



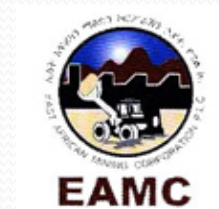
# POTENTIAL OF ALTERNATIVE ENERGY DEV'T FOR ETHIOPIAN CEMENT INDUSTRY: THE CASE OF PROSOPIS





# "CREATING WEALTH THROUGH INDUSTRY"

East African Holdings S.Co.



# Who are WE...?



- **East African Holding** - a leading business conglomerate in Ethiopia, playing prominent role in the Industrialization of the country since the last decade
- EAH is the umbrella company comprising of subsidiary companies which operate in sectors - manufacturing of Fast Moving Consumer Goods (FMCG), Agriculture, Agro Processing, Printing & Packaging, Transport, Real Estate, Cement Manufacturing, Ready Mix Concrete, Coal Mining and Biomass Projects
- EAH is also producing various types of Ethiopian coffee for local and export markets
- EAH is continuously evolving and strengthening its position as a major contributor in the development of the private sector in Ethiopia



# Who are WE...?

EAH strategic plans include major expansion and diversification projects through mega industries - large scale mining, commercial farming and METALS Engineering Companies which will significantly contribute to the industrialization of the nation, in hand with the Growth and transformation development plans set out by the Government.









