



# GWFF

GEOSPATIAL WORLD FORUM

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# Energy Access Explorer

## A Digital Public Good to Deliver Energy Transitions for Everyone



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**Lead, Energy Access Explorer**  
**World Resources Institute**

# IMPORTANCE OF ENERGY FOR SOCIO-ECONOMIC DEVELOPMENT

675 million people no access to electricity / 2 billion people cook with polluting fuels



Without access to electricity

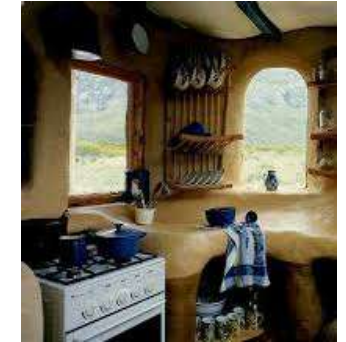
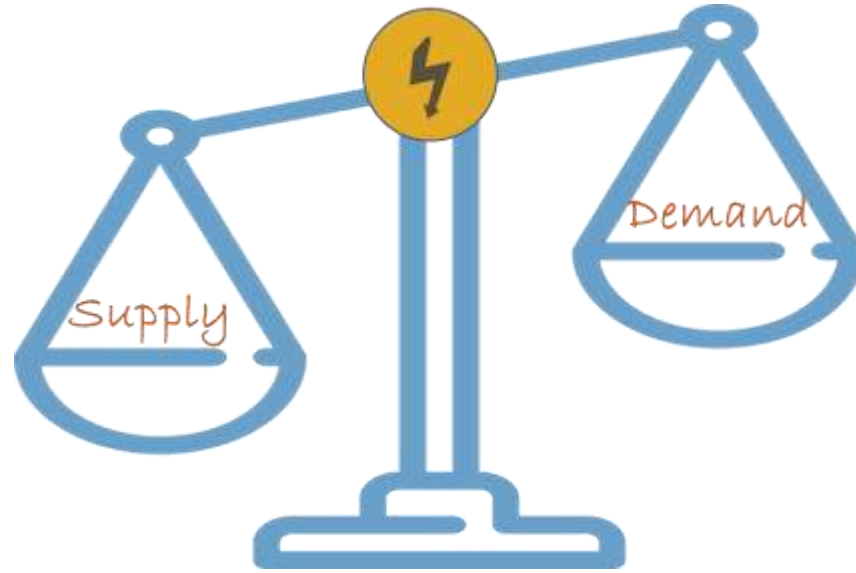


With access to electricity



Energy is interconnected with 125 (74%) out of 169 SDG targets

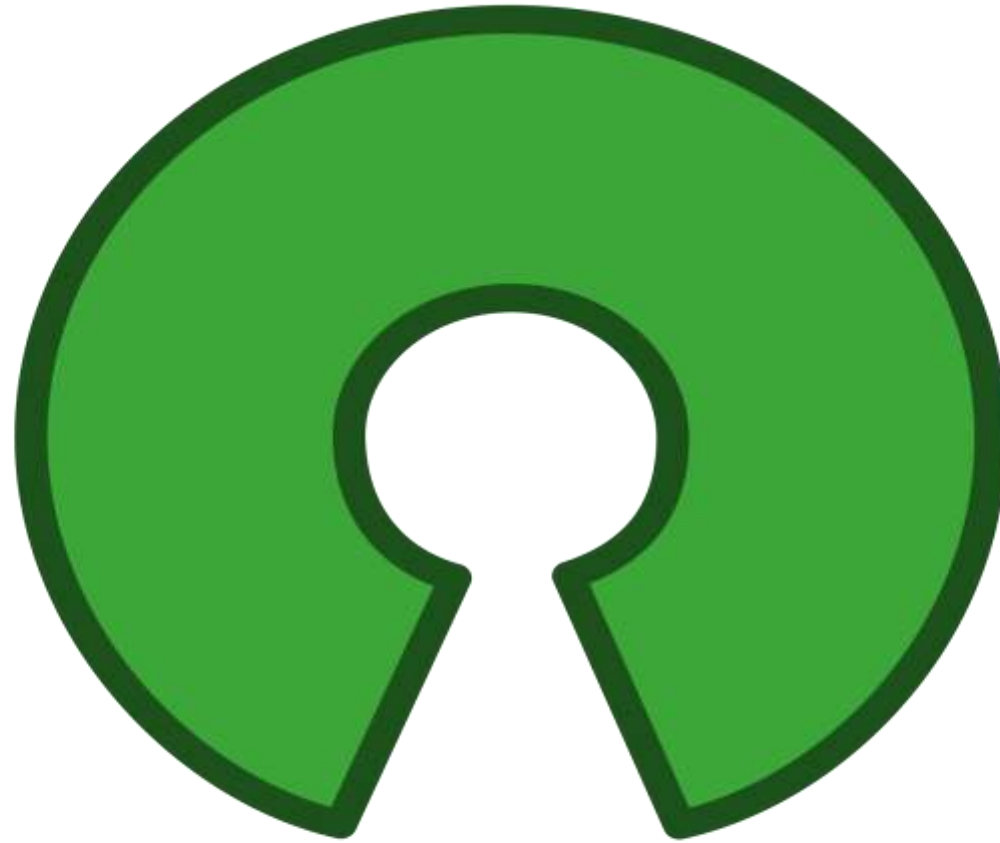
# TREAT DEMAND AND SUPPLY AS EQUAL



# REDUCE RELIANCE ON GIS AND PROGRAMMING EXPERTISE FOR DATA USERS



DEPLOY AN OPEN-SOURCE DYNAMIC INFORMATION SYSTEM  
FOR DATA PROVIDERS



**open source  
initiative<sup>®</sup>**

# Energy Access Explorer

Energy Access Explorer provides the data and tools necessary to create a future where all people have access to affordable, reliable and modern energy.

[Explore Data](#)

# Energy Access Explorer

Equity-driven

Data-informed

Integrated

Inclusive

## Dual Functionality

- ✓ High resolution Priority Areas for Energy Access Interventions
- ✓ Dynamic Information System for Data Providers

## Data in different scales and formats:

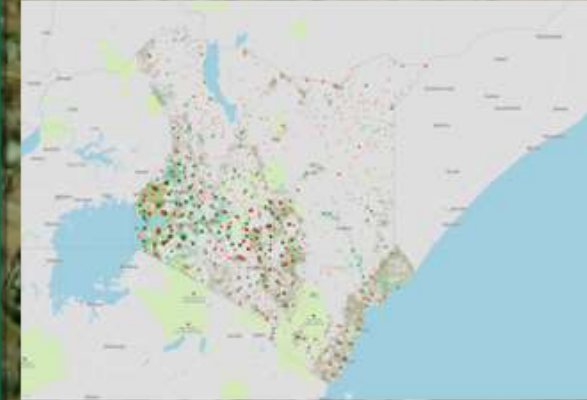
- ✓ Open Census
- ✓ Satellite
- ✓ Global
- ✓ National
- ✓ Sub-national
- ✓ Primary

