

Why Biomass-Based Cogeneration is Potentially the Ideal Starting Point for a Sustainable African Bio-fuel Industry:

An Eastern & Southern Africa Perspective

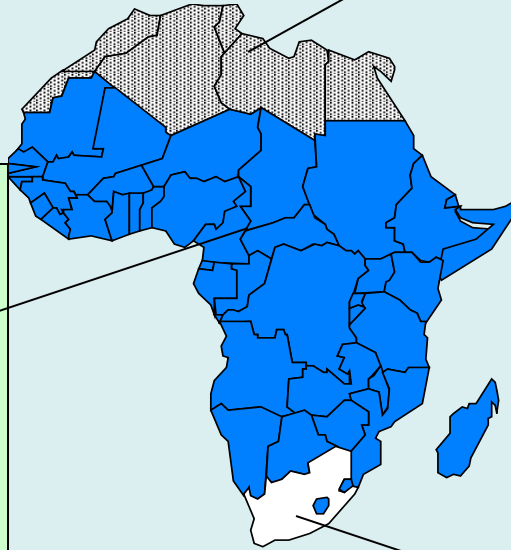
By

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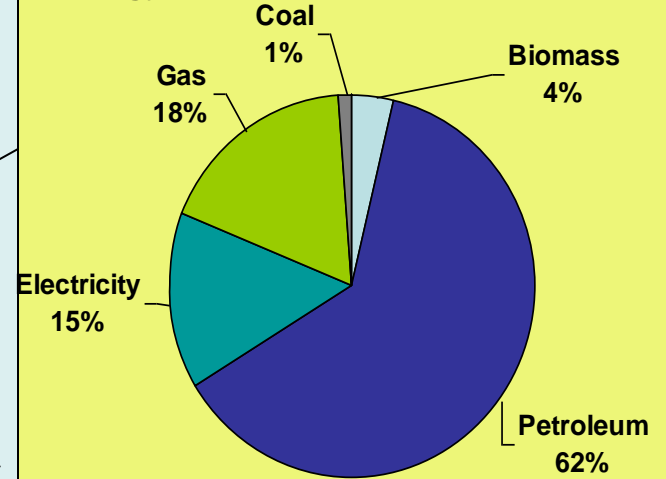


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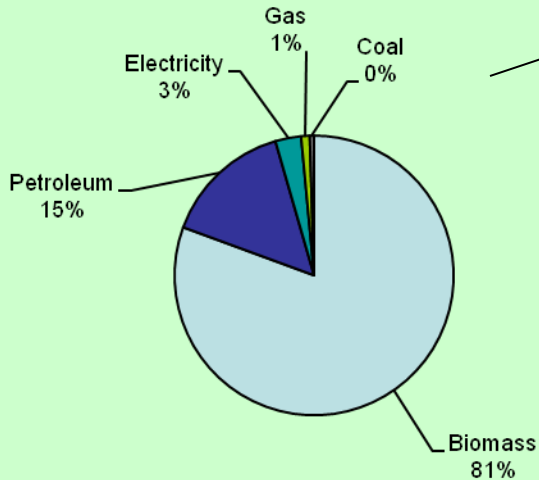
African Energy Sector: 3 distinct regions



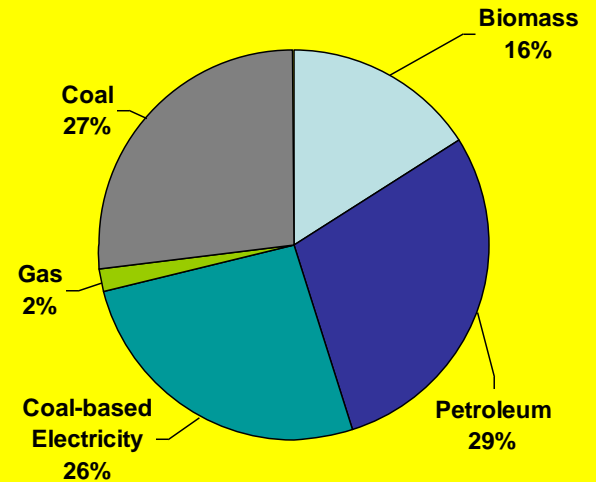
Energy Consumption - North Africa



Energy consumption - Sub-Saharan Africa



Energy Consumption - South Africa



Bio-Fuels in Africa – Broader Perspective

Both Liquid and Solid

1. Traditional Biomass Fuel Technologies (TBTs)

- Inefficient use of wood, charcoal, leaves, agricultural residues, animal/human waste & urban waste

2. Improved Biomass Fuel Technologies (IBTs)

- Improved and efficient technologies for direct combustion of biomass such as improved cooking/heating stoves and improved biofuel kilns

3. Modern Biomass Fuel Technologies (MBTs)

- Conversion of biomass energy to advanced fuels/forms namely liquid fuels, gas and electricity, including cogeneration.

