

MINISTRY OF ENERGY AND MINERAL DEVELOPMENT - GEOGRAPHICAL INFORMATION SYSTEM UNIT

The GIS (Geographic Information System) Unit in the Directorate of Energy Resources Development collects, manages and analyses all kind of energy related data together with their geographic location in a computerised information system and visualizes it graphically in form of printable maps, web maps, diagrams and 3D models. The GIS Unit supports the activities of the Ministry of Energy and Mineral Development in the following ways:

1. Data collection

The GIS unit is involved in data collection for the ERT and ESDP Projects and in monitoring activities in cooperation with the Sectoral Planning and Policy Analysis Department (SPPAD). To improve data collection the GIS Unit has developed paper-based as well as electronic field forms which help to record the location as well as the status and other attributes about each site while in the field. After fieldwork all data is entered into the GIS database and used for analysis and map production. Besides field work the GIS Unit frequently collects data from other organisations.



Fig.1: Field Data Collection (Here: measuring the water flow to estimate the hydropower potential of a river).

2. Data clean-up and data storage

Most data from other organisations has to be cleaned up before it can be integrated into the GIS database. The GIS Unit makes sure that coordinate systems and data formats fit to each other and that the attribute tables are filled correctly. Data is then fed into a well-structured geodatabase which can be accessed by the MEMD GIS officers and members of the Energy Sector GIS Working Group. With growing demand for GIS data the GIS Unit plans to make the database available to other MEMD offices over the intranet.

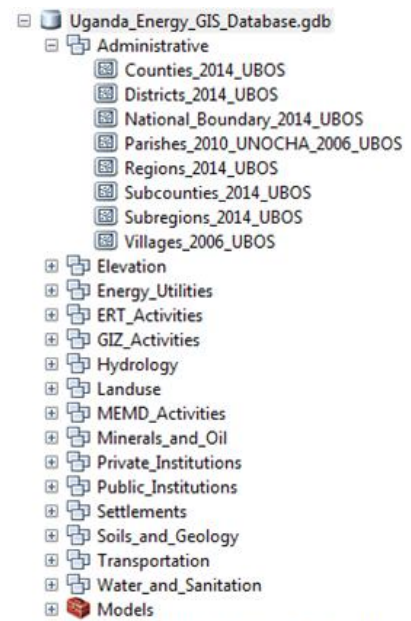
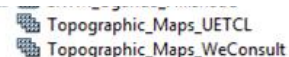


Fig.2: The Uganda Energy GIS Database.

3. Data analysis

Because GIS data is based on location information it can be used to identify spatial relationships between different datasets and to perform queries, selections and calculations. The GIS unit uses the existing GIS data to answer location based questions e.g.

- Which is the best location for a new solar power plant?
- Which is the best route for constructing a new transmission line?



- Which areas in Uganda have the lowest access rate to electricity?
- How many kilometers of new distribution lines were installed in a certain district in 2015?
- How many schools received solar PV systems through the ERT project in a certain area?

GIS is further being used to model and visualize different scenarios and justify decisions.

4. Map Production

The GIS Unit develops printable as well as web maps for the ministry and various projects. Maps are usually designed on request and can highlight the energy infrastructure or specific project activities in a certain area. Besides the printable maps an interactive web map showing the energy infrastructure in Uganda was developed by the GIS Unit in collaboration with the Energy Sector GIS Working Group. It is publicly available under <http://www.energy-gis.ug/webmap.html>.