## DEMAND

Demographics



Social & Productive Uses

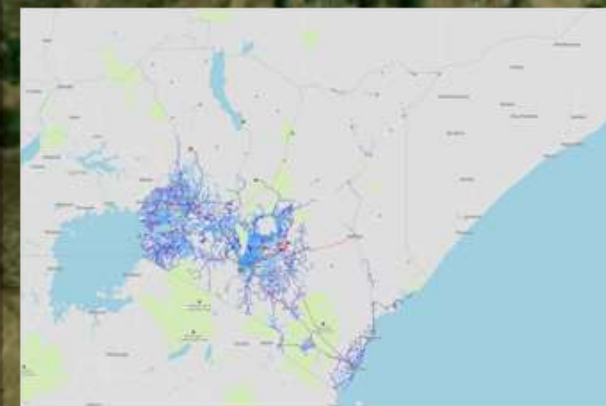


## SUPPLY

Energy Resources



Infrastructure





# EAE USE CASES

## Energy Access Explorer enables:

1. Strategic & Integrated Energy Planning
2. Expansion of clean energy markets
3. Impact investment
4. Bottom-up assessment of energy needs

REPORT

Save Analysis

### ENERGY ACCESS POTENTIAL

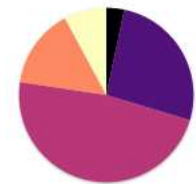
Current and/or potential

Area share

943,059 km<sup>2</sup>

Population share

217,030,249 people



Low Medium High



Energy Access Potential

Demand Index

Supply Index

Assistance Need Index

Raster Analysis

# Energy Access Explorer – Frontend

## Open Online Interactive Customizable

### Example of EAE Data – Uganda

In collaboration with Uganda's Energy Sector GIS Working Group and Ministry of Health

#### Demographics

- Population density

#### Socio economic activities

- Education facilities
- Health care facilities
- Agricultural zones

#### Resource availability

- Global Horizontal Irradiation

#### Infrastructure

- Transmission, Distribution and Power Generation network

#### Environment

- Protected areas

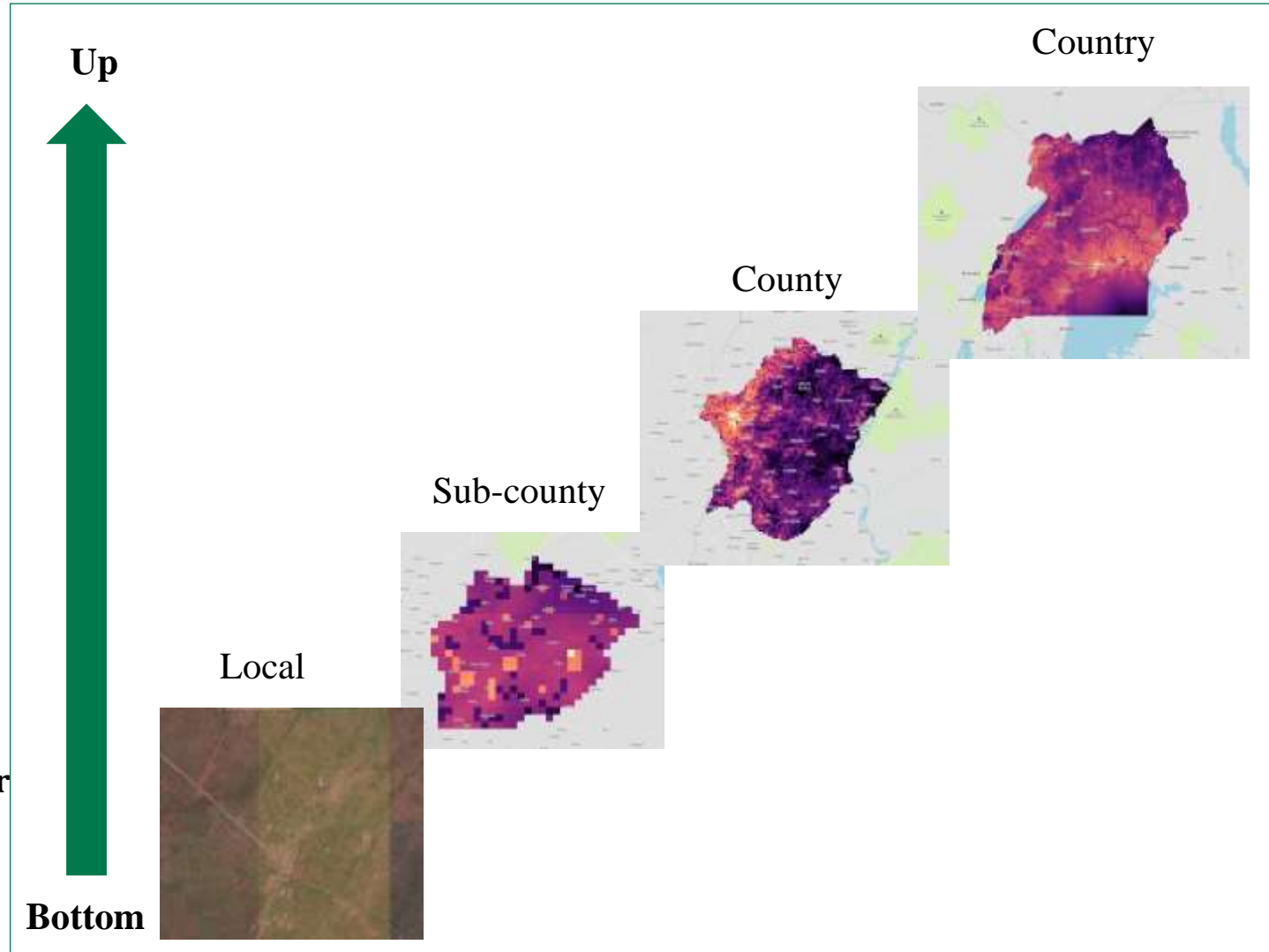
#### Finance

- Finance service providers

#### Multicriteria analysis

High priority areas close to health care facilities, far from distribution lines and with high solar irradiation

Plus high population density, and high agricultural productivity



# A DATA DRIVEN, INTEGRATED AND INCLUSIVE APPROACH TO PLANNING FOR ACHIEVING UNIVERSAL ACCESS TO ENERGY FOR EQUITABLE DEVELOPMENT

- Covers countries with **32%** of the total unserved population globally
- Originally prototyped for **3 countries** and is now being developed for **23 geographies**, at both **national and subnational levels**
- Close partnership with **> 200 stakeholders and users**.
- **> 20,000 users**
- **> 15 MUSD** in kind contributions



# NEW GEOGRAPHIES

Tanzania



Kenya



Uganda



## Prototype

Nigeria



Ethiopia



Zambia



Sierra Leone



India



Nepal



## New

## Pipeline

Togo



Mozambique



DR Congo



Republic of Côte d'Ivoire



Niger



Rwanda



Senegal



**ENERGY  
ACCESS  
EXPLORER**

# NEW DATA

The screenshot displays the Energy Access Explorer web application. The top navigation bar includes links for Tool, About, Get Involved, User Stories, Partners, and My EAE. The main interface is divided into several sections:

- Filter datasets:** A panel on the left with tabs for CENSUS, DEMAND, SUPPLY, OTHER, and ALL. Below these are expandable categories: LIGHTING COUNTY, COOKING COUNTY, ASSETS COUNTY, LIGHTING SUBCOUNTY, COOKING SUBCOUNTY, ASSETS SUBCOUNTY, DEMOGRAPHICS, PRODUCTIVE USES, RESOURCES, INFRASTRUCTURE, ENERGY CONSUMPTION, ENVIRONMENT, FINANCE, ADMINISTRATIVE BOUNDARIES, LIGHTING ELECT TIMELINE, DEMOGRAPHICS OTHER, LAND COVER, and HOUSEHOLD ENERGY.
- Map:** A central map showing a geographical area with a heatmap overlay representing energy access potential. The heatmap uses a color scale from dark purple (low) to bright yellow (high). Major cities like Kampala, Gulu, and Juba are labeled. The map is framed by a 'DATA' and 'ANALYSIS' tab bar.
- Summary Panel:** On the right, there are buttons for 'REPORT' and 'Save Analysis'. Below these, the 'ENERGY ACCESS POTENTIAL' section provides a summary: 'Current and/or potential', 'Area share: 590,478 km<sup>2</sup>', and 'Population share: 53,261,117 people'. It includes two pie charts and a legend with 'Low', 'Medium', and 'High' categories.

