

ECREEE REGIONAL WORKSHOP
GIS Energy Planning and RETScreen Training
22nd to 26th August 2011, KNUST, Kumasi–Kumasi

GIS–BASED SUPPORT FOR IMPLEMENTING POLICIES AND PLANS TO INCREASE ACCESS TO ENERGY SERVICES

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The Energy Center, KNUST, Kumasi, Ghana

Presentation Outline

- ❑ **BACKGROUND TO GHANA PROJECT**
- ❑ **GIS MAPS & ENERGY ACCESS MODELLING**
- ❑ **GIS-BASED ENERGY ACCESS REVIEW (GEAR) TOOLKIT**
- ❑ **TRAINING WORKSHOP**

GIS-based Energy Access Project Objectives

General Objective

- ❑ Contribute to effective implementation of policies & plans for achieving energy access targets in Ghana by 2020.



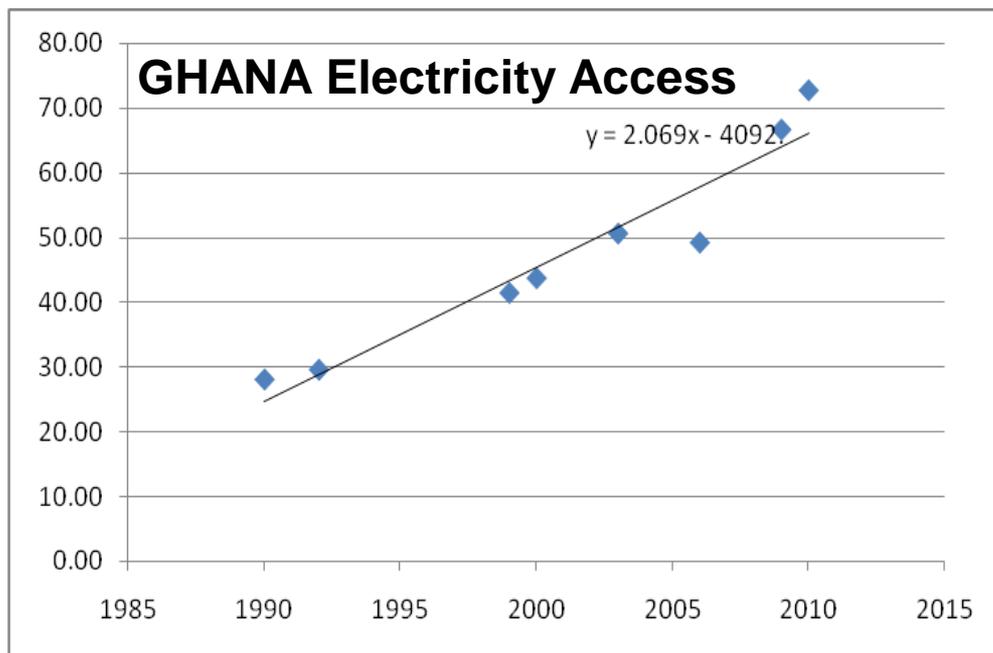
Specific Objectives

1. Review existing energy policies and plans for increasing energy access in Ghana.
2. Use GIS to collate & analyze data, provide timely information on pop. distribution, socio-economic activities, status of energy access programs.
3. Identify gaps in energy policies & plans for achieving expected energy access targets by 2020 and provide timely mitigation measures.
4. Develop methods & tools to facilitate business models, investment plans and capacity development to complement planned activities to achieve energy access targets by 2020.

Preparatory/Initial Activities

- Collected data on services (schools, hospitals, etc across the country with and without electricity)
- Data collection from electric power utilities (substations/ transformers, MV/ LV lines, rural/urban demand, etc)
- Selection of Network Planner Computer Model developed by Columbia University
- Decision to focus on electrification modelling leaving LPG modelling to be tackled in the future
- Ghana Energy Access Review (GEAR) Toolkit