TBTs



IBTs



MBTs

Biofuel Development in Africa

Widely-Tried Approach:

Greenfield large-scale private initiatives

- Key benefit: Optimize design of plantations and plant
- Key constraint: Steep learning curve – new land, new country, limited local technical expertise, no established policy links, no track record with local community
- ***Result: Extremely long gestation period, no local support, land/food controversies***

Key Approaches to Biofuel Development Development in Africa

At AFREPREN/FWD, we are appealing for an additional alternative approach:

- Define biofuels broadly to include both liquid and solid fuels**
- Find out who is already involved in biofuels**
- Easier to start with electricity cogeneration**
- Almost all sugar industries already have cogeneration with the requisite expertise, established links to policy makers, local community and financiers**

Key Approaches to Biofuel Development Development in Africa

At AFREPREN/FWD, we are appealing for an additional alternative approach:

- No land/food issue as fuel used is bagasse – a by-product**
- Can contribute to increasing electricity supply and expanding access to electricity in rural areas**
- Well accepted rural jobs and income generation potential**

Cogeneration/Small Hydro Potential in Africa

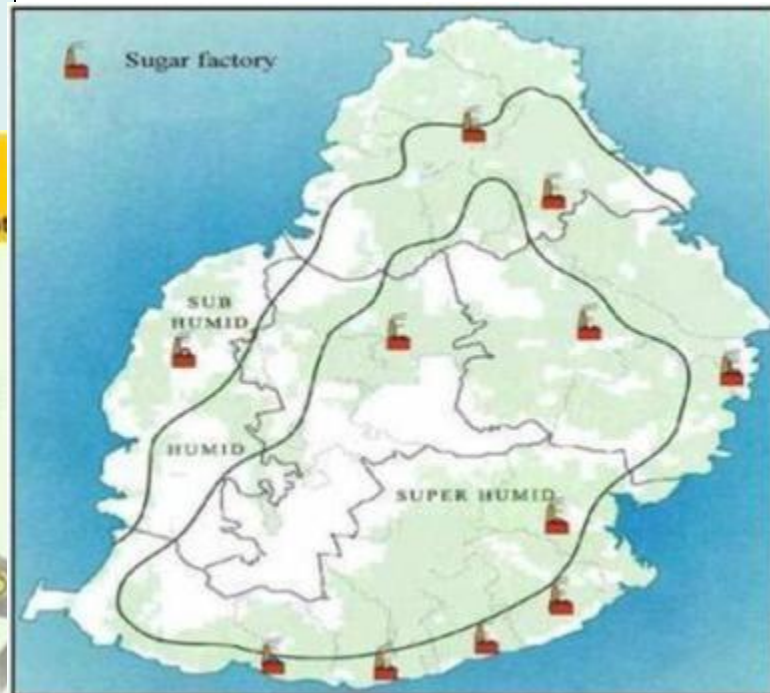
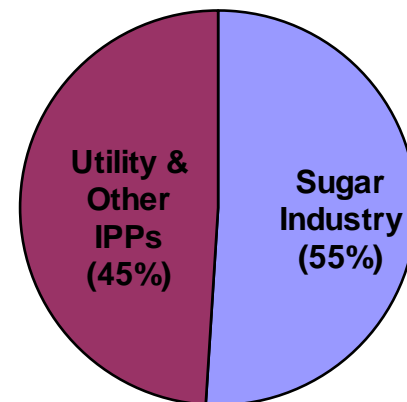