A green banner at the bottom of the map area contains the text: **More than 50 geospatial datasets per geography**

# NEW FEATURE: HIGH PRIORITY AREAS

The screenshot displays the Energy Access Explorer web application. The interface is divided into several sections:

- Header:** Includes the Energy Access Explorer logo and navigation links for Tool, About, Get Involved, User Stories, Partners, and My Sessions.
- Left Panel:** Titled "Analysis top locations", it shows a search bar and a list of 20 top results. Each result includes a percentage bar, coordinates, and location names.
- Map:** A satellite map showing a settlement area. A popup window is overlaid on the map, displaying detailed data for a selected location.
- Right Panel:** Titled "REPORT", it shows the "ENERGY ACCESS POTENTIAL" for the selected area, including area and population shares, and two pie charts. A legend below the charts identifies the Energy Access Potential, Demand Index, Supply Index, and Assistance Need Index.

**Search Results (Top 20):**

Percentage	Coordinates	Location
100%	[35.415, 2.867]	Turkana, Kaputir
99%	[34.952, 2.417]	West Pokot, Alale
93%	[34.835, 3.716]	Turkana, Kakuma
	[34.862, 3.700]	Turkana, Kakuma
	[36.004, 3.09]	Turkana, Kerio Delta
92%	[35.852, 2.528]	Turkana, Kalokol
	[39.066, -0.044]	Garissa, Madogo
	[35.204, 1.034]	West Pokot, Kasel
91%	[35.428, 2.867]	Turkana, Kaputir
	[35.485, 2.885]	Turkana, Kaputir
	[35.931, 3.599]	Turkana, Kang'Atotha
	[35.492, 2.129]	Turkana, Katilu
	[35.491, 2.148]	Turkana, Katilu
90%	[38.747, 0.05]	Garissa, Danyere

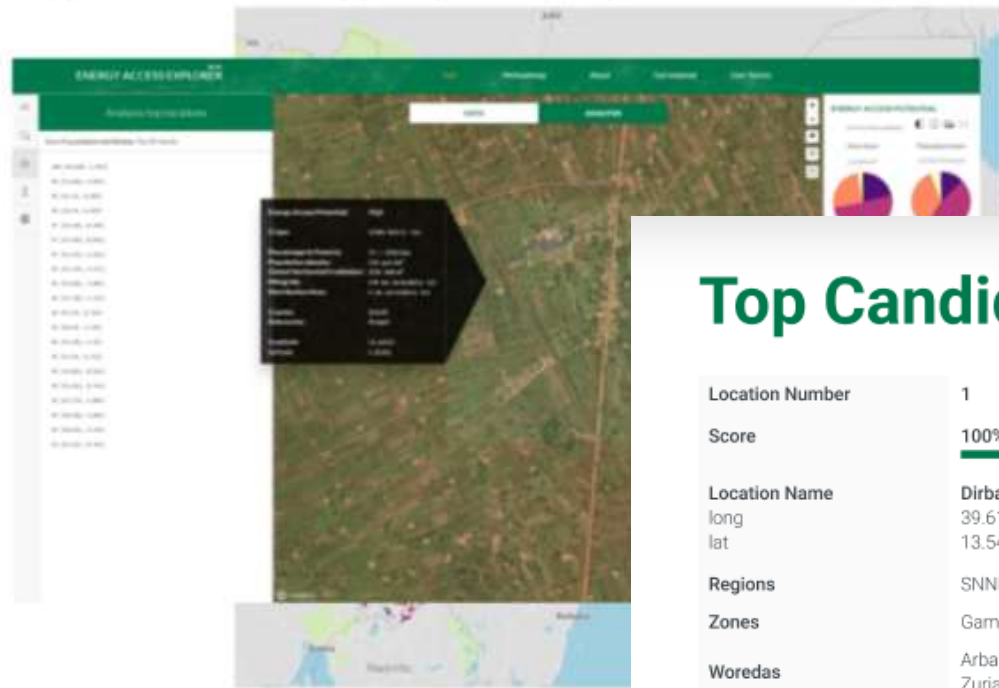
**Map Popup Data:**

- Energy Access Potential:** Medium-High
- DEMAND**
  - Population density: 270 ppl/km<sup>2</sup>
  - Healthcare Facilities: 1 km (proximity to)
- SUPPLY**
  - Global Horizontal Irradiation: 2295 kWh/m<sup>2</sup>
  - Distribution lines: 15 km (proximity to)
- Counties:** Turkana
- Subcounties:** Turkana South
- longitude: 35.42926
- latitude: 2.85845

**Report Panel:**

- ENERGY ACCESS POTENTIAL** (Current and/or potential)
- Area share: 16,756 km<sup>2</sup>
- Population share: 3,168,344 people
- Legend: Low (black), Medium (purple), High (yellow)
- Layers: Energy Access Potential, Demand Index, Supply Index, Assistance Need Index
- Raster Analysis: [dropdown]

# NEW FEATURE: FROM DATA TO ACTIONABLE INSIGHTS



## Top Candidate Locations For Energy Access Interventions

Location Number	1	2	3	4	5	6	7	8	9	10
Score	100%	100%	100%	99%	99%	93%	91%	91%	18%	17%
Location Name	Dirba	Ashegoda	Kharena	Neguida	Neguida	Addi Akel'	Ch'in Feres	Ch'in Feres	Addi Shakhu	Addi Shakhu
long	39.61238	39.61238	39.56747	39.44170	39.43272	39.45069	39.42374	39.61238	39.48662	39.49560
lat	13.54790	13.44308	13.54790	13.44308	13.44308	13.59156	13.60902	13.54790	13.42560	13.41686
Regions	SNNP	SNNP	SNNP	SNNP	SNNP	SNNP	SNNP	SNNP	SNNP	SNNP
Zones	Gamo	Gamo	Gamo	Gamo	Gamo	Gamo	Gamo	Gamo	Gamo	Gamo
Woredas	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria	Arba Minch Zuria
Energy Access Potential	High	High	High	High	High	High	High	High	Low	Low
Accessibility to cities	37 minutes	45 minutes	23 minutes	56 minutes	1.5 hours	34 minutes	45 minutes	2 hours	15 minutes	15 minutes
Population density	4495 ppl/km <sup>2</sup>	9222 ppl/km <sup>2</sup>	1950 ppl/km <sup>2</sup>	1950 ppl/km <sup>2</sup>	4495 ppl/km <sup>2</sup>	5421 ppl/km <sup>2</sup>	4323 ppl/km <sup>2</sup>	9384 ppl/km <sup>2</sup>	8141 ppl/km <sup>2</sup>	11774 ppl/km <sup>2</sup>
Healthcare facilities (proximity to)	1 km	3 km	1 km	1 km	1 km	2 km	undefined	undefined	1 km	undefined
Schools (proximity to)	1 km	3 km	1 km	1 km	1 km	2 km	undefined	undefined	undefined	undefined
Mines (proximity to)	2 km	19 km	1 km	2 km	2 km	1 km	18 km	18 km	39 km	39 km
Nighttime lights, calibrated radiance (cr)	248 cr	248 cr	248 cr	248 cr	248 cr	248 cr	235 cr	235 cr	254 cr	254
Crops, metric ton (mt)	29964 mt	29964 mt	29964 mt	29964 mt	29964 mt	29964 mt	32909 mt	32909 mt	7940 mt	7940 mt

