5 community centres • 5,000 ha planted involving 2,000 smallholder farmers • Smallholder income increased 3x • 2 million trees planted in forest shelterbelts • 4,000 ha of forest loss prevented per annum <p>Urban:</p> <ul style="list-style-type: none"> • 20m litres of clean cooking fuel sold per annum • 80,000 urban households using clean cookstoves • 320,000 t CER per annum 	<ul style="list-style-type: none"> • Upstream expansion to match fuel demand of 80,000 stoves <ul style="list-style-type: none"> • 15,000 ha / 6000 farmers • Agroforestry system replicated in Inhambane & Nampula provinces • Ethanol plant capacity expanded in modules • Stove market share expanded to 40% (160,000 households) • Cooking solution launched in other sub-Saharan African cities
<p><i>Targets have been set to demonstrate the commercial viability, sustainability and scalability of the venture & facilitate replication in other African cities</i></p>		

Rollout Plan



Estimated market size & capital requirements for expansion



<i>Urban market</i>	<i>Population (2011E)</i>	<i>Charcoal Market (2011E)</i>	<i>Liquid Fuel Addressable Market (40%)</i>	<i>Estimated Capital Investment</i>
Dar es Salaam	3.3 M	\$190 M	\$76 M	\$60 M
Kampala	2.0 M	\$115 M	\$46 M	\$40 M
Addis Ababa	3.1 M	\$180 M	\$72 M	\$60 M
Luanda	4.5 M	\$260 M	\$104 M	\$80 M
Lusaka	1.8 M	\$105 M	\$42 M	\$35 M
Antananarivo	1.9 M	\$110 M	\$44 M	\$40 M
Harare	2.3 M	\$130 M	\$52 M	\$45 M
Nairobi	3.5 M	\$202 M	\$81 M	\$65 M
Kinshasa	8.9 M	\$510 M	\$204 M	\$150 M
Accra	3.6 M	\$210 M	\$84 M	\$65 M
Dakar	2.7 M	\$155 M	\$62 M	\$50 M
Douala	2.2 M	\$125 M	\$50 M	\$40 M
Bamako	1.9 M	\$110 M	\$44 M	\$40 M
Yaoundé	1.8 M	\$105 M	\$42 M	\$35 M
Ouagadougou	1.9M	\$110 M	\$44 M	\$40 M