**Electricity
Supply to
Agro-industry
&
National Grid**

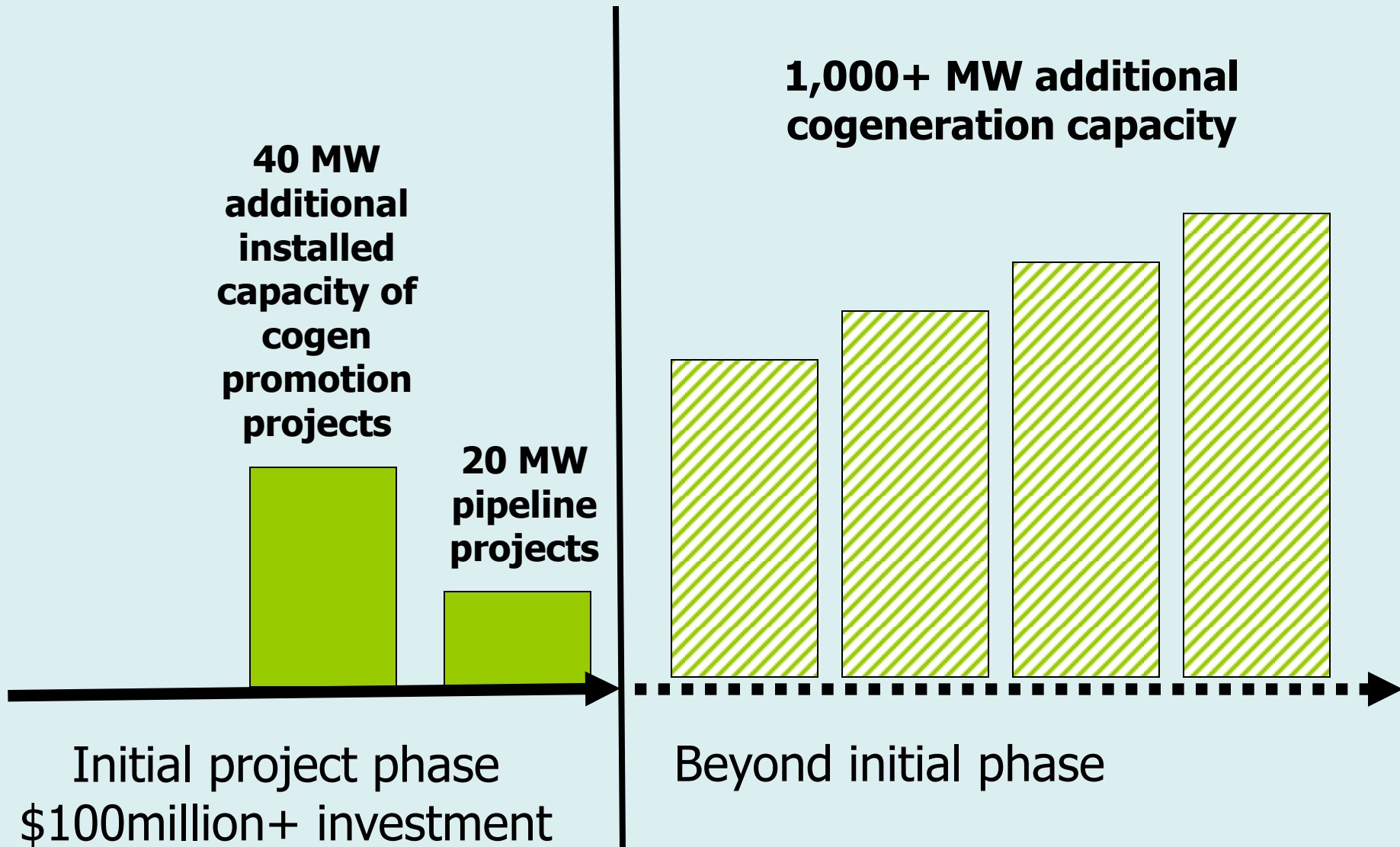
Cogeneration Development in East Africa Success Story of Mauritius

- Began with smaller installations (1.5- 5MW, now installing utility-scale base load multif-fuel cogen plants)
- Sugar industry-based cogen accounts for **55%** of total electricity generation
- Electricity revenue is more stable than sugar revenue which often fluctuates
- Grid connected cogen operational in Uganda, Kenya & Tanzania. Current and planned cogen plants could provide platforms for rural mini-grids