Demand



# ENERGY ACCESS EXPLORER



Clear all datasets      Clear filters

Health Facilities

5.00      proximity in km      250

Wind speed

0.00      m/s      20.00

Distribution lines

2.00      proximity in km      700.00

default     

33 KV     

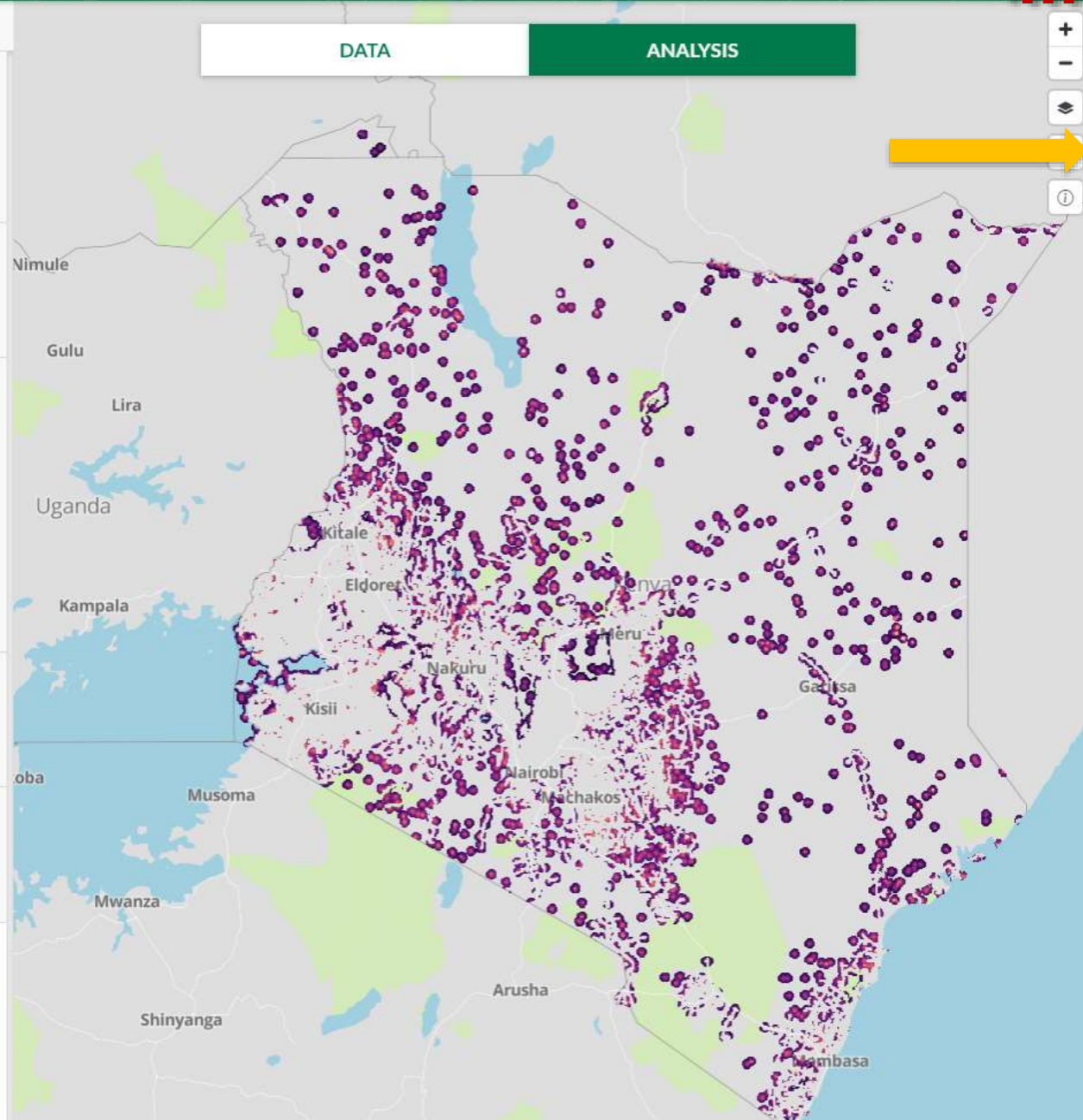
11 KV     

Global Horizontal Irradiation

500.00      kWh/m<sup>2</sup>      2800.00

Population Density

0.00      ppl/km<sup>2</sup>      100000.0



REPORT

Save Analysis

ENERGY ACCESS POTENTIAL

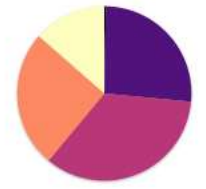
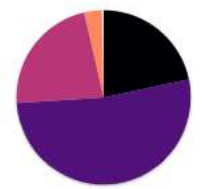
Current and/or potential

Area share

91,078 km<sup>2</sup>

Population share

4,323,441 people



- Energy Access Potential
- Demand Index
- Supply Index
- Assistance Need Index

Raster Analysis





# NEW FEATURE: EFFECTIVE DATA MANAGEMENT AND GOVERNANCE SYSTEM

## Data Management System

Data, Metadata, System Customization in one place

ENERGY ACCESS EXPLORER

Geographies Categories Users

Kenya - datasets

Filter: name, id, owners, name, lang, category

production staging training test dev

Name	Category	Type	Deployed	Dated	Updated
counties	boundaries	polygons-boundaries	🌐	📅	(1) 2019 2022-11-27
county-assets-computer	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-assets-internet	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-assets-iron-roof	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-assets-mobile	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-assets-radio	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-assets-refrigerator	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-cooking-charcoal	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-cooking-electricity	indicator	polygons-value	🌐	📅	2019 2022-11-27 (img alt: icon)
county-cooking-firewood	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-cooking-log	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-lighting-candle	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27
county-lighting-dry-cell-lantern	indicator	polygons-value	🌐	📅	(1) 2019 2022-11-27

## Data Governance System

Roles and Responsibilities of partnering institutions/data providers

ENERGY ACCESS EXPLORER

Geographies Categories Users

Users

Filter: email

email	role
annkarungi@gmail.com	Admin
ndyamuron@gmail.com	Admin
mugabibrodine@gmail.com	Admin
zaraka@creec.or.ug	Admin
ndyamuhaki@creec.or.ug	Admin
kumbujohi@gmail.com	Admin
falzal.mulindwa@umeme.co.ug	Admin
jayny@creec.or.ug	Admin
kwoko.mukson@gmail.com	Admin
george.okiefo@umeme.co.ug	Admin
opiomaria@gmail.com	Admin
mambuya@creec.or.ug	Admin
annebwegode@gmail.com	Admin
sokano@creec.or.ug	Admin
bakubya@gmail.com	Admin