# Ethiopian Cement Industries Profile

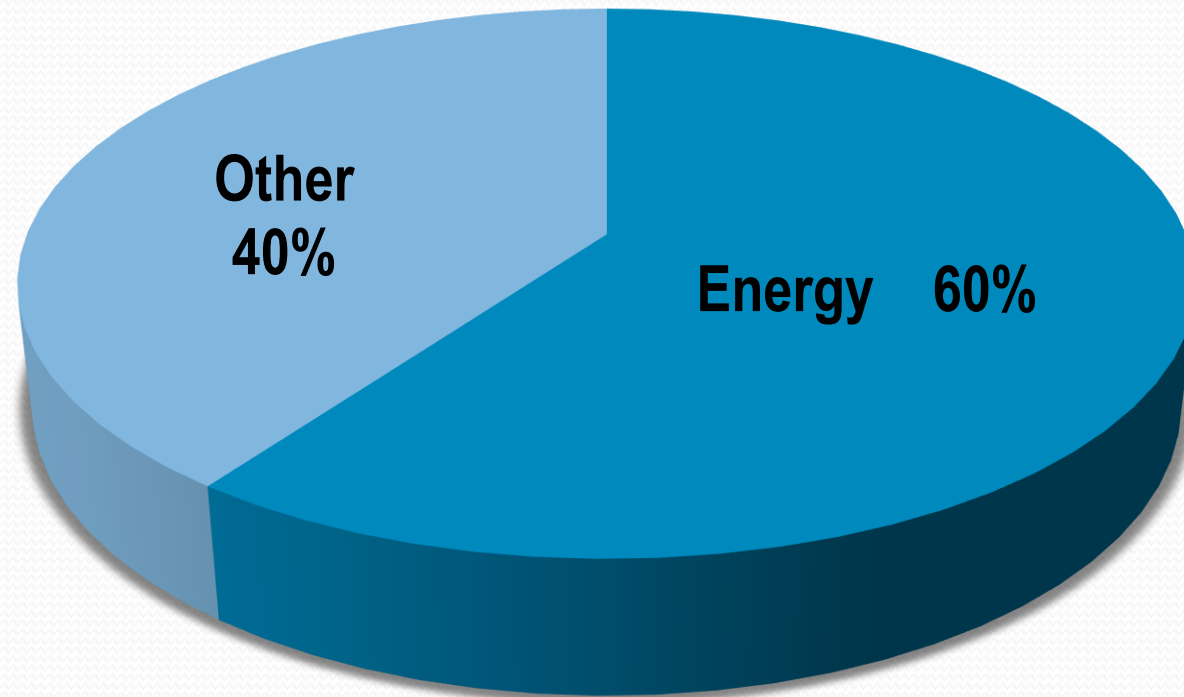


Company	Clinker Capacity (TPY)	Demand coal import (TPY)	Expenses coal import US\$/Y
NCS	1,000,000	140,000	25,200,000
Messebo Cement Co.	2,100,000	286,500	51,570,000
Mugher Cement Co.	1,600,000	218,800	39,384,000
Derba Cem. Co.	1,850,000	250,000	45,000,000
Dangote Cement	2,500,000	320,000	57,600,000
Ethio Cement	750,000	100,000	18,000,000
Habesha Cement	1,400,000	165,000	29,700,000
Abay Cement (2022 start up)	1,650,000	210,000	37,800,000
<b>Total:</b>	<b>12,850,000</b>	<b>1,690,300</b>	<b>304,254,000</b>



