

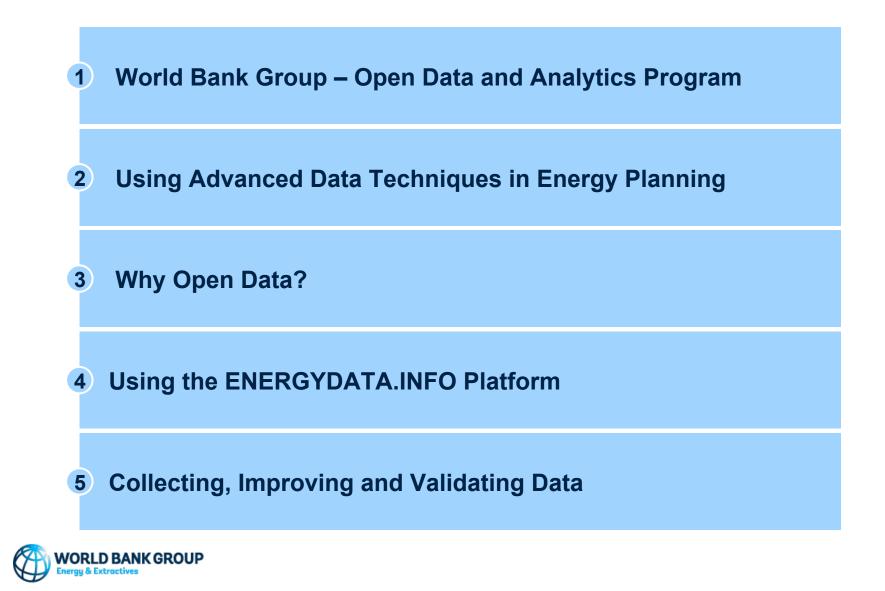
ENERGYDATA.INFO TRAINING

Naichen Zhao & Chris Arderne World Bank Group

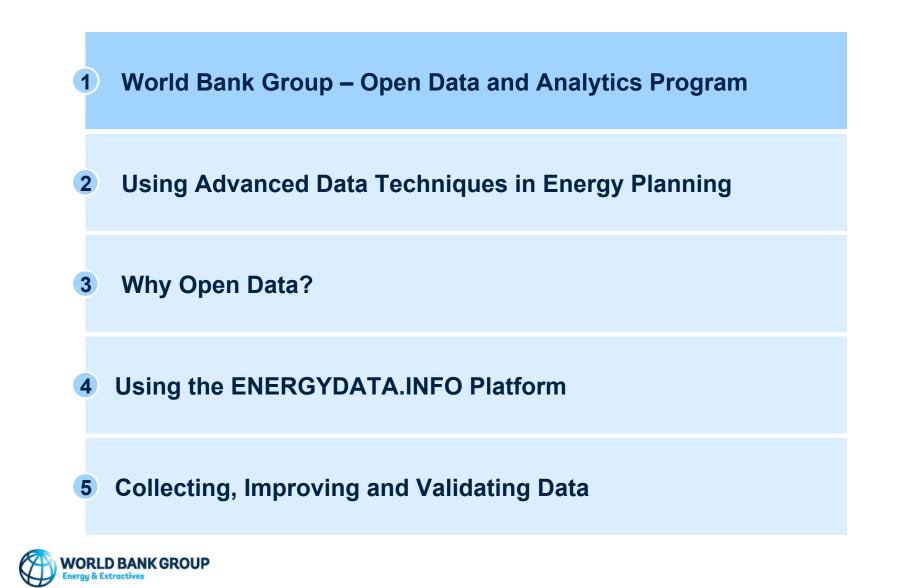
The Summer School on Modeling Tools for Sustainable Development Trieste - June 14, 2017



Overview



Overview



Global WBG initiative with objective to...

