ENERGY ACCESS EXPLORER

LINKING ENERGY ACCESS AND SOCIO-ECONOMIC DEVELOPMENT WITH GIS

Dimitris Mentis, PhD
Senior Associate and Project Manager, Energy Access Mapping
World Resources Institute
Energy is interconnected with 125 (74%) out of 169 SDG targets.
• Essential for matching demand and supply
• System cost minimization without compromising energy security, reliability of supply and environmental integrity.
• Fundamental transformation of energy systems to achieve SDG 7.
ENERGY PLANNING - GAPS

Typical energy planning tools:

➢ Largely inadequate for regional energy access planning;

➢ Fail to consider the spatial fluctuations of energy systems:
  ▪ Intermittent energy resources (such as wind, solar, hydro) vary in space.
  ▪ Power infrastructure, energy demand and economic activities differ from one area to another.
Effective electrification planning requires geospatial information.

In developing countries, there is a lack of reliable energy-related data.
ENERGY PLANNING AND GIS

Planning tool for renewable energy infrastructure

Example: IRENA’s Global Atlas

Planning tool for electrification

Example: Electrification paths based on OnSSET, KTH, UNDESA
GAPS AND OPPORTUNITIES IN SPATIAL ENERGY PLANNING

- Data and tools have focused on the supply side;
- New data initiatives add the spatial dimension of demand side (see Multi-tier framework survey, Electricity Supply Monitoring Initiative etc.).

Energy planning objective:
Need to match energy demand and supply...
ENERGY ACCESS EXPLORER

An open, interactive, online mapping platform to help accelerate energy access in unserved and underserved areas.
ENERGY ACCESS MAPPING - SURVEY

• Understand the importance of datasets in the energy planning process and seek feedback on existing mapping platforms.

• More than 40 respondents from:
  – Academia
  – Private companies
  – Planning Institutions
  – NGOs
  – Development banks
EXPECTED OUTCOMES

• **Market identification:** Off grid developers to understand better affordability and level of service needed.

• **Strategic energy planning:** Energy planning institutes to link electrification and development.

• **Impact investment and grants:** Development finance institutions and donors to identify areas where investments and grants will have the most impact.
NOTE ALSO THAT...

Energy Access Explorer will:

• complement geospatial cost-optimization energy planning tools (like OnSSET, Network Planners, Reference Electrification Model etc.);

• Provide better geospatial data and proxies for estimating demand for electricity to power livelihoods, as well as social and economic activities;

• Treat demand and supply as equal;

• Serve as a database that aggregates up-to-date geospatial information, potentially reducing users’ high transaction costs for data aggregation and sharing.
Data selection and customization panel

Legend:
Underlying Data and Analytical Outputs
DEMAND → SOCIO-ECONOMIC ACTIVITIES → HEALTH FACILITIES
DEMAND \rightarrow SOCIO-ECONOMIC ACTIVITIES \rightarrow AGRICULTURE
DEMAND → RESOURCE AVAILABILITY → SOLAR IRRADIANCE
SUPPLY → INFRASTRUCTURE → TRANSMISSION
Select areas within 40 km from the Transmission network.
Combine:
- Population density
- Distance from schools < 13 km
- Distance to Health facilities < 10 km
- Distance to Transmission < 40 km
- Solar irradiance > 2000 kWh/m²
OVERLAY POPULATION DENSITY AND POVERTY RATES
ANALYTICAL OUTPUTS

Energy Access Index: identifies areas with higher demand and supply and is an aggregated measure of all selected indicators from the two respective categories.

Supply Index: identifies areas with higher supply and is an aggregated and weighted measure of all selected indicators under Resource Availability and Infrastructure.

Demand Index: identifies areas with higher demand and is an aggregated and weighted measure of all selected indicators under Demographics and Socio-economic activities.

Assistance Need Index: identifies areas where market assistance is most needed. It is an aggregated and weighted measure of a number of selected indicators under all categories.
ENERGY ACCESS EXPLORER - ONGOING WORK

• Continue incorporating data (from MEMD and the GIS Energy Sector Working Group and others)
• Add more functionalities
• Improve the design
• Develop a technical note with the methodology
• MSc thesis co-supervised by MEMD, WRI and KTH to develop further the Energy Access Explorer for Uganda.
STAKEHOLDER ENGAGEMENT

• Partner with local stakeholders to improve data and develop a tool that reflects the user needs.

• Partner with local development-oriented organizations to help them integrate clean electricity services to health, education and agriculture.

• Co-develop, co-own, co-administer tools!

Introduction to Modelling tools for Sustainable Development at UNDP, Addis, Ethiopia, August, 2016
DATA STANDARDS

Geospatial Energy Access Planning is a powerful tool but to scale up we need to:

- Emphasize the importance of certain datasets
- Develop **data standards**
  - To facilitate data sharing and its reuse
  - To facilitate comparability across countries and models
  - To integrate into powerful interfaces for massive access
WRI’s Energy Access Mapping Team

Core team

Elise Mazur
Research Analyst, Energy Access Mapping

Anila Qehaja
Research Intern, Energy Access Mapping

Dimitrios Mentis
Manager, Energy Access Mapping

Fabian Jendle, Senior Software Developer

Nuria Alemany, Senior Designer

Advisory team

Lily Odarno
Senior Associate, Energy Access

Francis Gassert
Data for Impact Lead

Davida Wood
Senior Associate, Energy Access

Bharath Jairaj, Director, Energy Program, India

Pamli Deka
Manager, Energy Access

Amala Devi
Project Associate, Clean Energy Finance

Sanjoy Sanyal
Senior Associate, Energy Governance

Uttara Narayan
Senior Project Associate

Chen Chen
Monitoring And Evaluation Associate
PARTNERS

Technical Institutes

University of Massachusetts Amherst
KTH
UNIVERSITY OF CAMBRIDGE

Governmental Agencies

TANZANIA TRADITIONAL ENERGY DEVELOPMENT ORGANIZATION
RE AGENCY

Technology Companies

development SEED
Google
ABB

Development Institutions

IKEA Foundation
CHARLES STEWART
MOTT FOUNDATION
The Wallace Foundation
WORLD BANK GROUP
Interested in learning more or contributing to the development of Energy Access Explorer?

dimitrios.mentis@wri.org