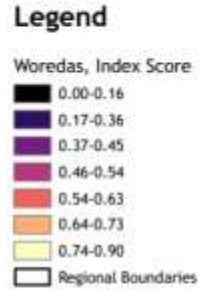


# INVESTING FOR IMPACT

## RESULTS BASED FINANCING – OFF GRID ELECTRIFICATION IN ETHIOPIA

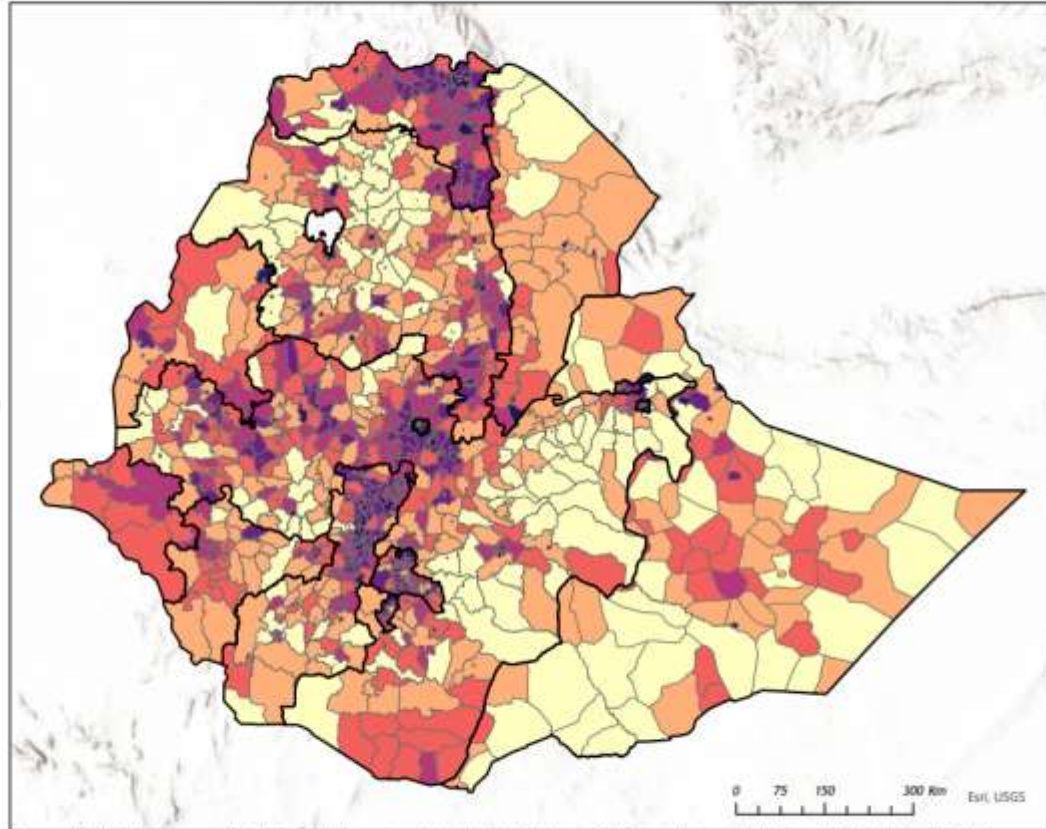


Priority Areas for Off-Grid Electrification in Ethiopia



Index Weights:

- Mean Distance from Grid (40%)
- Off-Grid Population (30%)
- Off-Grid Pop. Density (20%)
- Off-Grid Area (10%)



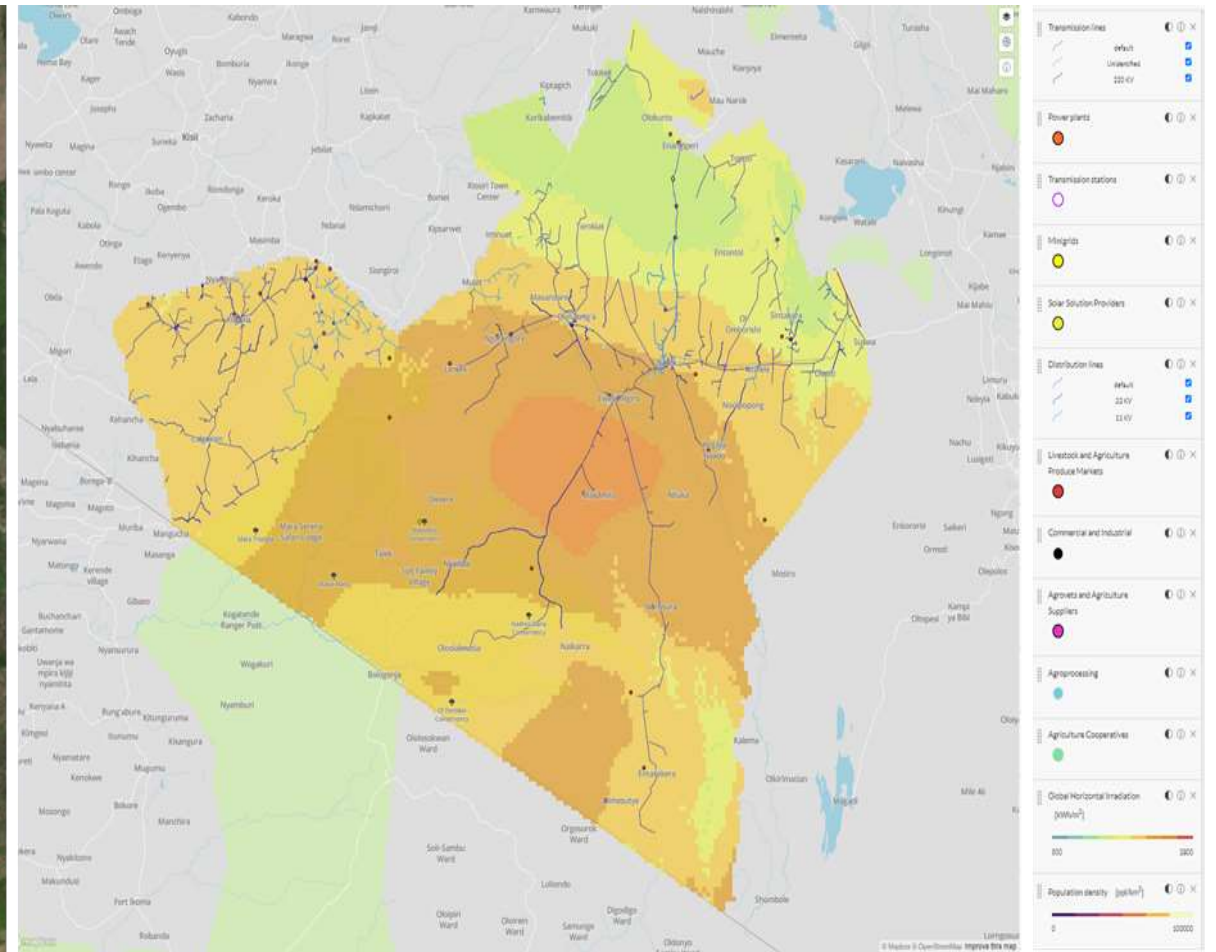
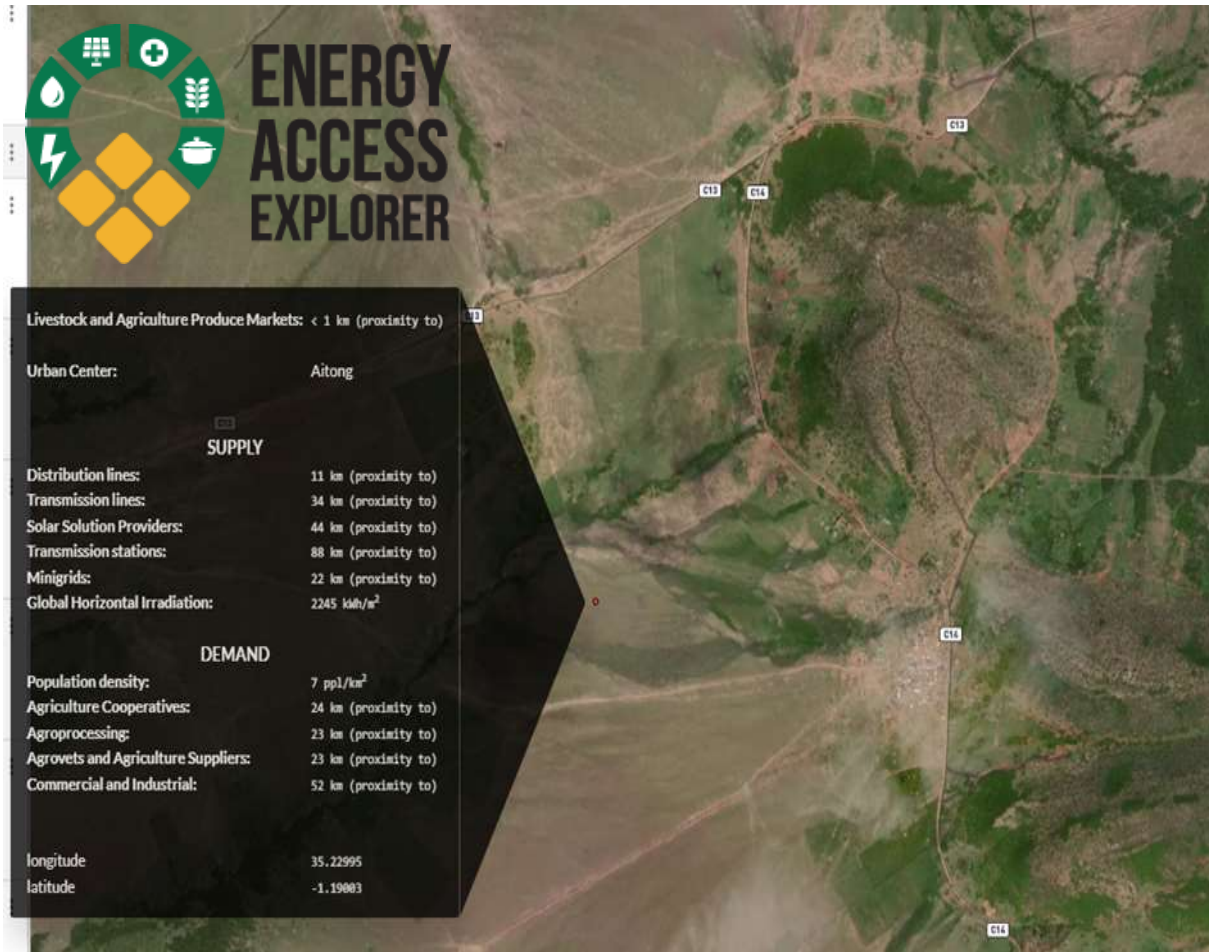
Prepared by World Resources Institute (WRI) in partnership with the Ministry of Water and Energy (MoWE) and the World Bank. 2023.  
Data and analysis are provided by Energy Access Explorer ([www.energyaccessexplorer.org](http://www.energyaccessexplorer.org))