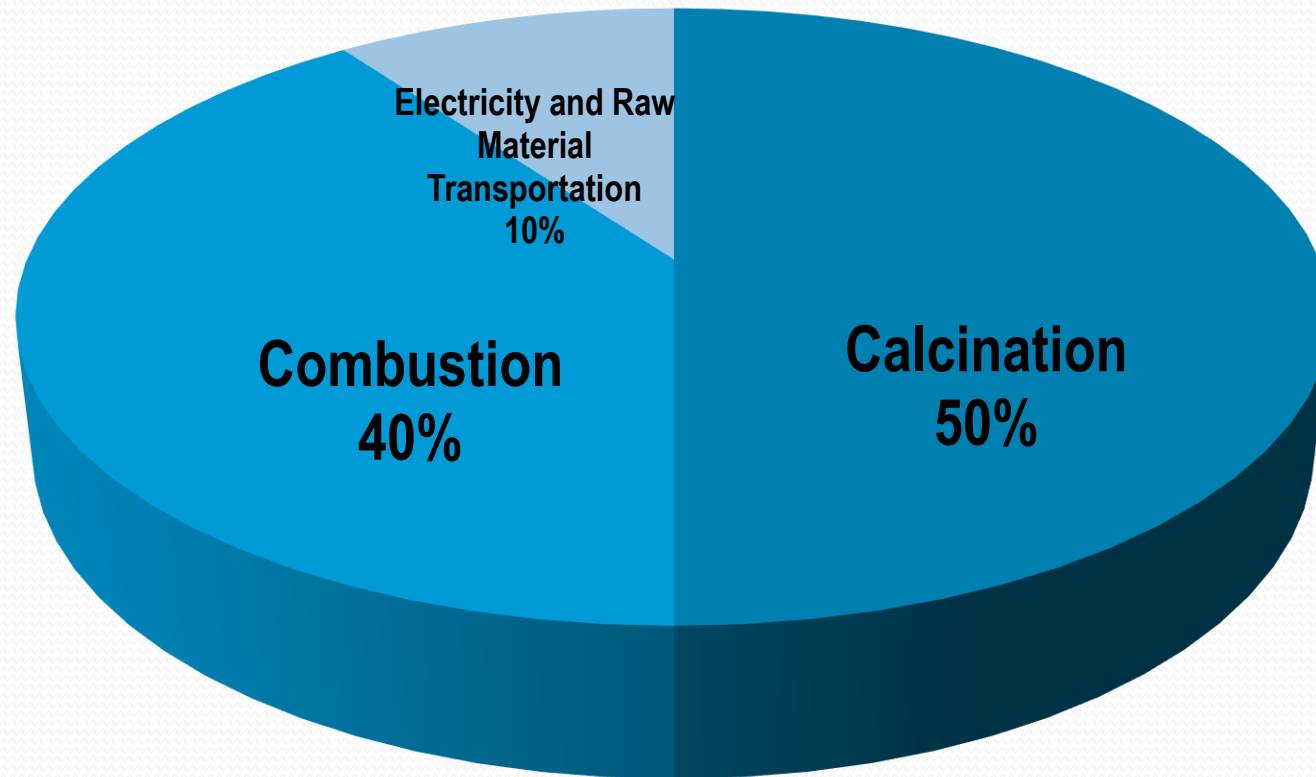
# **COST OF PRODUCTION**

A-1 COST OF PRODUCTION





# CO<sub>2</sub> Emission Contribution





# ALTERNATIVE FUELS?



- Alternative fuels in cement industry refers to fuels that differ from today's conventional fuels. Conventional fuels in today's cement industry context refers to Natural gas, Heavy Fuel Oil(HFO), Coal and Petcoke.
- Alternative Fuels are categorized into
  - ✓ Waste Derived Fuels(WDF)
    - Plastics, paper, used tire, Sewage sludge, Refuse Derived fuel(RDF), Meat and Bone Meal (MBM), etc
  - ✓ Biofuels (Biomass Derived Fuels=BDF)
    - Agri-Wastes(Rice husk, Sesame Stalk, Coffee husk, Cotton stalk and etc)
    - Forestry(Prosopis juliflora biomass, Bamboo tree, and etc)

# WHY ALTERNATIVE FUELS?



**For the environment**

*Net CO2 emission reduction*

**For the Society**

*alleviating the Problems  
caused by wastes, invasive  
trees + Job creation*

**WHY ALTERNATIVE  
FUELS????**

**For the Government/Country**

*Eases Foreign Currency burden*











**For the Cement Plants**

*Cost Reduction*



# ASSESSMENT OF DIFFERENT ALTERNATIVE FUELS IN ETHIOPIA



S.No	Alternative Fuel Name		Net Calorific Value (Kcal/Kg)	Ash Content(%)	Annual Quantity (ton/annum)	Areas	Source
1	Prosopis Juliflora		4200-4900	1-2	>8million	Afar region	GIZ ,Own analysis
2	Bamboo Tree		4500	1-5	1million	All regions	Cement dev.Strategy
3	Coffee Husk		3900	11.4	214,299	Oromiya,SNNP,Gambela	UNDP,2001 data
4	Cotton Stalk		4100	3.3	400,301	Afar,Tigray,SNNP, Oromiya,Gambela	UNDP,2006 data
5	Sesame Stalk		3800-4050	4-6	571,488	Tigray and Amhara Region	Regional Agri.Bureau and own computation,UNDP,FLS lab
6	Chat Stalk		N.A	N.A	110,000	Diredawa,Harar and Somali region	UNDP
7	Rice Husk/Straw		3700	15-20	925,014	All regions	EIAR,2014 Projected data and 0.49/1 ratio,other sources
8	Jatropha Seed cake/Oil		4635/9100	18.6/0.168	NA	All regions	Alternative Energy Development Directorate and Pramanic (2003),Science journal of Engineering
9	RDF		3500-4800	8-15	193,779	Mekelle,Diredawa,Harar and Addis Ababa	City Municipalities+own recomputation
10	Saw Dust		3800-4500	3.3	25,000	SNNP & Oromiya	Cement dev.Strategy,UNDP and others