Access to Electricity: Ghana's Achievements vs ECOWAS Targets



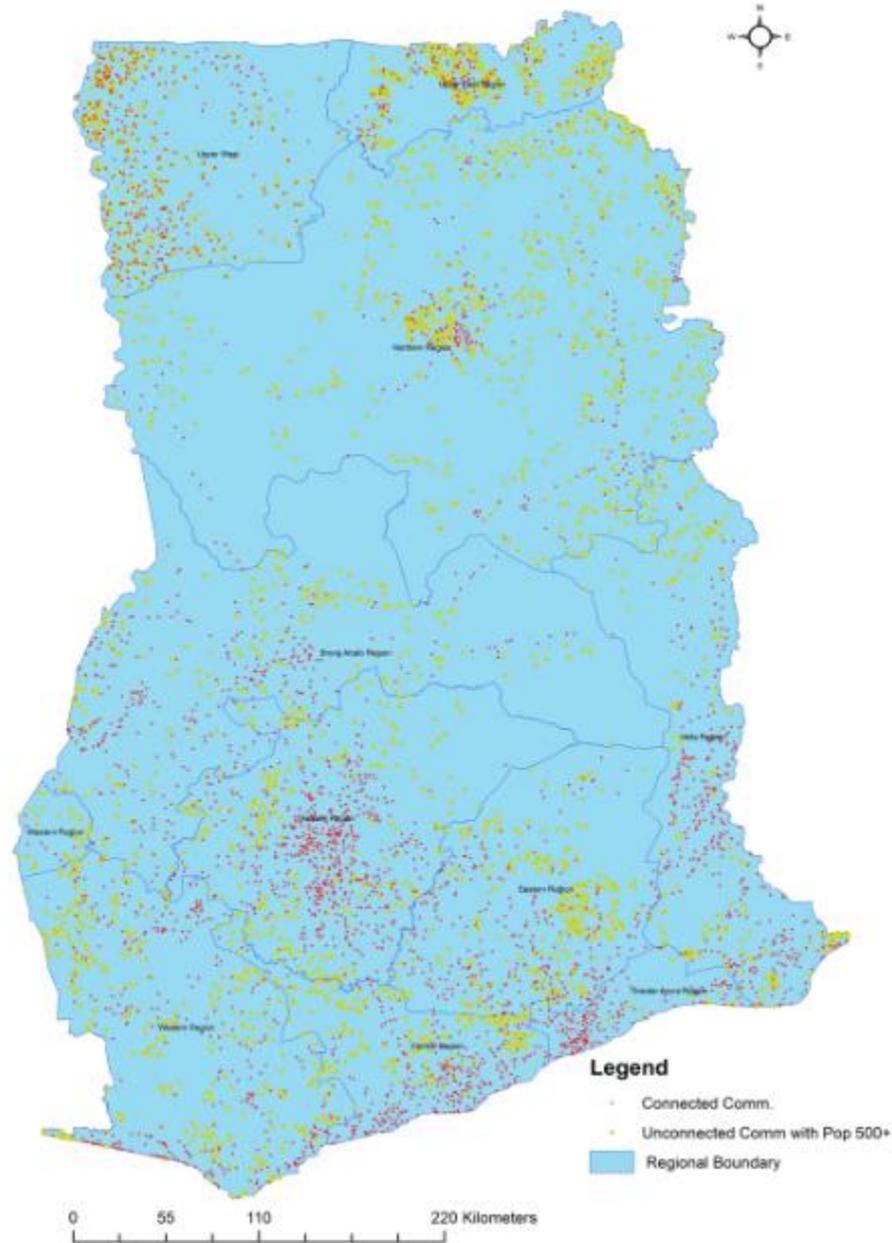
REGION	Access Rate		Overall Access Rate
	Urban	Rural	Regional
Ashanti	100%	68%	84%
Brong Ahafo	100%	45%	67%
Central	98%	69%	81%
Eastern	100%	51%	70%
GR. Accra	100%	75%	97%
Northern	100%	22%	50%
Upper West	100%	26%	40%
Volta	99%	50%	65%
Western	100%	43%	68%
Upper East	100%	31%	44%
National	100%	49%	73%
ECOWAS	100%	36%	50%

