



# 1. AFREPREN/FWD

## Cogen for Africa Project

[www.afrepren.org](http://www.afrepren.org), [www.afrepren.org/cogen](http://www.afrepren.org/cogen)  
[www.unep.org](http://www.unep.org) & [www.afdb.org](http://www.afdb.org)



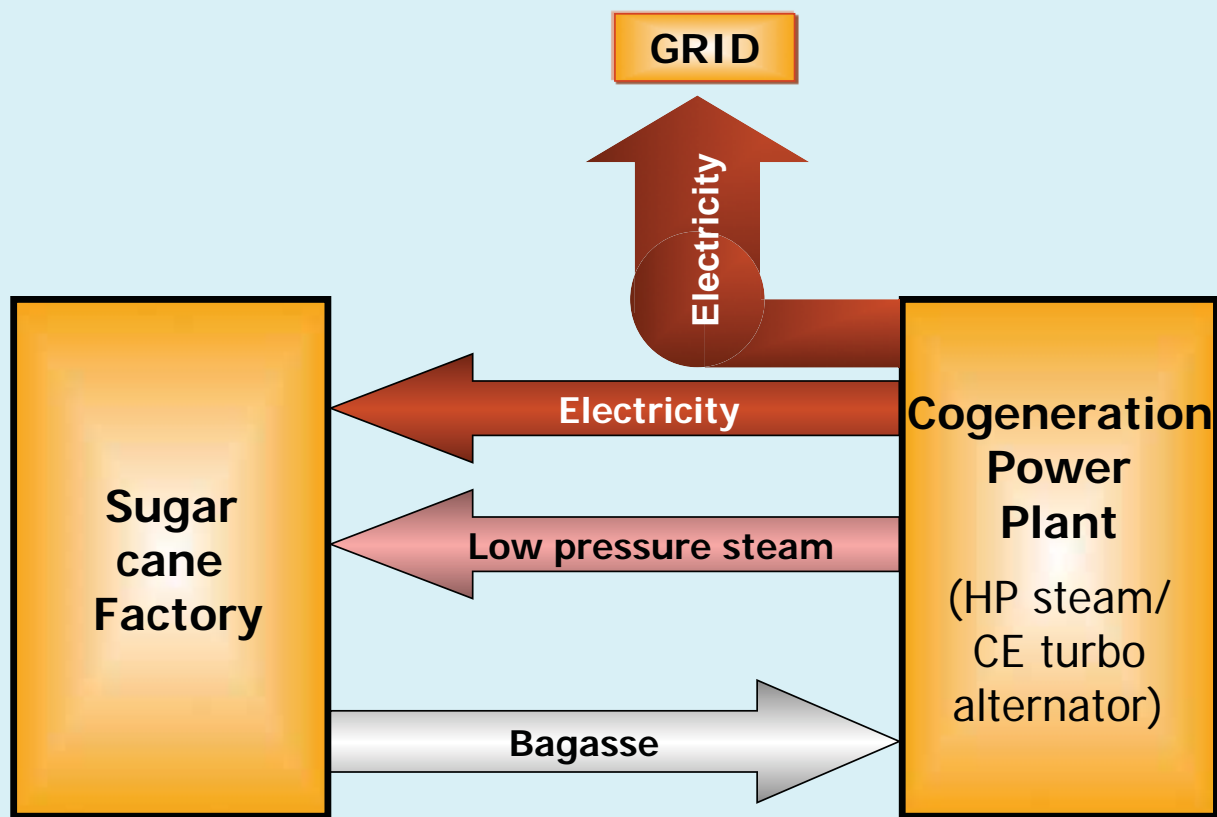
## 2. Outline

### **Cogen for Africa Project**

- 1. Status & Potential**
- 2. Milestones**
- 3. Challenges**
- 4. Lessons Learned**