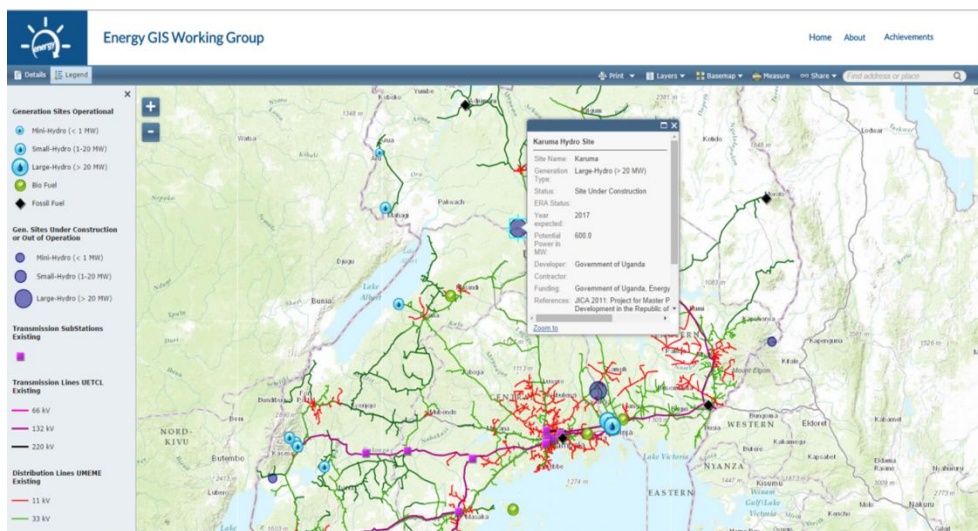


Fig.3: Interactive Web Map showing the Energy Utilities of Uganda.

5. Developing a database for statistical energy data

The Head GIS Unit together with the Sectoral Planning and Policy Analysis Department (SPPAD) develops a Database Management Systems (DBMS) for statistical energy data. The team has already designed the structure of the database and decided on the attributes (fields) and tables to be stored in the DBMS. Currently the tables and fields are integrated into the database software (PostgreSQL) and rules are set. The database is expected to be fully functional in 2016.

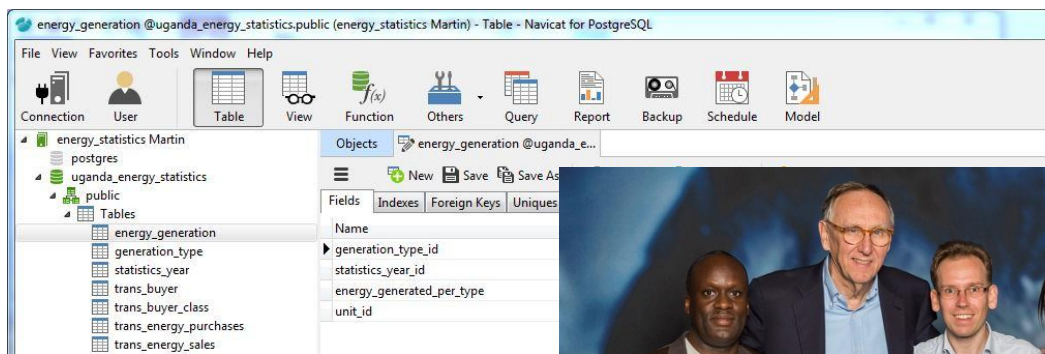


Fig.4: Designing Tables and Attributes (Fields) for the Energy Statistics Database.

6. Support of the Energy Sector GIS Working Group

The MEMD GIS Unit is a co-founder and active member of the Energy Sector GIS Working Group. This working group was formed during the Joint Planners Meeting for the Energy Sector in 2011. GIS Officers from MEMD, REA, UETCL, UMEME, UEGCL, ERA and GIZ meet once per month to share ideas and data and to plan joint activities like annual GIS Workshops and the GIS Day. The Energy Sector GIS Working Group has developed a common Energy Sector GIS Database and an Interactive Web Map showing the Energy Utilities of Uganda. In 2014 the Working Group won the Special Achievement in GIS (SAG) Award. This award is given by Esri USA to GIS users around the world to recognize outstanding work with GIS technology.



Fig.5: Members of the Energy Sector GIS Working Group receive the Special Achievement in GIS Award from Esri in San Diego, USA.

7. Trainings

The MEMD GIS Unit offers trainings in data management, data collection, GIS analysis and map production for interested MEMD staff and for members of the Energy Sector GIS Working Group. Trainees learn how to access and use the existing GIS database and GIS maps to solve spatial problems and make better decisions. They also learn how to integrate, analyze and visualize their own data collected in the field using GPS devices and/or GPS enabled smartphones.



Fig.6: Training of GIS Users.

8. GIS Workshops and GIS Day

The MEMD GIS Unit together with the Energy Sector GIS Working Group organizes annual Energy GIS Workshops in Kampala with focus on GIS solutions for the Energy sector. In these workshops we present our



Fig.7: Annual Energy GIS Workshop at Imperial Royal Hotel.

achievements and new projects as well as latest technology innovations from GIS business partners like Esri, Technobrain and OSIssoft. The MEMD GIS Unit also supports UBOS in organizing the annual Uganda GIS Day.

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