GIS Maps & Energy Access Modelling

Ghana Electrical Network Map

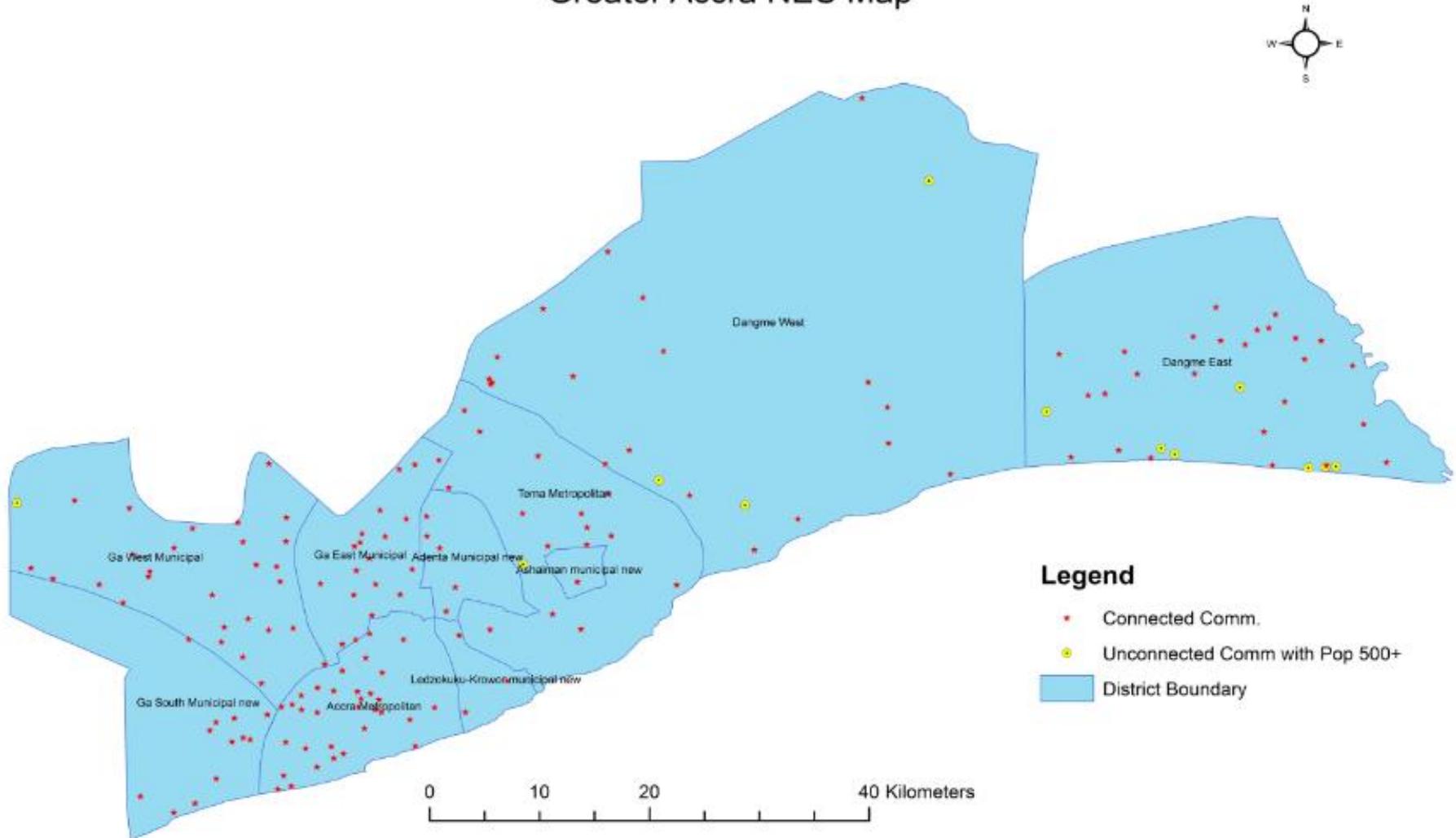


Ghana Electricity Access



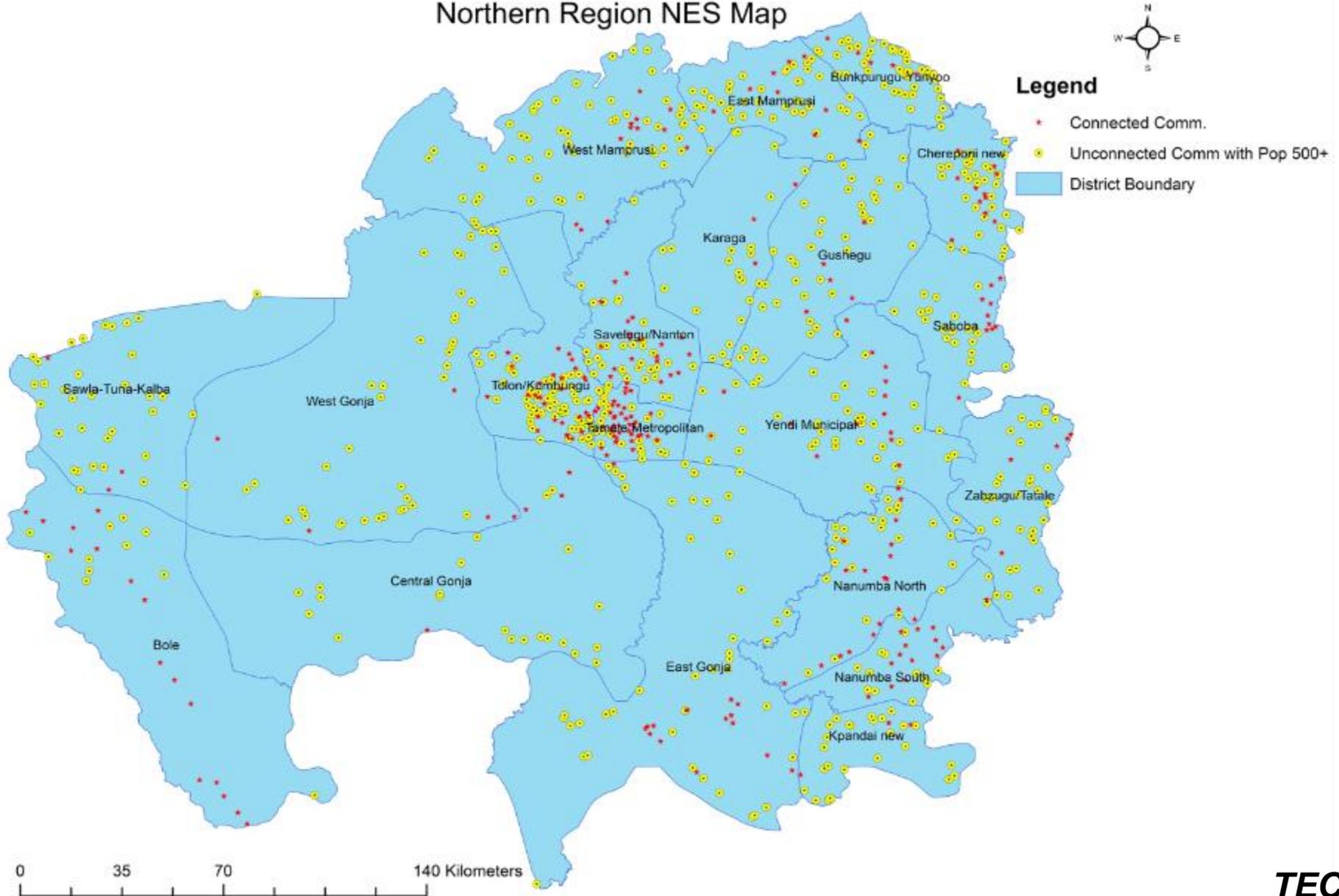
Access to Electricity - Highest