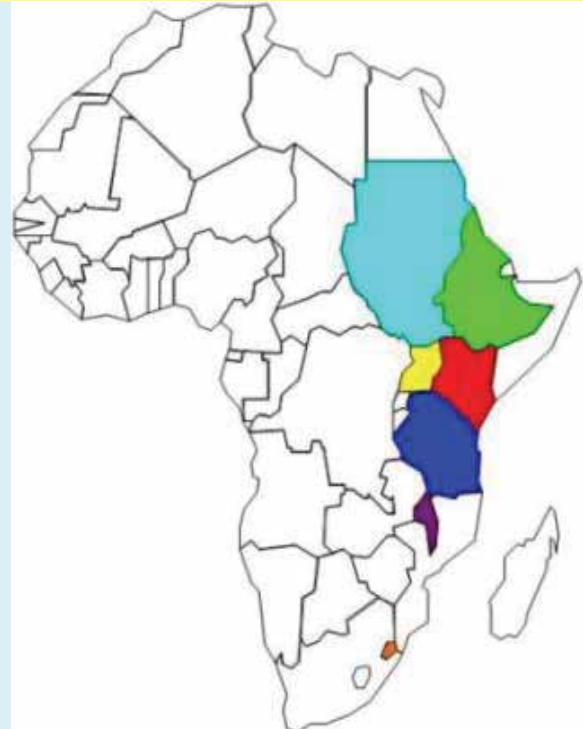
### 3. What is Cogeneration?



Typical sugar factory annexed to a cogeneration plant

## 4. Cogen for Africa Project

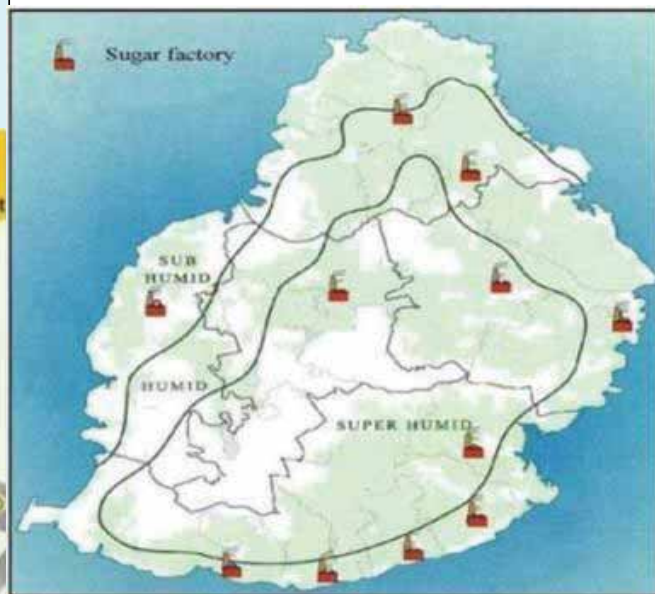
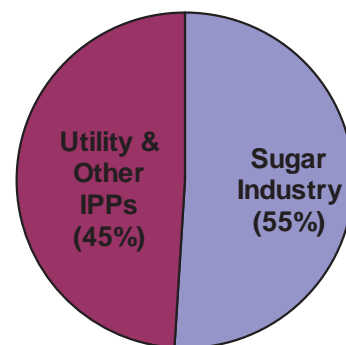
- Initiative of United Nations Environment Program (UNEP), African Development Bank (AfDB) & AFREPREN/FWD
- **Objective:** Promote cogeneration (mainly biomass-based)
- Initial focus on biomass-based agro-industries in **7 project countries**
- Building on success of Mauritius & others: India, Brazil, Denmark, Netherlands, Germany



## 5. Biomass Cogeneration Development in Africa – Success Story of Mauritius

- Began with smaller installations (1.5-5MW, now installing utility-scale base load multi-fuel cogen plants)
- Sugar industry-based cogen accounts for 55% of total electricity generation (close to half from biomass)
- Electricity revenue is more stable than sugar revenue which often fluctuates
- Grid connected cogen operational in Uganda, Kenya & Tanzania. Significant potential for scaling up cogeneration in mainland sub-Saharan Africa