# PROSOPIS JULIFLORA UTILIZATION



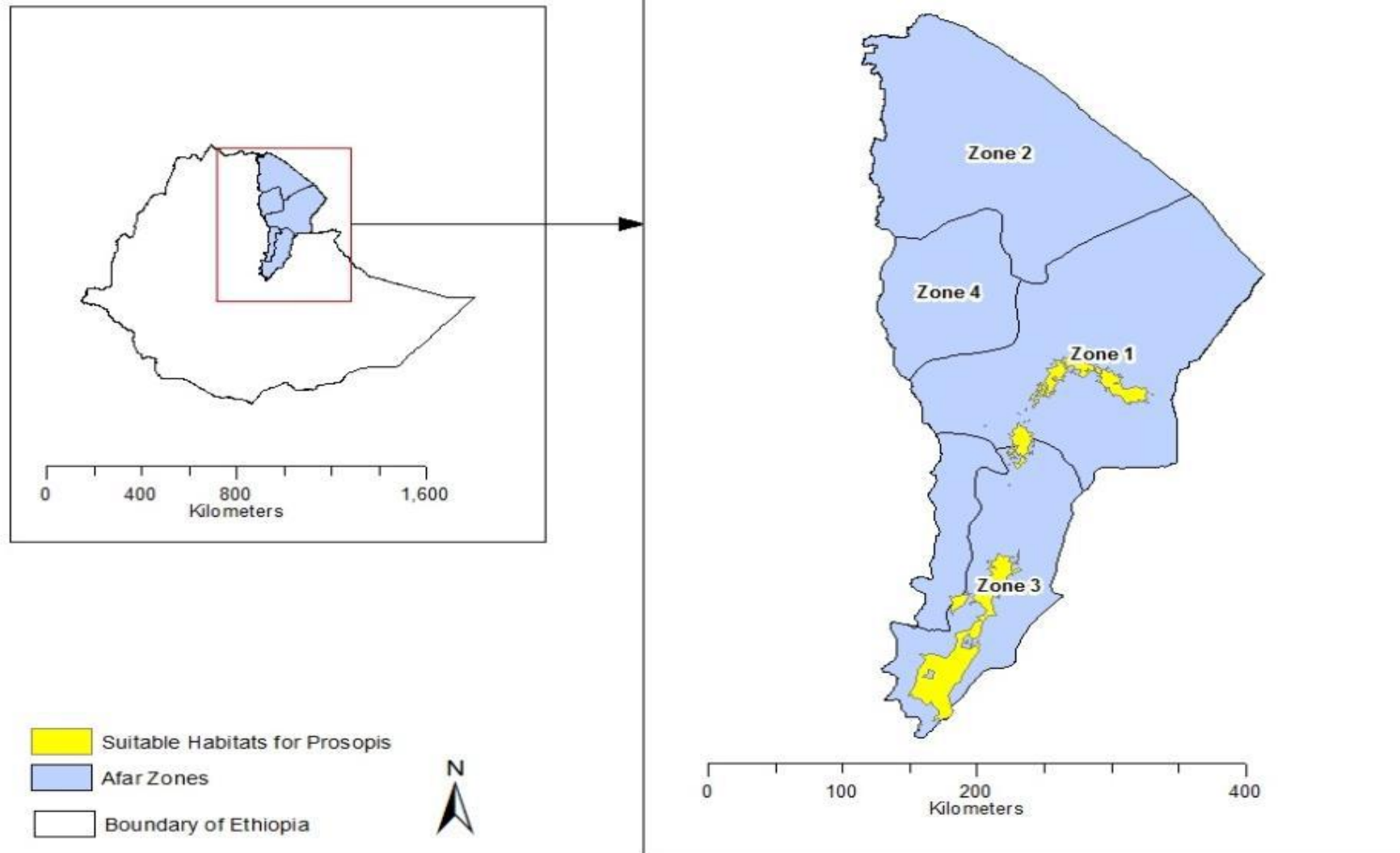


## Prosopis in Awash(Kesem kebena)



# AREAS INVADED BY PROSOPIS

Suitable Habitats for *Prosopis Juliflora* Invasion in Afar, Ethiopia. Maxent Model.

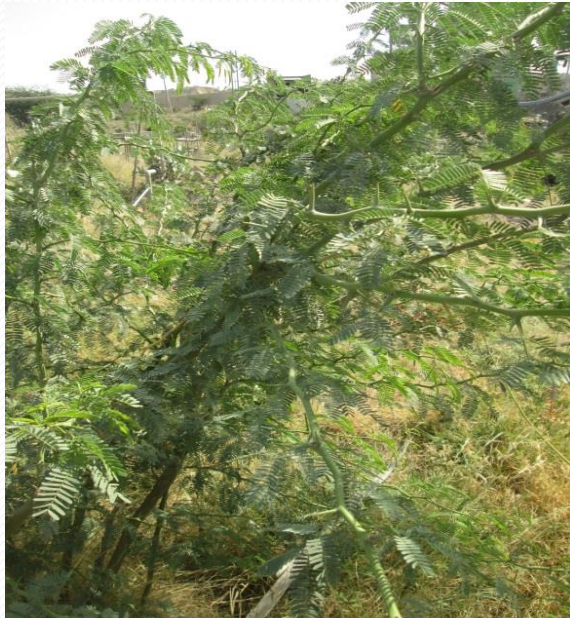




# Local Biomass – Prosopis Juliflora



- PJ high quality fuel to be fired in cement kiln
- Environmentally completely friendly (CO2 neutral)
- Cleaner emissions from cement plants (no SO3, no heavy metals, no other gases, less fine dust etc.)
- Sustainable for infinite period!