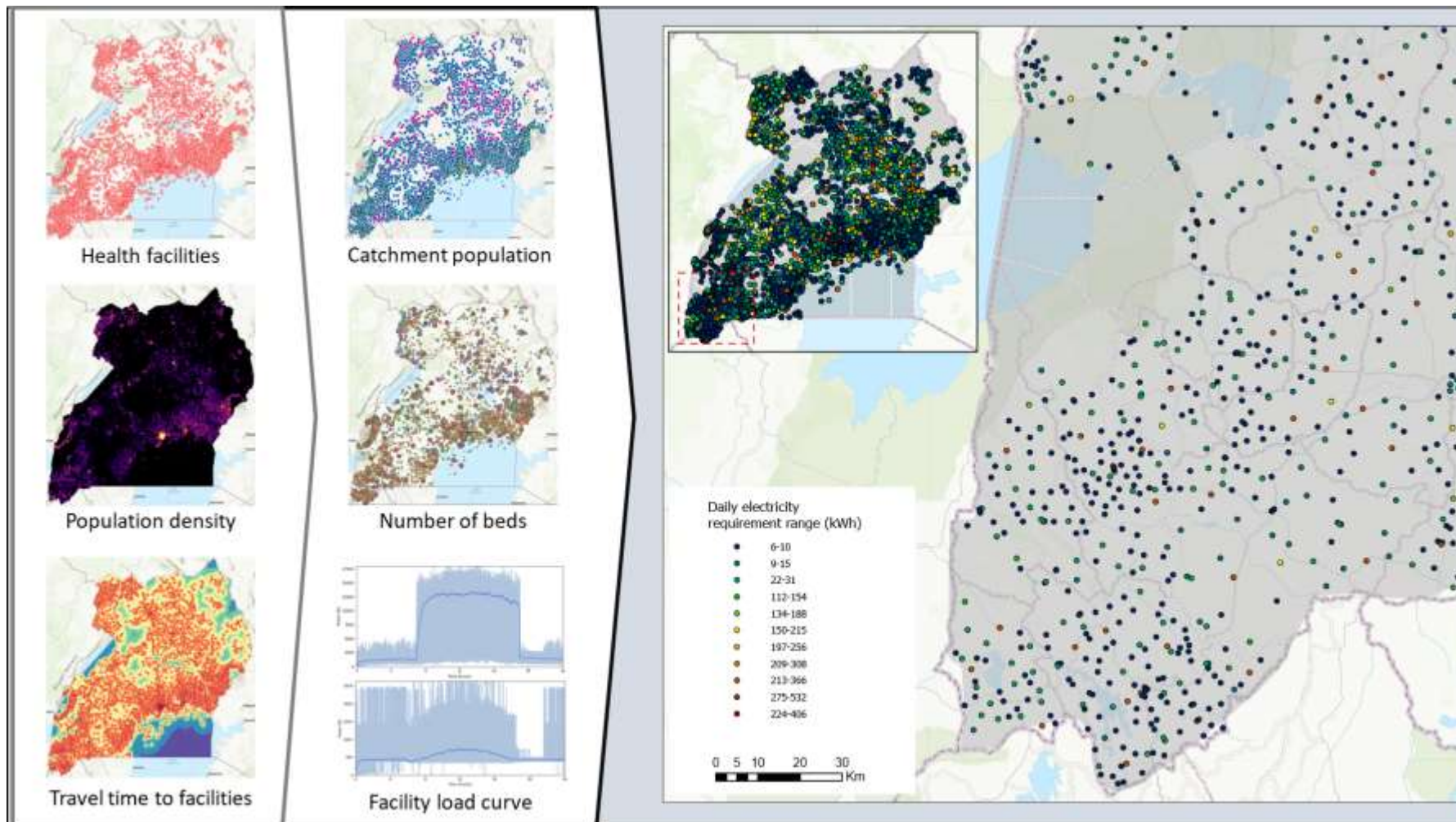
ውሃና ኢነርጂ ሚኒስቴር  
MINISTRY OF WATER AND ENERGY  
የኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ግንባታ ጠቅላይ ሚኒስትር ጽ/ቤት | Federal Democratic Republic of Ethiopia