Power Generation



## 6. Cogeneration Potential in Africa

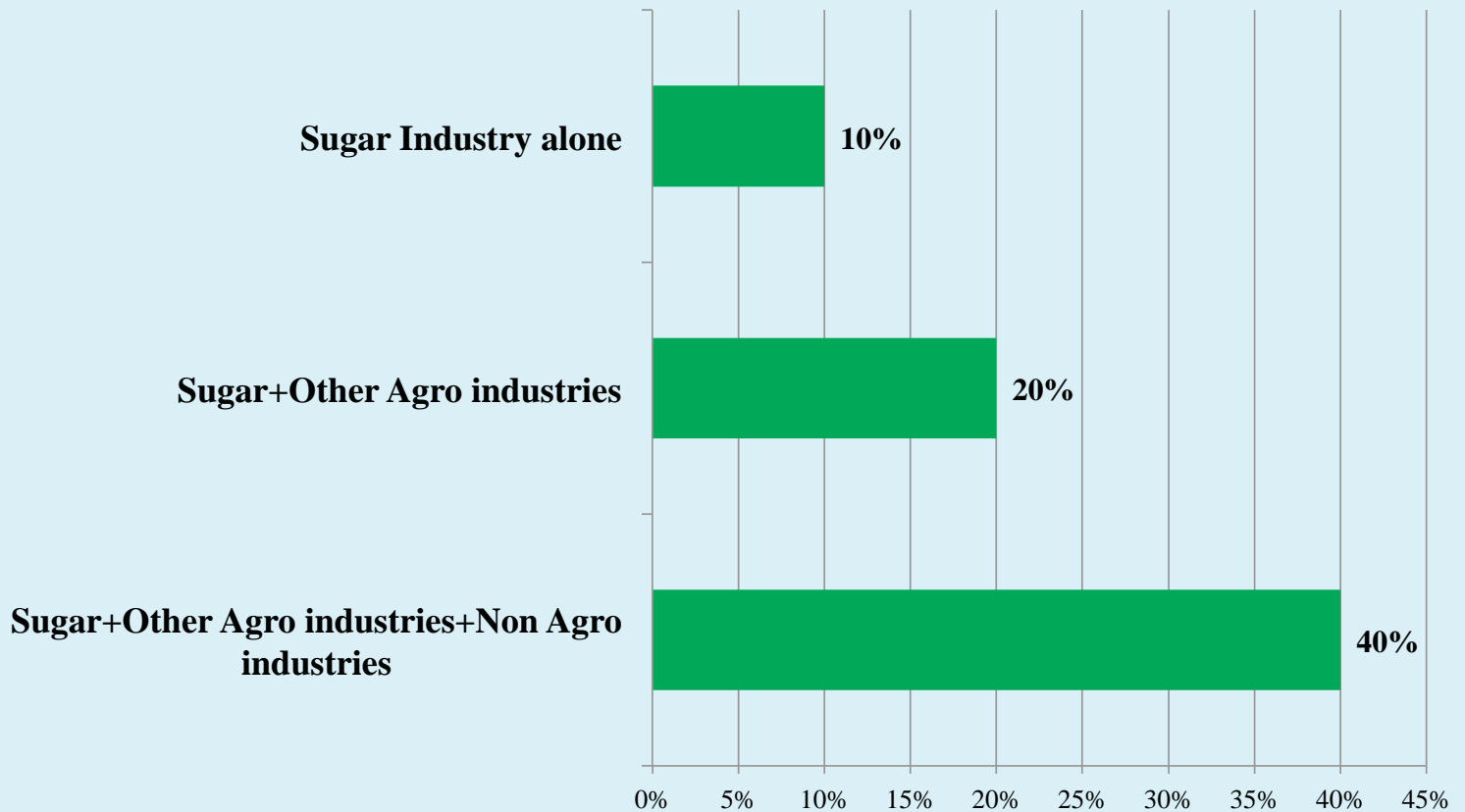


**Electricity Supply  
to Agro-industry**



## 7. Cogeneration Potential in Africa

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



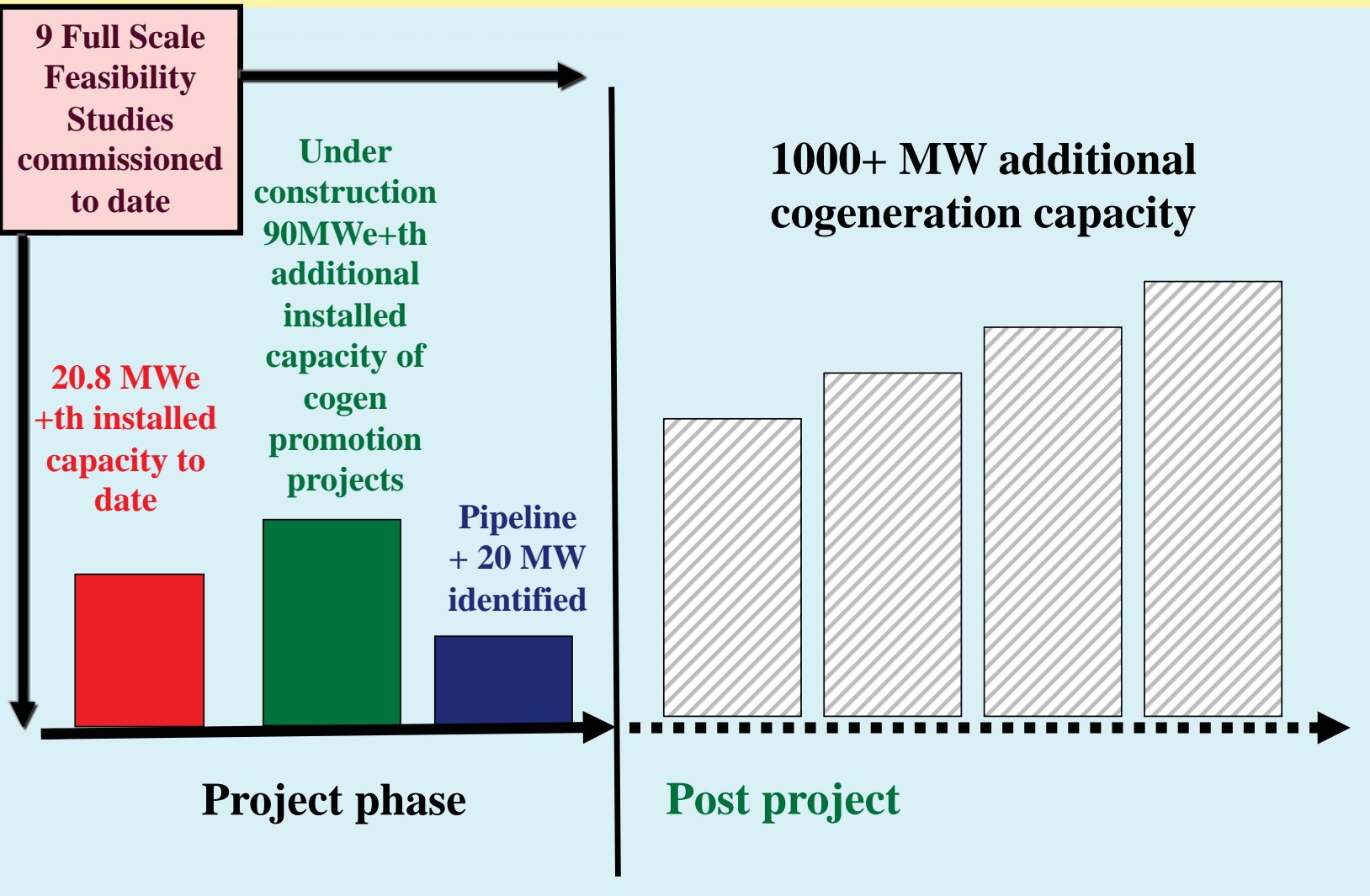
Source: AFREPREN/FWD

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





# 9. Cogen for Africa – Planned Installations & Status



## 10. Cogen for Africa Project Progress

### Key Progress to date

- 9 Full Scale Feasibility Studies commissioned
- 20.8MW (3.8MWe + 17MWth) of efficient Cogen systems installed in Kenya & Uganda
- 90MW (30MWe + 60MWth) Under construction in Uganda
- 103 People trained (85% of end of project target)
- 197 Investment Opportunities Identified

# 11. Cogen for Africa Project Activities

**Project activities address key barriers through**

Co-financed grants for:

- Training
- Technical assistance
- Pre-feasibility/full feasibility studies
- Engineering studies
- Power Purchase Agreement (PPA) development / negotiations
- Mobilization of investment finance etc

## 12. Commissioned Cogen for Africa Plants



### **Kakira Sugar, Uganda:**

Installed - 3MWe + 6MWth  
@45bar cogen plant

Under construction - 30MWe  
60MWth @67bar



### **James Finlay Tea, Kenya:**

Installed - 0.8MWe +  
11MWth @24bar cogen  
plant

Planned - 2.7MWe 37.1MWth

# 13. Under Construction - 30MWe 60MWth 67bar Model Cogen Plant



**Kakira Sugar, Uganda:**

**Turbine Alternator Deck  
Rebar**

**Boiler Chimney Foundation  
Completed**



## 14. Success Factors for Cogen in East Africa

- **Resource assessment:**
  - Long sugar harvest period (about 11 months)
- **Specialization:**
  - Dedicated cogen project development teams
- **Incremental approach:**
  - Proven technology. Rehabilitation of old sugar factory equipment & incremental addition of equipment
- **Efficiency:**
  - Switch from steam mills to electric mills
- **Policy support:**
  - Feed in Tariff (key factor) & regional support from AFREPREN/FWD Cogen for Africa project
- **Benefits sharing:**
  - Out growers account for bulk of sugar feedstock for many sugar factories