# HOW TO REDUCE CO2 EMISSION?



- INCREASING ENERGY EFFICIENCY
- ALTERNATIVE FUEL AND MATERIALS UTILIZATION
- SUBSTITUTION OF CLINKER BY NATURALLY BURNED CEMENTIOUS MATERIALS (LIKE PUMICE, POZZOLANA ETC)
- UTILIZATION OF WASTE HEATS FOR THERMAL OR ELECTRIC ENERGY



## **REDUCE COST OF PRODUCTION**

- **INCREASING ENERGY EFFICIENCY**
- **ALTERNATIVE FUEL AND MATERIALS UTILIZATION**
- **SUBSTITUTION OF CLINKER BY NATURALLY BURNED CEMENTIOUS MATERIALS (LIKE PUMICE, POZZOLANA ETC)**

# GOVERNMENT STRATEGIES FOR ALTERNATIVE FUEL



## CLIMATE RESILIENT GREEN ECONOMY(CRGE)

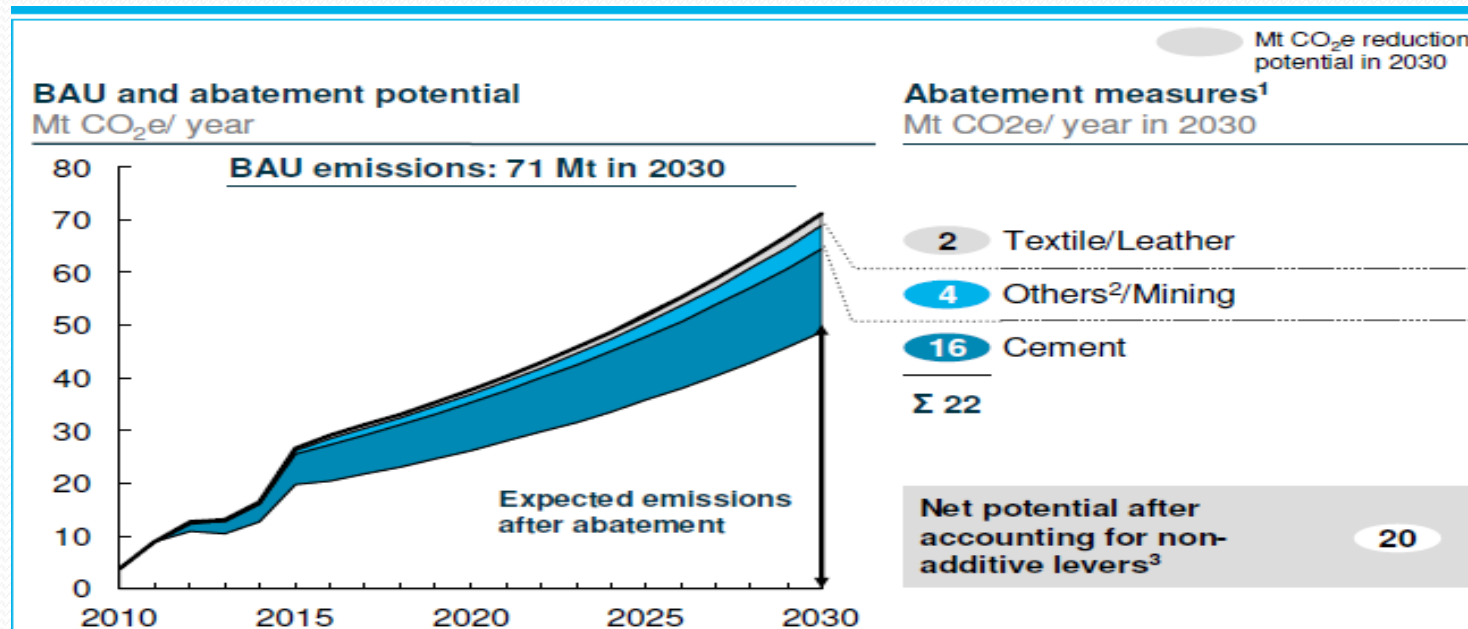
- Ethiopia's long term strategy of becoming middle income country by 2030
- 50% of Ethiopian Industry Sector GHG(CO<sub>2</sub>) emission comes from Cement Industry



