RURAL ELECTRIFICATION AGENCY
Rural Electrification Agency (REA) is a semi-autonomous body created by an Act of parliament under Ministry of Energy and Mineral Development. REA is mandated to implement rural electrification programs in Uganda and has a vision of achieving universal access to electricity by 2035.

Since its formation in 1999, Government of Uganda through Rural Electrification Board, REA has implemented several rural electrification projects. The major role of REA is to implement governments’ rural electrification programme in line with the provisions of the electricity act 1999 and statutory Instrument No. 75 of 2001.
Building and maintaining a national rural electrification data base
Procurement of private sector operators to manage public funded rural electricity service territories
Preparing annual status reports on the progress of the rural electrification programme
Planning and implementing projects approved by the board
Generating information relating to investment opportunities in rural electrification
Processing applications for financial support from the REF
Recommending to the board the most efficient use of the REF

RURAL ELECTRIFICATION AGENCY functions
In July 2013, Cabinet approved a new Rural Electrification Strategy (RESP) 2013-2022, designed to achieve a much faster acceleration of the national geographical coverage and consumer access as compared to the current 7% that has been covered so far. With increased financing from GOU and other development partners, there is optimism that the 26% access target can be achieved.

**RESP OBJECTIVES**

- To achieve an accelerated pace of electricity access and service penetration to meet national development goals.
- To ensure that the programme progressively, facilitates access to all forms of modern energy services to replace kerosene lighting and other forms of traditional cooking and heating by 2030.
RURAL ELECTRIFICATION strategy

Rural Electrification programme has been implemented under a constrained power generation environment. However after the completion of Karuma and Isimba Hydro power projects which are in their initial stages of implementation, there will be increased power generation. Therefore there is need for immediate large scale distribution and access to prepare for this generation capacity.

Therefore there is a need to:
• Identify the households that do not have access to electricity.
• Prioritise those areas according to supply and demand.
• Determine the optimal route for extending the network to those areas.

As a decision support tool, GIS can ensure success in attaining the above objectives.
WHAT IS GIS?
GIS Systems are a special information systems that keep track not only of events, activities, and things, but also of where these events, activities, and things happen or exist.

Geographic location is an important attribute of activities, policies, strategies, and plans.
Almost everything happens somewhere and in most cases, knowing where some things happen is critically important.

Examples:
- Position of country boundaries.
- Location of Banks, hospitals
- Appropriate routes for extensions.
- Management of service territories.
- Equitable allocation of funds for grid extensions.

- Wayleave corridors
- Positioning of poles
- Location of broken poles and wires
- Location of un-electrified trading centers.
- Location of burning transformers.
- Location of wildlife areas.
- Location of off grid communities.
- Asset management
- Monitoring of service operators.
DATA FED INTO GIS
MAJOR GIS DATA SOURCES

Maps
GPS data collection
Drawings (sketch or AutoCAD and GIS)
Aerial (or other) Photographs
Satellite Imagery
CAD data bases
Paper records and documents
Secondary GIS sources:
- Re-scanned images,
- Digitizing maps,
- Digital elevation model.

Secondary GIS data sources are digital and analog datasets that were originally captured in another format (such as papers or films)
ADMINISTRATIVE DATA
(data from other Organisations)

Sources include;
- REA
- ERA
- UETCL
- UEGCL
- KCCA
- MOE
- MUK
- UBOS
- NFA
- NAVTEQ
- GIZ
- MEMD
- UMEME
- NWSC
- UNRA
- ESRI
- And many others
Primary Data sources include data collection in digital format. Data is collected for in house purposes.

The GIS Unit has overseen automation of various activities in REA for example;
- Electronic verification template of donor funded projects (NORAD, PVTMA, OBA, WB-CDM).
- Electronic templates for preliminary survey.
- Electronic templates for As Built Verification.
- Electronic templates for other data collection activities.

REA is currently implementing a country wide GIS data capture exercise for all REA assets located in the 13 service territories.
### LV LINE

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<th>Core Size</th>
<th>Core Cond</th>
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<th>Date</th>
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### MV POLE

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### TRANSFORMER

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### MV POLE

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<th>Size</th>
<th>Usage</th>
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<th>Cust_2P</th>
<th>Cust_1P</th>
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<th>Insula_Typ</th>
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This data capture exercise has so far been carried out in three service territories i.e. North Western, South Western and Western.