"Make energy sector data, visualizations and modelling tools increasingly accessible to our teams, client governments, partners and other stakeholders"



Data Analytics within the Energy & Extractives Sector

- Vast increase in use of software and applications in recent years, including national planning, monitoring, site selection and project design tools
- Based on more **<u>detailed demand data</u>** (i.e. bottom-up approach to modelling)
- **Dynamic**, with ability to adjust parameters and roll-out sequencing
- Visualizations provide a very useful stakeholders' engagement tool
- Inform policy and investment decisions with more precision
- > Allows for a **transparent** balancing of infrastructure decisions
- Long term trend driven by (i) an exponential availability of <u>data</u>, (ii) increased availability of on-demand <u>computational power</u> through the cloud, (iii) increased availability of <u>open source software</u>, (iv) advancement in <u>analytical algorithms</u>.



National-level Energy Planning Analytics Examples

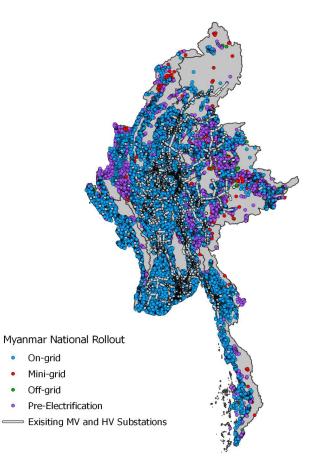
UN DESA - KTH University

(2030 universal access target)

UNITED REPUBLIC OF TANZANIA **Diesel Price** 0.7 US\$/liter **Energy Consumption** kWh/household/year Tier 3 224 696 M 2.195 Stand Alone \$ 0.32 US\$/kWh 205 People Population / 100 km² **Transmission Lines** National Grid 0 100.000+ - Existing Trans, Line ····· Planned Trans. Line Mini Grid 0 100.000+ Stand Alone 0 100,000+ i About this Map

Columbia University - Myanmar NEP

(2030 universal access target)





Project-level Energy Analytics Examples

MIT / Pontecomillas - GridForm

(Site selection and minigrid system design tool)



Powerhive - SWARM

(Private solution for sites' identification and selection)



Site identification and selection

We can rapidly identify the best microgrid locations by using our proprietary SWARM software to remotely analyze sites based on financial, technical, and geospatial data. Whether an electrification project is for a single village or a large region, we can provide detailed site analyses that are ranked based on profit potential. When it's time for ground-truthing and customer acquisition, our software will streamline the process so that your team can work quickly and efficiently.

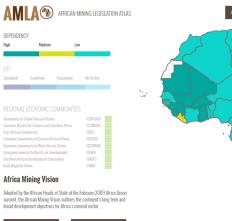
See also <u>http://www.developmentmaps.org/</u> for a different example of private sector offerings in GIS analytics for off-grid site identification



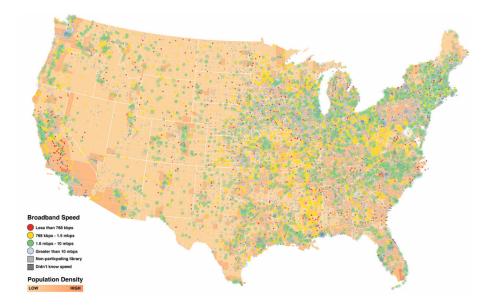
Data Visualizations Examples

Regulations – IDB Climatescope & WB AMLA Surveys – National & Subnational











ABOUT AMLA

GUIDING TEMPLATE

WBG EEX Open Data Platform - www.energydata.info



Featured Apps

View all apps >



Africa Electricity Grids Explorer BY THE WORLD BANK GROUP



Global Solar Atlas





About ENERGYDATA.INFO

- ENERGYDATA.INFO is an open data platform providing access to datasets and data analytics that are relevant to the energy sector
- It has been developed as a public good available to governments, development organizations, non-governmental organizations, academia, civil society and individuals to share data and analytics
- Aimed at supporting the United Nations' Sustainable Development Goal 7 of ensuring access to affordable, reliable, sustainable and modern energy for all
- The World Bank Group (WBG) strives to enhance public access to and use of data that can support development impact. The platform is designed according to open data and open source standards and principles
- It is powered by the open-source data portal platform CKAN, and it is developed publicly on GitHub. More information on CKAN and GitHub can be accessed at ckan.org and github.com