## 15. Challenges Encountered

### Challenges faced include:

- Favorable feed-in-tariffs and standard Power Purchase Agreements (PPAs) still absent in many African countries.
- Government focus on large power generators & unwilling to buy cogenerated power
- Limited investment in transmission system and instability of grids



Switchyard  
constructed by  
Kakira for power  
export



## 16. Challenges Encountered

### Challenges faced include:

- Delays experienced in supply of cogen equipment due to congestions at Mombasa & Dar es Salaam ports
- Reliance on external experts/consultants to undertake cogen related studies & maintenance of cogen plants. Local technical expertise is not yet well developed



**Congestion of Containers at Mombasa Port preventing ships from loading / offloading**



## 17. Challenges Encountered

The **major challenge** encountered to date is feedstock insecurity especially in the sugar sector:

- In some countries, sugar sector characterized by land wrangles, cane poaching incidences, etc



## 18. Scale up in Cogeneration

- Modest cogen investments in competitive sugar, tea & wood industries
- This could be replicated across all agro-industries & power generation capacity expanded to allow surplus for export:
  - Wood, rice, pulp & paper, coffee, sisal, palm oil, tea, cocoa, tobacco, maize etc
- Once one company in a competitive industry construct a successful cogen plant, all the other companies initiate similar investments