Greater Accra NES Map

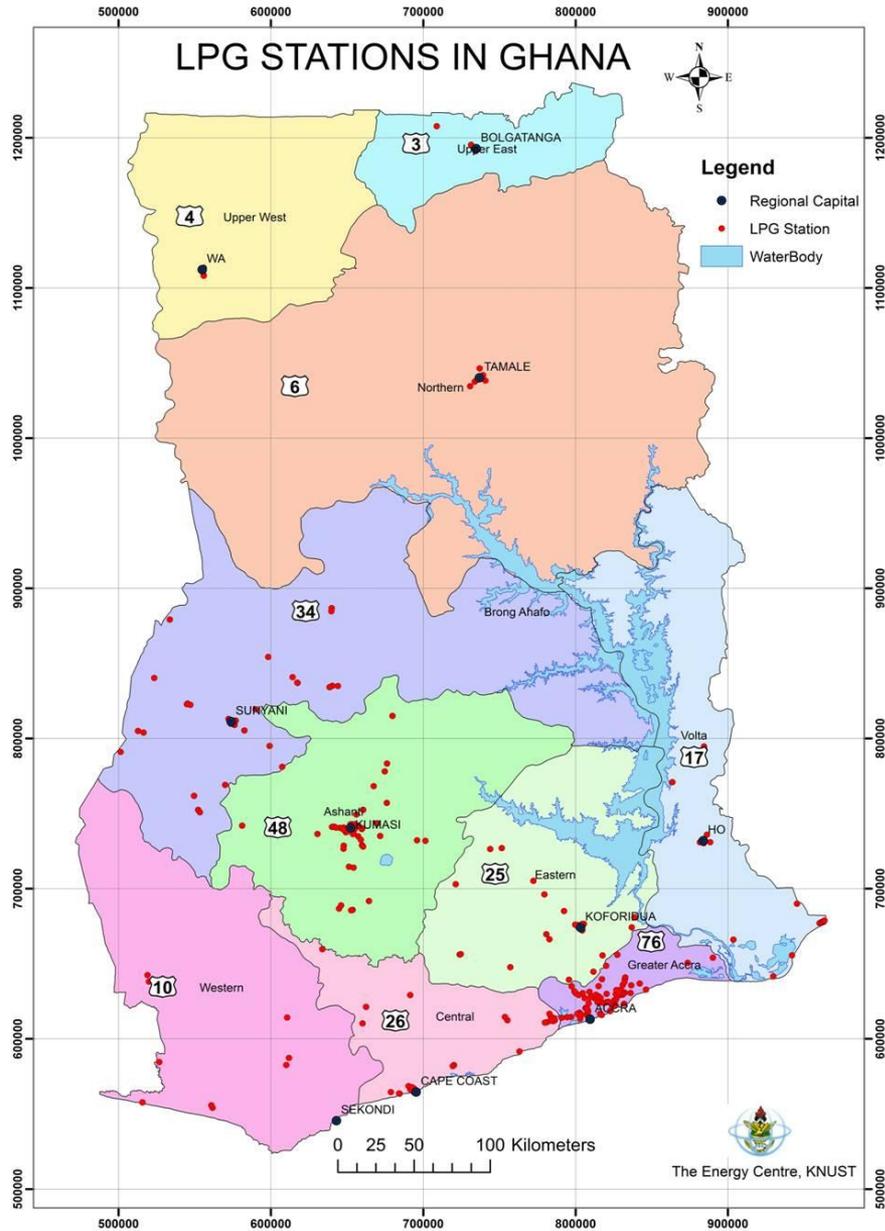


Access to Electricity - Lowest

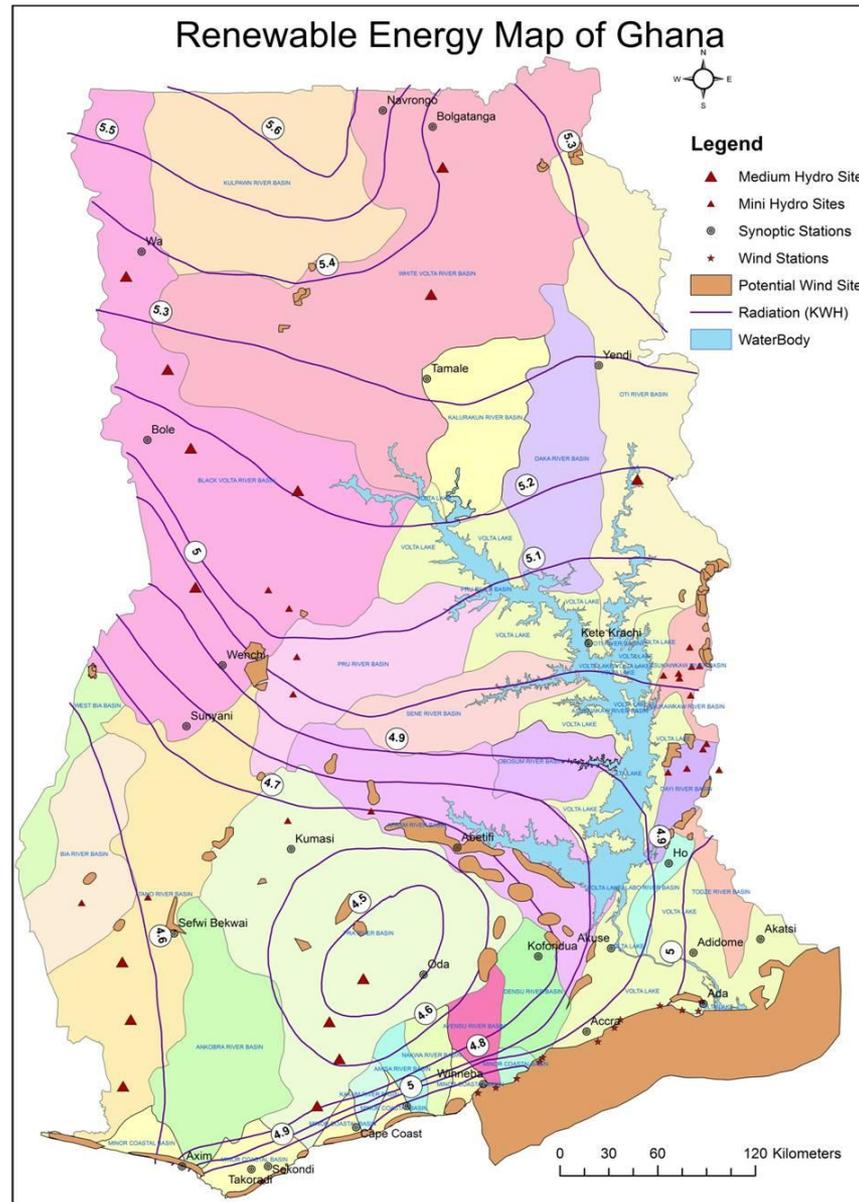
Northern Region NES Map



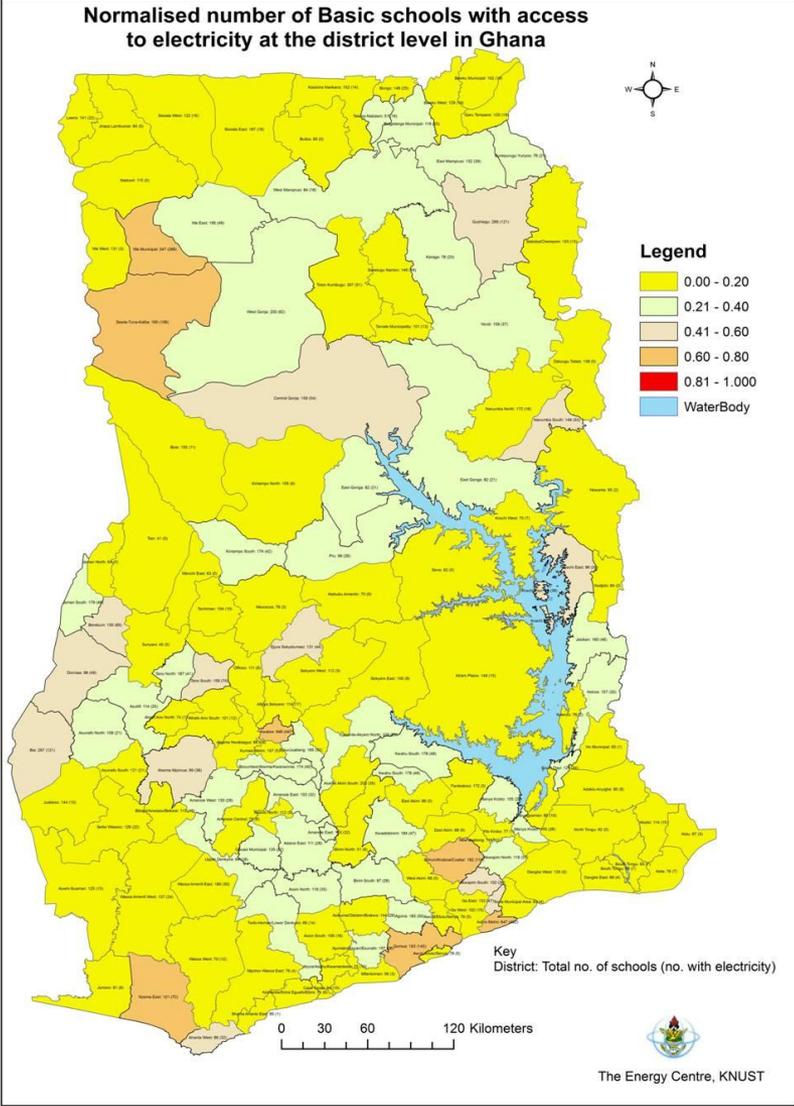
LPG Stations in Ghana



Renewable Energy Resources



Access to Electricity by Basic Schools



GEAR Toolkit

- GIS-based Energy Access Review (GEAR) Toolkit for viewing / investigating

- Communities Electrified/Un-Electrified with attributes (population, recommended electrification option, costs of electrification, etc)
- User defined queries (Community/ District/ Region/ Ghana)
- Electrification Rates