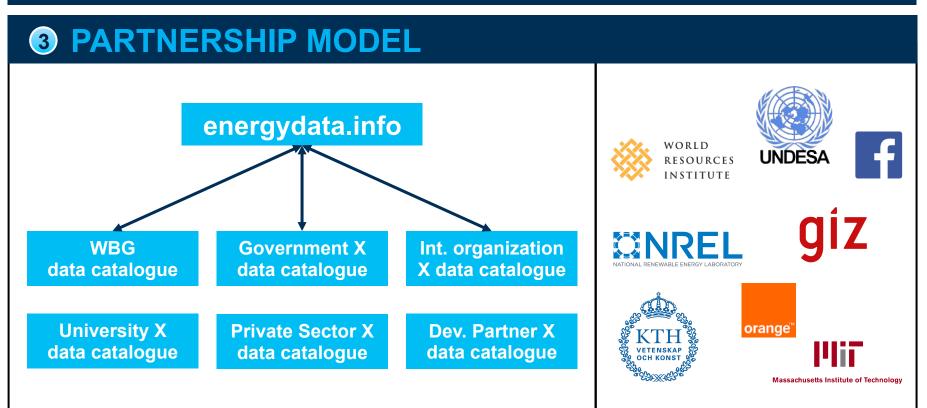
Data Partnerships

1 AGGREGATION

Governments, International organizations, research institutions and private sector stakeholders collect large amounts of data that is largely unavailable or scattered

2 COLLECTION

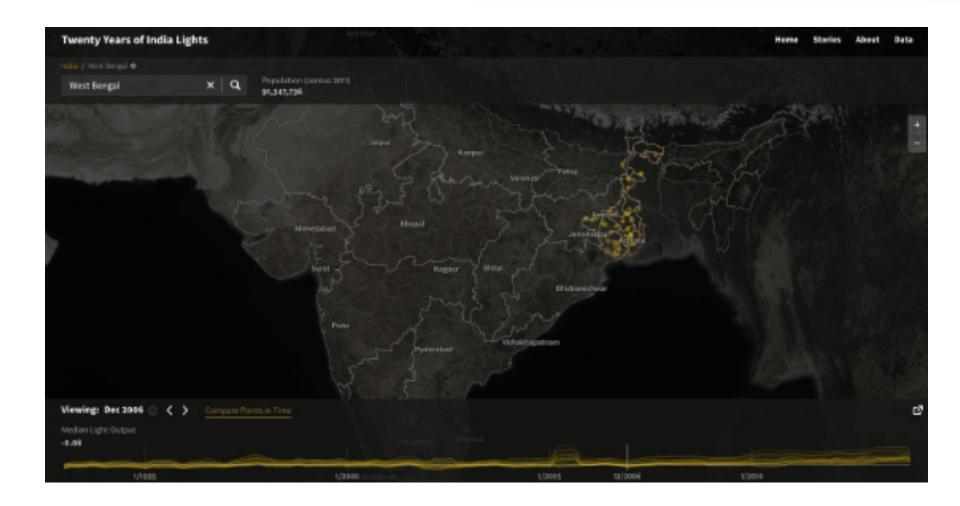
Big data and machine learning offer an opportunity to efficiently address data gaps at scale