# PRODUCTIVE USES OF ENERGY— CRITICAL FOR SOCIO-ECONOMIC GROWTH



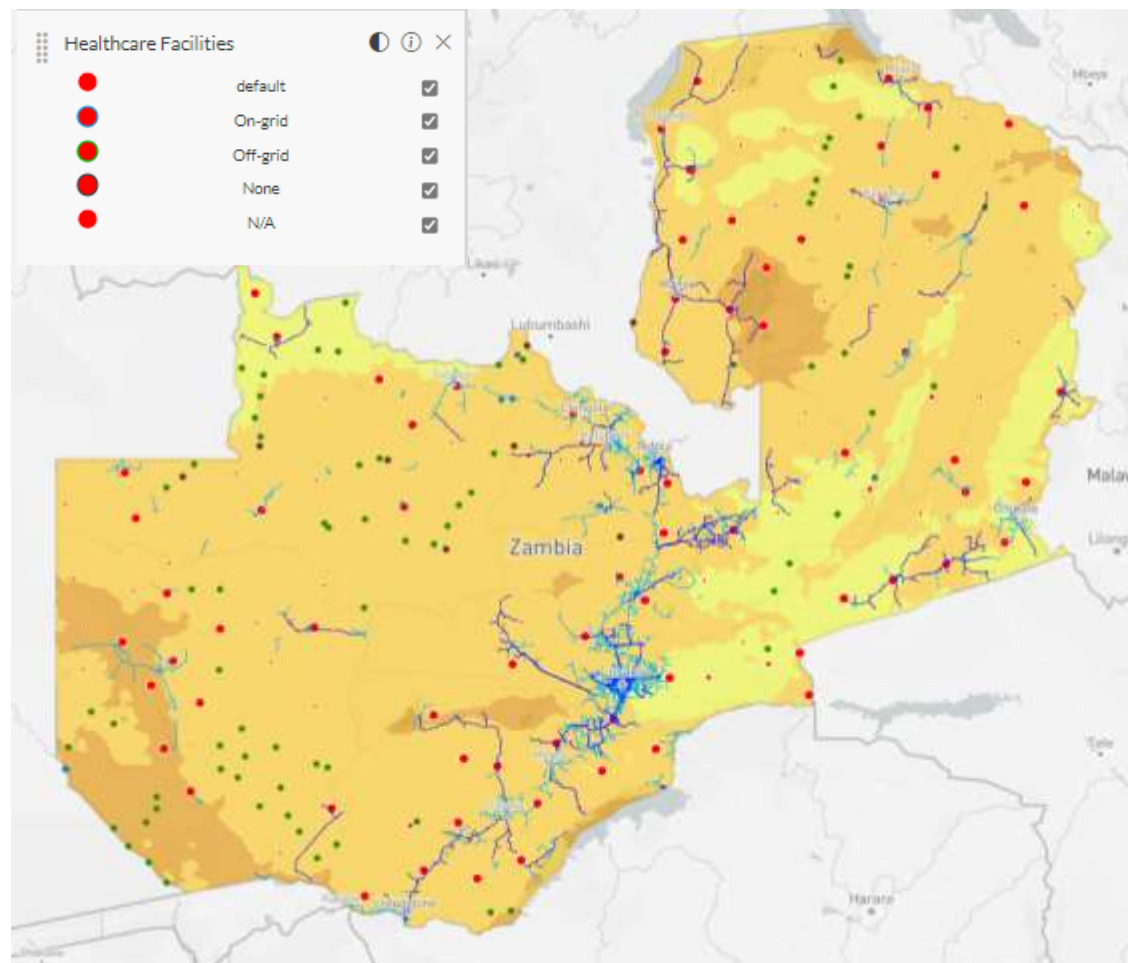
# POWERING HEALTHCARE — QUINTESSENTIAL FOR EQUITABLE DEVELOPMENT



# POWERING HEALTHCARE — QUINTESSENTIAL FOR EQUITABLE DEVELOPMENT



**ENERGY  
ACCESS  
EXPLORER**



## ELECTRIFICATION OF HEALTH FACILITIES IN ZAMBIA:

### ACTION PLAN



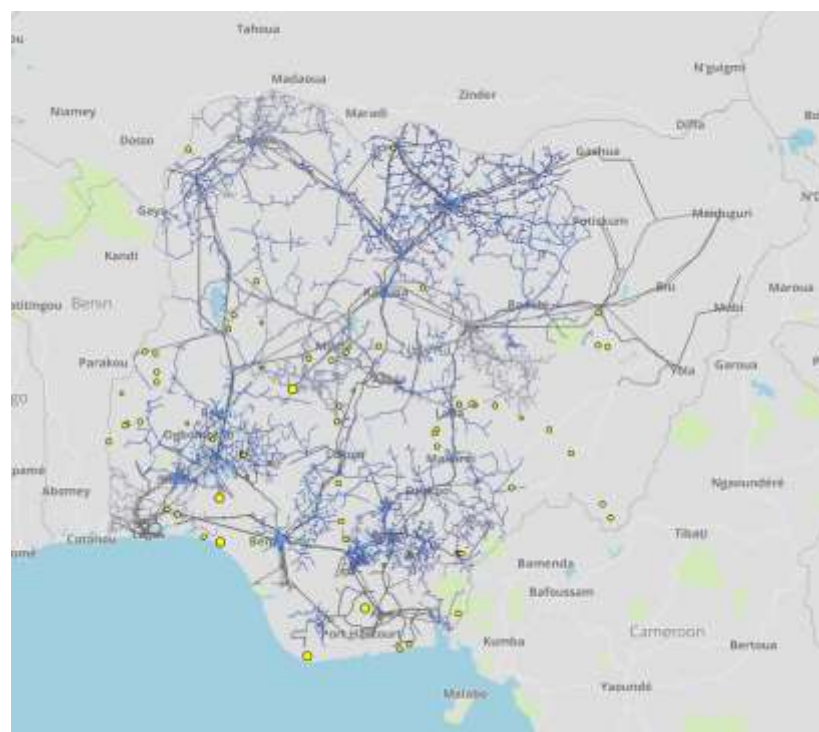
# MARKET INTELLIGENCE — UNEARTHING MARKET PROSPECTS FOR CLEAN ENERGY

## AFRICA MINIGRID PROGRAM IN NIGERIA

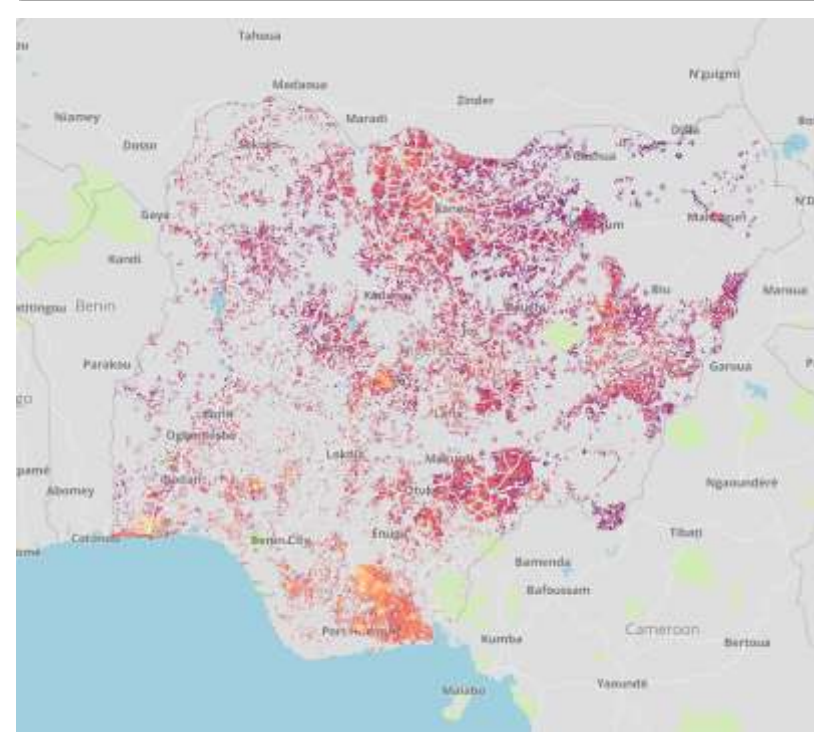
Demand



Supply



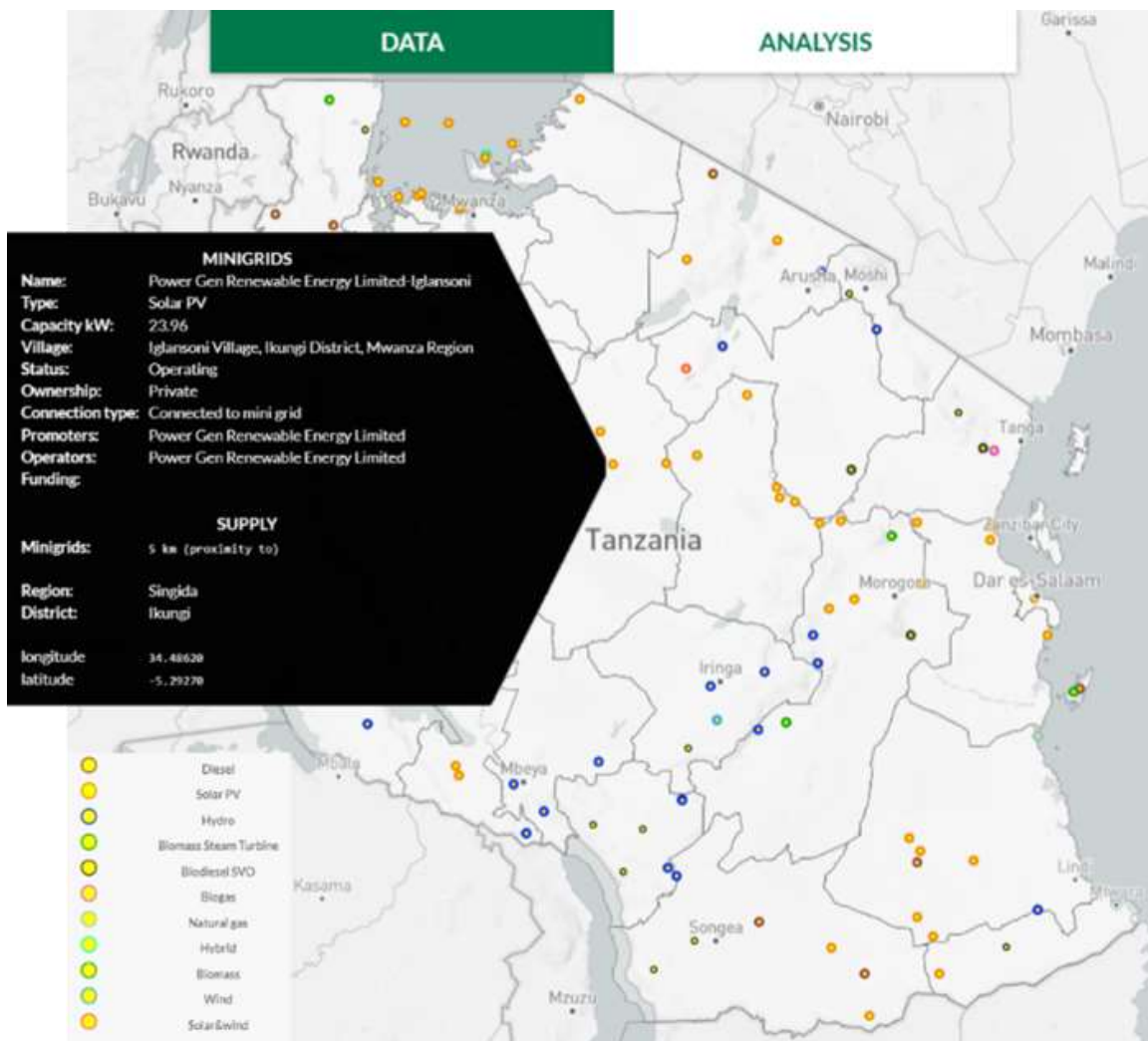
Opportunities



# MARKET INTELLIGENCE — UNEARTHING MARKET PROSPECTS FOR CLEAN ENERGY TANZANIA



**ENERGY  
ACCESS  
EXPLORER**



**WORLD  
RESOURCES  
INSTITUTE**



# PRIORITY AREAS FOR CLEAN COOKING

## DEMAND

Population density



Health care facilities

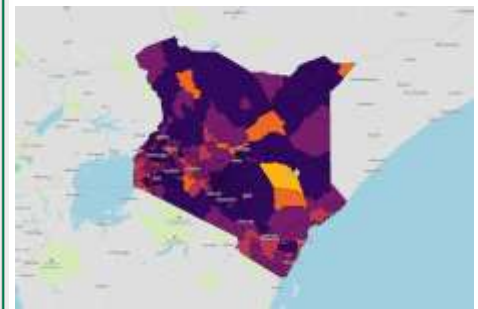


Education facilities