## ...CTD



- >70% of Ethiopian Industry Sector GHG abatement potential is expected from Cement Industry (Out of 22 million ton CO<sub>2</sub>(2030) abatement potential, 16mt CO<sub>2</sub> is expected from Cement Industry)
- Considering 20% substitution of coal by biomass residues, an abatement potential of 4.2mtCO<sub>2</sub> is expected in 2030



<sup>1</sup> Represents total identified gross potential, some measures are not additive

<sup>2</sup> Chemicals (including fertiliser), food processing, paper and pulp industry

<sup>3</sup> Assuming full implementation of all levers

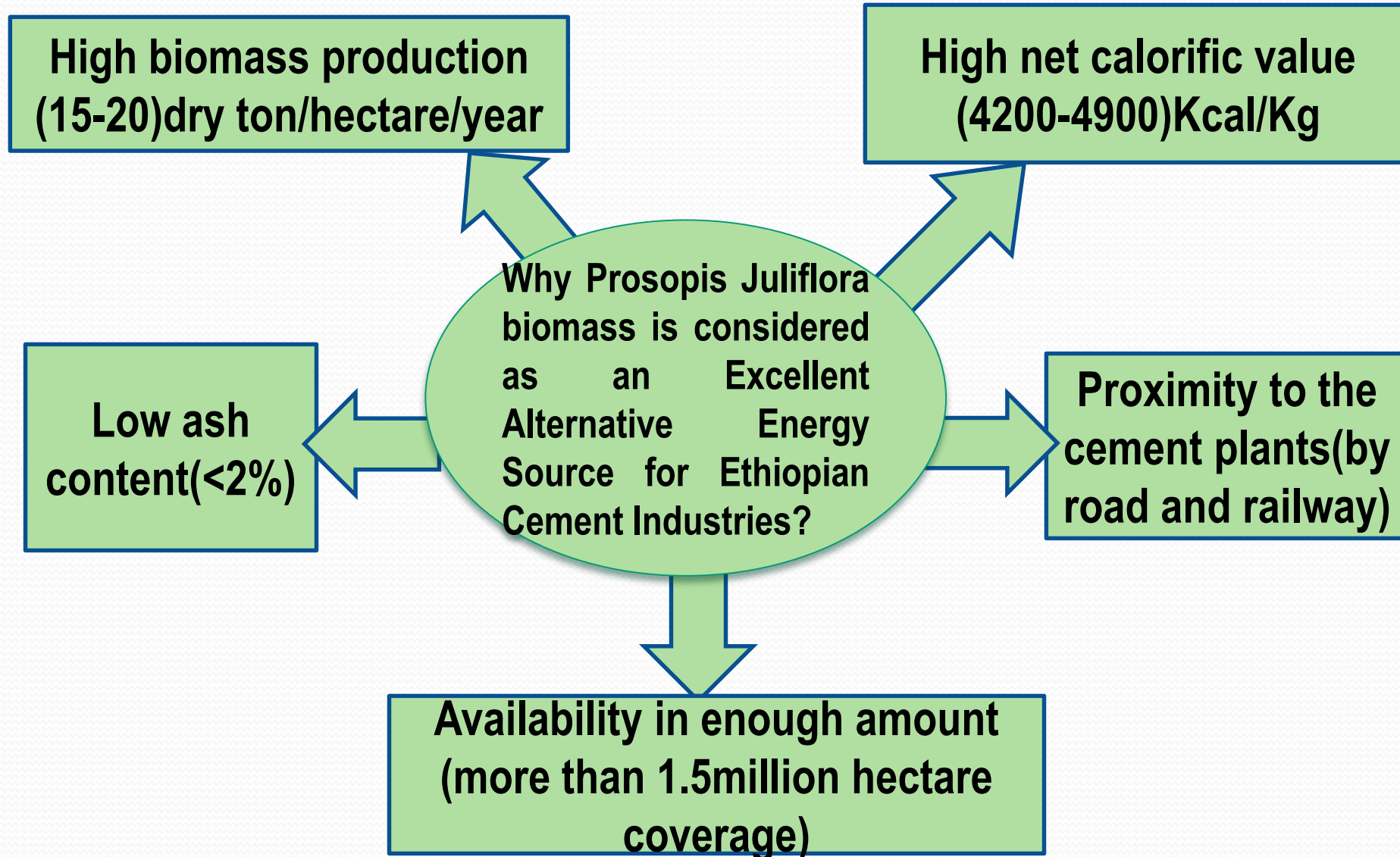
# ETHIOPIAN CEMENT INDUSTRY DEVELOPMENT STRATEGY (2015-2025)