## 19. Cogeneration Potential in Agro Industry

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



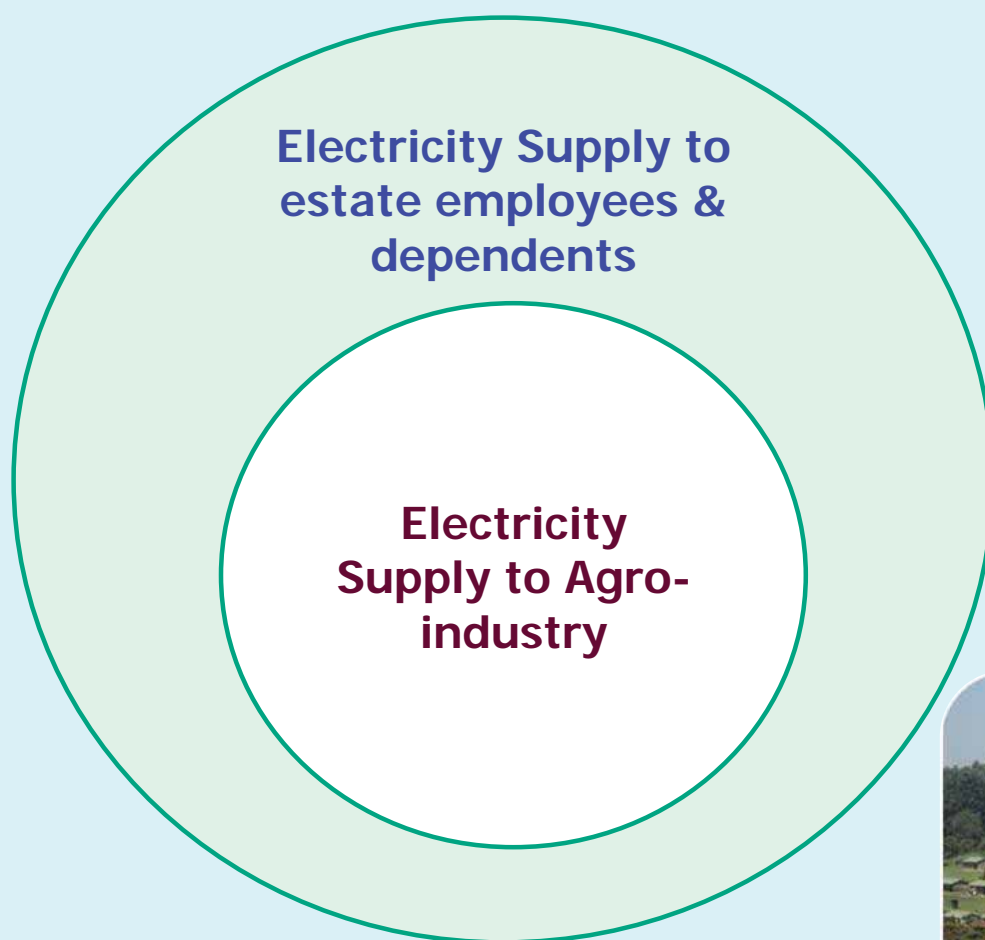
## 20. Cogeneration Potential in Africa



**Electricity Supply  
to Agro-industry**



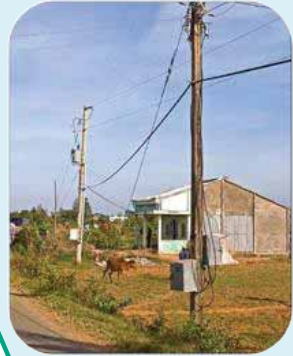
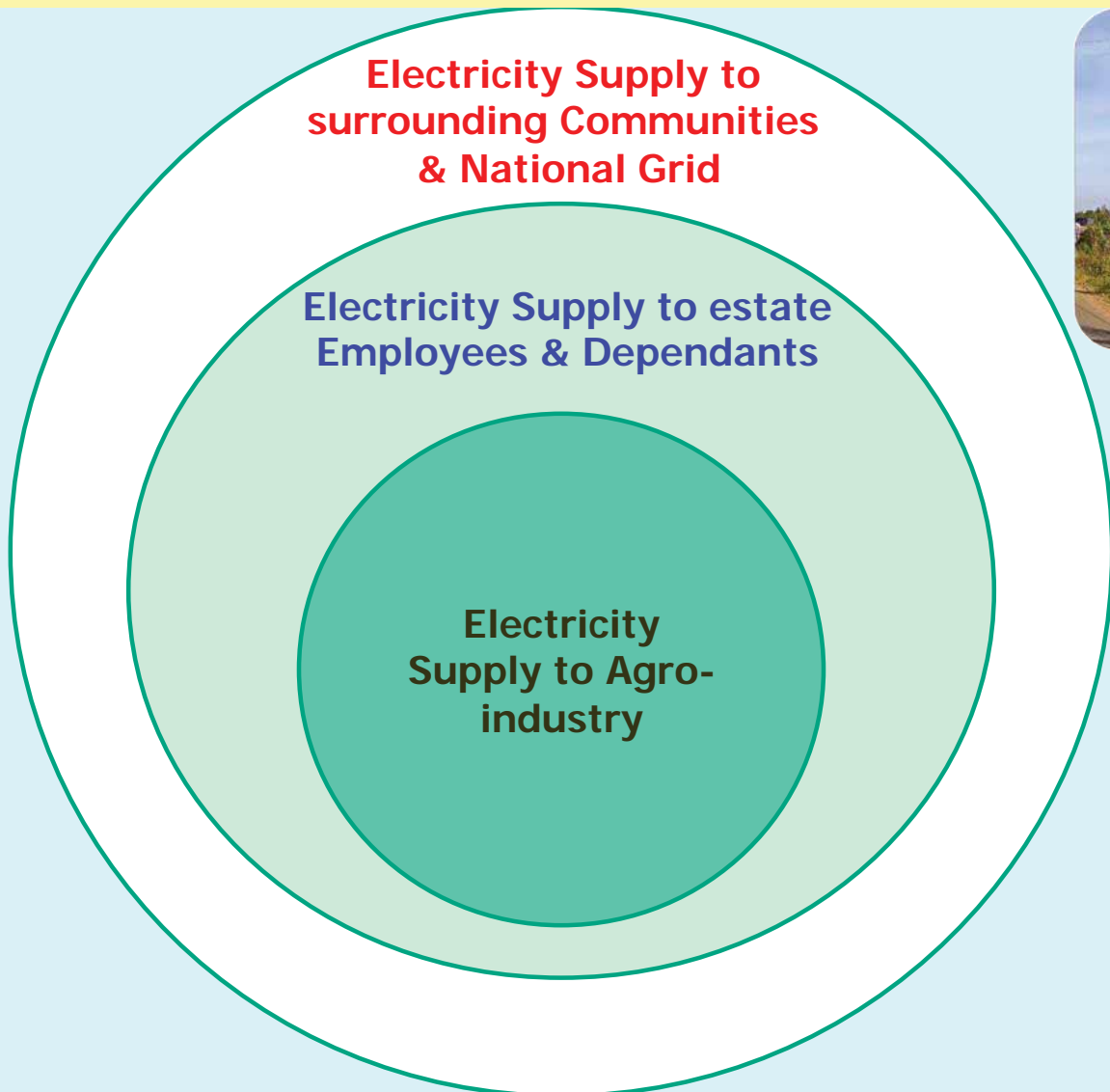
## 21. Cogeneration Potential in Africa



In most agro-industries, a cluster of households develops due to presence of workers, out growers & the secondary economy that emerges as a result of this settlement



## 22. Cogeneration Potential in Africa



**23.**

**Thank You**

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