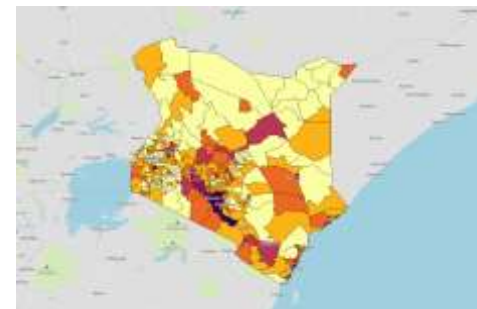


## SUPPLY

Cooking with Charcoal



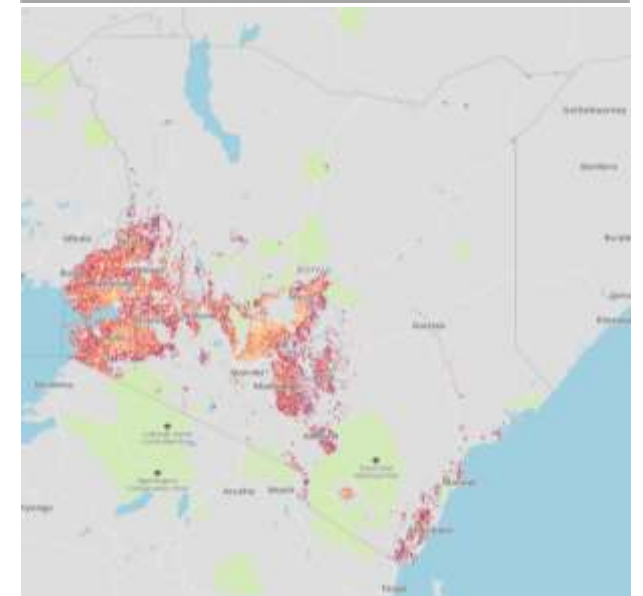
Cooking with Firewood



Distribution network



## PRIORITY AREAS FOR CLEAN COOKING INTERVENTIONS



ENERGY  
ACCESS  
EXPLORER



WORLD  
RESOURCES  
INSTITUTE



Strathmore University  
Energy Research Centre



CLEAN  
COOKING  
ALLIANCE



# Energy Access Explorer

An Open-Source, Data-driven, Integrated & Inclusive Approach to Achieving Universal Access to Energy for Equitable Development

**20,000 Users** from **158 Countries**

**48% Female Users**



**Website: [energyaccessexplorer.org](https://energyaccessexplorer.org)**

**Code: [GitHub.com/energyaccessexplorer](https://github.com/energyaccessexplorer)**

Interested in learning more or  
contributing to the development of  
EAE?

**[Dimitrios.Mentis@WRI.org](mailto:Dimitrios.Mentis@WRI.org)**

Lead, Energy Access Explorer