<table>
<thead>
<tr>
<th>SERVICE TERRITORY</th>
<th>TRANSFORMERS</th>
<th>HVLINE(KM)</th>
<th>LVLINE(KM)</th>
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<td>Western</td>
<td>117</td>
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GLIMPSE OF THE ON-GOING GIS DATA CAPTURE EXERCISE

LINE CLEARANCE

VANDALISM

EFFECTS FROM ROAD CONSTRUCTION
GLIMPSE OF THE ON-GOING GIS DATA CAPTURE EXERCISE

BUDONGO FOREST

HOIMA SUGARCANE

HOIMA – KAGADI ROAD
OUTPUTS FROM DATA FED INTO GIS
In regards to the Rural Electrification Strategy, GIS acts as a tool to aid achieving an accelerated pace of electricity access and service penetration to meet national development goals.

With GIS, Rural Electrification can realise;

- Identification of On & Off Grid Projects
- Energy Demand Patterns
- Network Asset Audit & Inspection.
- Asset Management.
- Load Forecast and Load flow studies

- Location of Potential Last mile connections.
- Potential small-scale hydro sites.
- Potential Geothermal
- Potential Biomass Areas
- Potential Solar PV electrification
- Wind Energy Stations
Using GIS, REA has identified over 115 mini hydro/Solar sites (10-100kw) around the country.
Running solar mini grid sites include:

**Site Name:** Kitobo Mini Grid
**Capacity:** 200kw
**No. of Household served:** around 1,000

**Site Name:** Kyenjojo
**Capacity:** 10kw
**No. of Household served:** around 100

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**CRITERIA**

- Planning.
- Location.
- Distance from On Grid (5kms)
- Demand: Household.
- Road Network
- Terrain

REA has over seen set up of several solar plants and small scale solar subsidies.
OFF GRID PROJECTS - BIOMASS

REA has overseen the setup of biomass sites,

CRITERIA
- Planning.
- Location.
- Feedstock.

Running biomass sites include;

Site Name: Pamoja Mityana/Mpigi biomass sites
Capacity: 32kw/11kw
No. of Household served: 66/14
Feedstock: Maize cobs.
As of 2015/2016 FY, REA has constructed over 7,700km medium voltage and 4,200km of Low Voltage. Main grid extension have continued to target district headquarters, economic growth centers and social services.

**CRITERIA**

- Location.
- Distance.
- Demand/Households.
- Road Network
- Terrain
- Planning
- Costing
- Funding.

95% of district headquarters have been electrified,

- **106** – (Electrified)
- **2** – (Under construction)
- **3** – (Under procurement)
- **1** – (Feasibility study)
The country was divided into service territories, each served by service Provider and is responsible for all operational and management aspects within the assigned service territory.

- North Western (UEDCL)
- Mid Western (UEDCL)
- Southern (UEDCL)
- Eastern (UEDCL)
- Central North (UEDCL)
- North Eastern (UEDCL)
- North North Western (UEDCL)

- Northern (PACMECS)
- Rwenzori (BECs)
- Western (UEDCL)
- South Western (UEDCL)
- West Nile (WENRECO)
- Central (KRECS)

All of these feed on Umeme’s footprint across the country.
STATISTICAL ANALYSIS

CUSTOMERS vs TRANSFORMER SIZE (Section of Kyenjojo – Kagadi 33kV)

Source: REA GIS data capture exercise 2017
NOTH WESTERN SERVICE TERRITORY
CONDUCTOR SIZE (MMSQ)

Source: REA GIS data capture exercise 2017
STATISTICAL ANALYSIS

NOTH WESTERN SERVICE TERRITORY
33kV DISTANCE (Km)

Source: REA GIS data capture exercise 2017
SUMMARY

- Identification of On/Off Grid Projects
- Network Asset Audit & Inspection.
- Energy Demand Patterns
- Asset Management.
- Load Forecast and Load flow studies
- Location of Potential Last mile connections.
- Potential small-scale hydro sites.
- Potential Geothermal
- Potential Biomass Areas
- Potential Solar PV electrification
- Wind Energy Stations

GIS

SECONDARY DATA

PRIMARY DATA

ADMINISTRATIVE DATA
CHALLENGES IN FEEDING GIS SYSTEMS FOR RURAL ELECTRIFICATION
CHALLENGES IN FEEDING GIS SYSTEMS FOR RURAL ELECTRIFICATION

• Under utilization of GIS technology.
• Costly GIS Softwares.
• Irregular dataset updates.
• Paper Maps to Digital process is generally the most complex & expensive.

CHALLENGES

• Unreliable and inaccurate data sets.
• Data sharing policies.
• Bureaucracy in data requests.
• Limited access to information or datasets.
• Inconsistent coordinate systems within shared datasets.
Open source data about energy utilities in Uganda can be found at energy-gis.ug.

THANK YOU