Power Generation

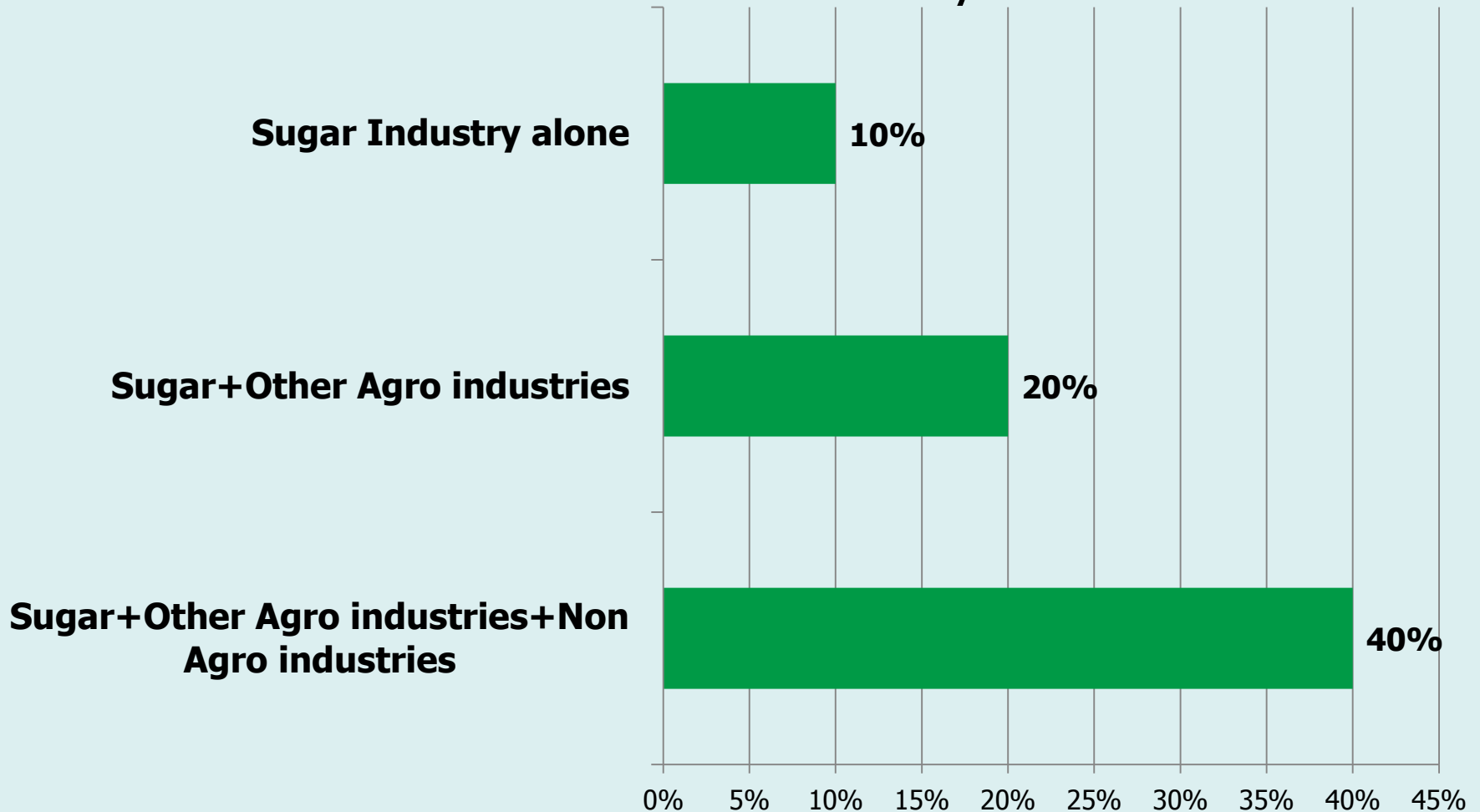


AFREPREN/FWD Cogen for Africa Program Status & Plans



Energy Security: Grid-Connected Cogeneration Potential in Africa

Cogeneration Potential as a % of Electricity Demand for Typical Sub-Saharan Country



Cogeneration/Small Hydro Potential in Africa



**Electricity Supply to estate
Employees & Dependants**

**Electricity
Supply to
Agro-industry
&
National Grid**



Cogeneration/Small Hydro Potential in Africa



**Electricity Supply to
surrounding Communities
& National Grid**

**Electricity Supply to estate
Employees & Dependents**

**Electricity
Supply to
Agro-industry
&
National Grid**



Case Study of Cogeneration & Small Hydro in Tea Industry - Kenya

- James Finlay Ltd, the largest tea estate in East Africa employs **>12,000 people**
- Through cogen and small hydro provides heat and power to tea factories and access to electricity to about **60,000 employees & dependants**
- Plans underway for additional **cogen and biogas plants**



Rural Agro-Industries Can Develop, Operate and Maintain Rural Power Installations and Mini-Grids



Cogeneration & Small Hydro in Agro-Industry

- **Cogeneration** in **sugar sector** and **Small Hydro** in **tea sector** of East African region increase competitiveness of key agro-industries.
- Protects/creates jobs (from manual labor to management).
- Over **18+ million people in the Eastern African region** directly or indirectly dependent on sugar and tea sub-sectors



Agro Industry in Africa

- Agriculture, agro-industries & related services account for:
 - **25 to 50% GDP of most African countries &**
 - **Over 70% of employment**
- In East African region
 - Sugar industry directly or indirectly affects livelihood of over **10 million people**
 - Tea industry affects livelihood of over **8 million people**



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