- Plans to improve GEAR Toolkit to enable updates, historical trends, web-based application and LPG projections



Additional information on Toolkit

- For an unelectrified community:
 - Recommended technology for electrification (grid, mini-grid or off grid)
 - Initial cost of the system
 - Operations and maintenance costs
 - Required technical components such as length of medium voltage lines, low voltage lines, transformer capacities, diesel generator capacities, diesel fuel costs, solar panel capacities, batteries, etc.
-

GEAR Toolkit homepage

Home :: GIS-based Energy Access Review Toolkit - Windows Internet Explorer

http://geartoolkit.creativemediaconsult.com/

energy access africa

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GIS-based Energy Access Review(GEAR)Toolkit

National Electrification and LPG information System ...!

The Energy Center,KNUST

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ECOWAS GEAR Toolkit

GNIS Web Portal



WELCOME TO THE OFFICIAL WEBSITE OF THE GEAR TOOLKIT



GEAR TOOLKIT
GIS Based Energy Access Review Toolkit
Version 1.0.0

GEAR Toolkit Login Section

The GIS-based Energy Access Review Toolkit is an interactive computer-based Decision Support System (DSS) developed to compile, analyze and present data for Energy Access planning, management and monitoring. This will aids in providing precise information needed to make timely decisions related to electrifying a community, region or district in the country. However, with the inherent limitations faced by the traditional system of record-keeping (files and papers) and the voluminous nature of data involved during planning, an automated system can be developed using Geo information Technology. Geo Information technology makes use of GIS Technology in the management of geographic features @ [Read the Gear Toolkit License Agreement](#).

Key Features

- Map Explorer
- Query Window
- Geo Update Window
- National Electrification & LPG Database

Partnership With Us

Partnership with the Energy Center, KNUST in promoting the GEAR Toolkit World wide. Share with us in the many benefits the GEAR Toolkit turns to offer in disseminating precise Energy planning data etc. If you have any ideas or questions, please feel free to contact us.

Project Team News

The Project Team comprises Professor Abeeku Brew-Hammond, Director of the Energy Center, KNUST, Dr. A.A. Duker, Mr. Francis Kemausuor as Project Coordinator, Mr. Isaac Adu Roku, Mr. Festus Boamah and Mr. Daniel Ladzaga As Programmer.

Training Sections

Training Sections on the GEAR Toolkit has Been Organised for some Staffs at the Energy Commission of Ghana. There is also going to be another training Section for representatives of Ecovias member Countries on The use of the GEAR Toolkit.

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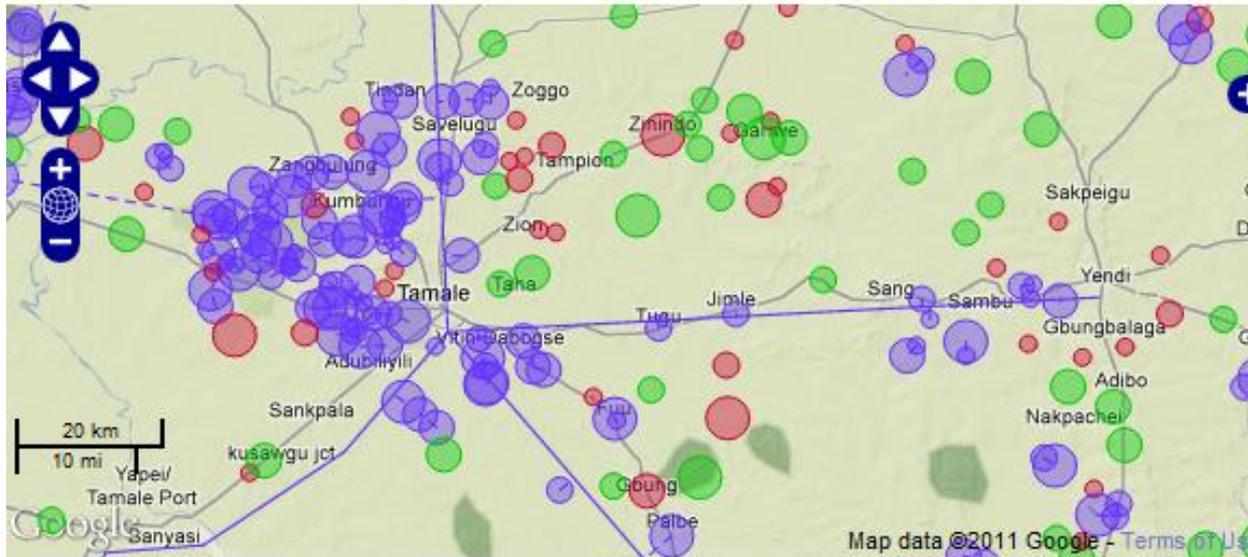
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Network Planner:

Columbia University / Earth Institute Decision Support Tool for Electricity Planning

Legend Unelectrified Off-grid Mini-grid Grid



Chakori Konkomba	474	\$139,454	\$187,266	\$44,860	off-grid
Chama	1,140	\$295,637	\$301,399	\$107,685	off-grid
Chanchangu	784	\$210,238	\$202,573	\$74,264	mini-grid
Chankpem	403	\$124,552	\$101,751	\$38,816	mini-grid
Chanzegwu	483	\$142,320	\$187,932	\$46,061	grid
Charkudo	680	\$184,733	\$197,249	\$63,221	grid
Chegu	621	\$172,410	\$194,587	\$58,283	grid

Network Planner is:

- A data-driven, algorithmic method for designing least-cost national electricity plans

It includes:

- A graphic interface for displaying results
- Numerous data-views to see detailed and summary cost and technical data.

Initial electrification costs by Region (Grid + Mini-Grid + Solar)

Penetration Rate set to 100%

Greater Accra \$2,021,299

Upper East \$37,605,641

Eastern \$32,049,291

Upper West \$40,619,900

Central \$33,532,927

Volta \$43,637,225

Brong Ahafo \$33,660,745

Western \$60,761,953

Ashanti \$36,208,825

Northern \$85,568,248

Penetration Rate = 100% TOTAL: \$405,666,052

Penetration Rate = 60%

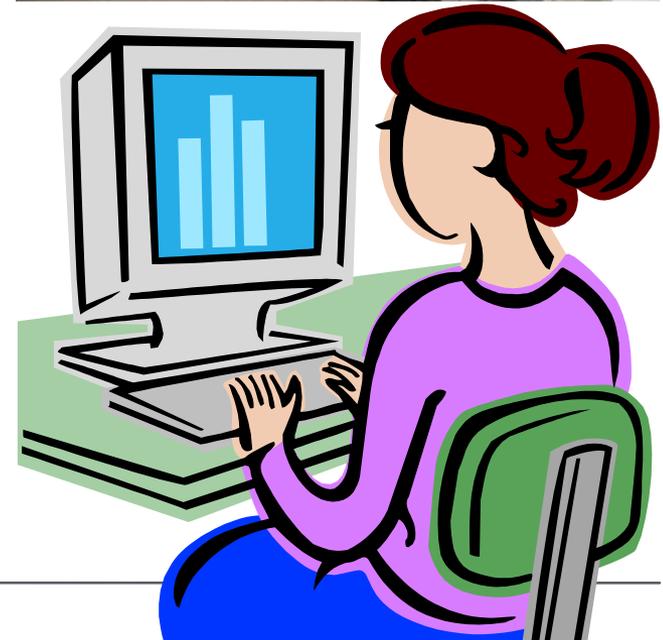
Total: 287,358,895

Penetration Rate = 30%

Total: 147,096,023

Objectives of Training Workshop

- Overview of Network Planner used in electrification modeling
- GIS-based Energy Access (GEAR) Toolkit
- GIS as tool for energy access planning



Training Materials

- Manuals for training provided
- Proposal for GIS-based Energy Access Project downloadable from ECOWAS Energy Portal, <http://energyaccessafrica.org>
- Template for project implementation being developed



<http://energycenter.knust.edu.gh/>

Thank you!
Merci!
Obrigado!