ECIDS has listed Alternative energy utilization in Ethiopian Cement industries among the recommended strategic Projects “it is imperative to invest in alternative energy sources in order to reduce cost of production and cement price.”



# WHY PROSOPIS?



# Saving US\$ and Fuel costs - NCSC



	Spending US\$ p. y.	Saving US\$ p. y.
Import Coal with FOREX (US\$) currently	\$ 24.710.400	
Substitution of coal with PJ (Biomass)	(spending FOREX p. y.)	(saving FOREX p. y.)
40%	\$ 14.826.240	\$ - 9.884.160
60%	\$ 9.884.160	\$ - 14.826.240
Costs processed PJ at cement kiln (calculated in US\$ but actual costs arise in Birr)	(spending local currency/Y)	
40%	\$ 4.537.500	
60%	\$ 6.798.000	
Total costs fuel (imported coal + PJ):	(spending fuel total p. y.)	(saving on fuel p. y.)
40%	\$ 19.363.740	\$ - 5.346.660
60%	\$ 16.682.160	\$ - 8.028.240



# Saving US\$ and Fuel costs – total Ethiopian Cement Industry



	Spending US\$ p/y	Saving US\$ p/y
Import Coal with FOREX (US\$) currently	\$ 304.254.000	
Reduction of imported coal	(spending FOREX p. y.)	(saving FOREX p. y.)
40%	\$ 182.548.080	\$ - 121.705.920
60%	\$ 121.710.600	\$ - 182.543.400
Costs processed PJ at cement kiln (calculated in US\$ but actual costs arise in Birr)	(spending local currency p/y)	
40%	\$ 37.191.000	
60%	\$ 55.774.950	
Total costs fuel (imported coal + PJ):	(costs fuel coal + PJ)	(saving on fuel p/y)
40%	\$ 219.739.080	\$ - 84.514.920
60%	\$ 177.485.550	\$ - 126.768.450

# Reduction of CO<sub>2</sub> Emission from Coal



Target	Thermal Substitution Rate		
	10%	40%	60%
NCSC only (T/Y CO <sub>2</sub> reduced)	33,000	133,000	200,000
Total cement inds. (T/Y CO <sub>2</sub> reduced)	391,000	1,564,500	2.347,000

# Reduction of other hazardous Emissions in comparison to Coal



NOX ..... minus 10 - 25% \*)

SOx ..... minus 40 - 80% \*)

Heavy metals in fine dust from chimney:

- Hg (Mercury)
- Pb (Lead)
- Cd (Cadmium)
- All other HM contained in coal

\* depending on thermal substitution rate

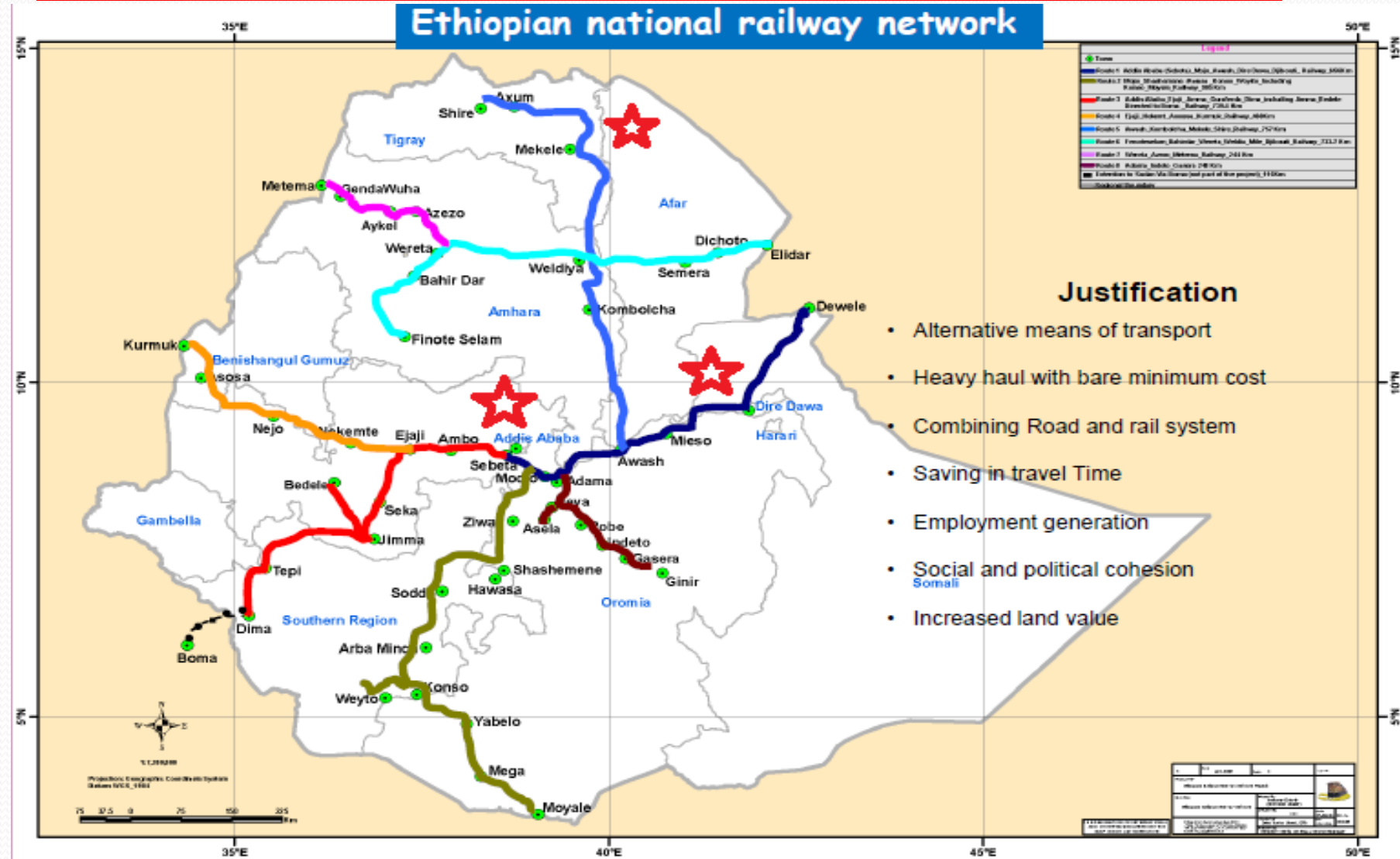




# Proximity of the invaded areas to Cement plants(road)



# Proximity of the invaded areas to Cement plants(Rail way)





# Required Investment for Harvesting & in Cement Industry



Creating Wealth Through Industries



# Benefits for Nation



If all cements plants substitute imported coal with local PJ:

- Saving of Foreign Currency - up to US\$ 182 millions/Y
- Saving of total fuel costs cement industry – up to\$ 126 millions/Y
- Creation of up to 1,000 new jobs in Afar Region (harvesting/transport)
- Reduce large areas of PJ „invasion“ and free agricultural land
- Significantly improved emissions from Cement Industry
- SOLUTION with WIN-WIN-WIN EFFECT for People of Ethiopia, Macro Economy Ethiopia, Cement Industry



The image is a vertical split composition. The left half shows a lioness in grayscale, lying down in a savanna setting with dry grass. The right half shows a male lion with a large, golden-brown mane, also lying down in a similar savanna environment. The background of the right half is a deep blue sky. Overlaid in the center, spanning both halves, is the text 'THANK YOU' in a white, bold, serif font.

**THANK  
YOU**