Overview

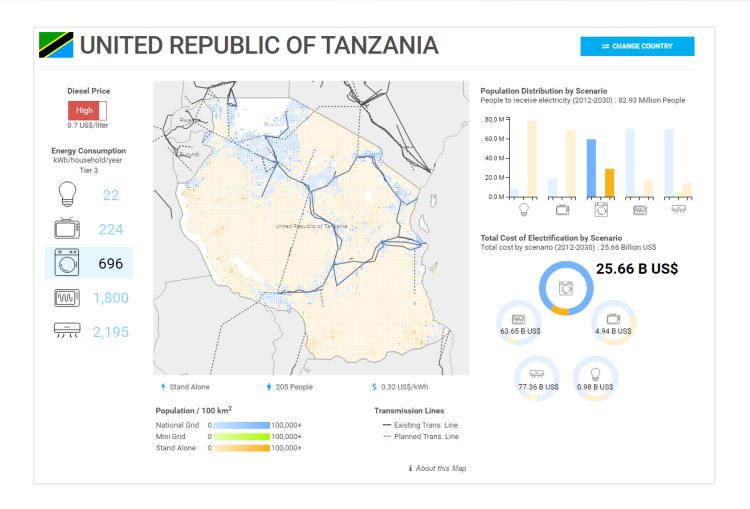


Tool 1: India Night Lights (WB)



Monitor rural electrification in 600,000 villages over twenty years. From space.

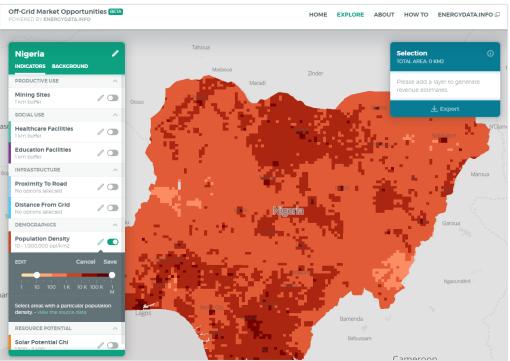
Tool 2: High Level Least Cost Options Plan (UN-KTH)



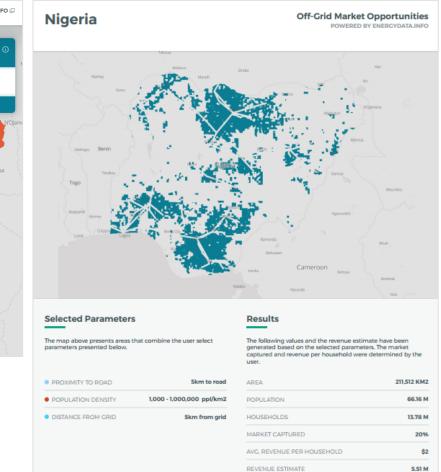
Estimate the mix of technologies that will provide universal electricity access at the lowest cost.

WORLD BANK GROUP

Tool 3: Off-Grid Market Opportunities (IFC)



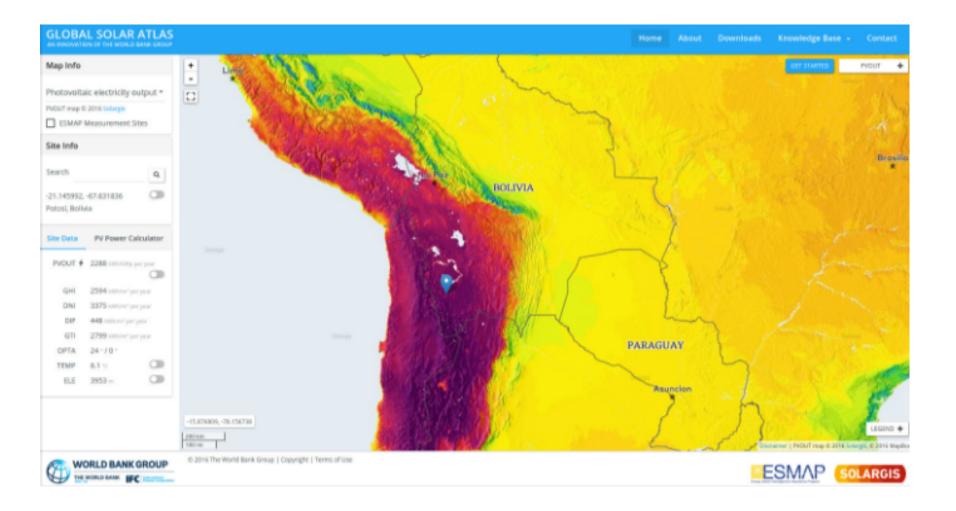
Open source application to estimate market opportunities for off-grid energy services in Sub-Saharan Africa.





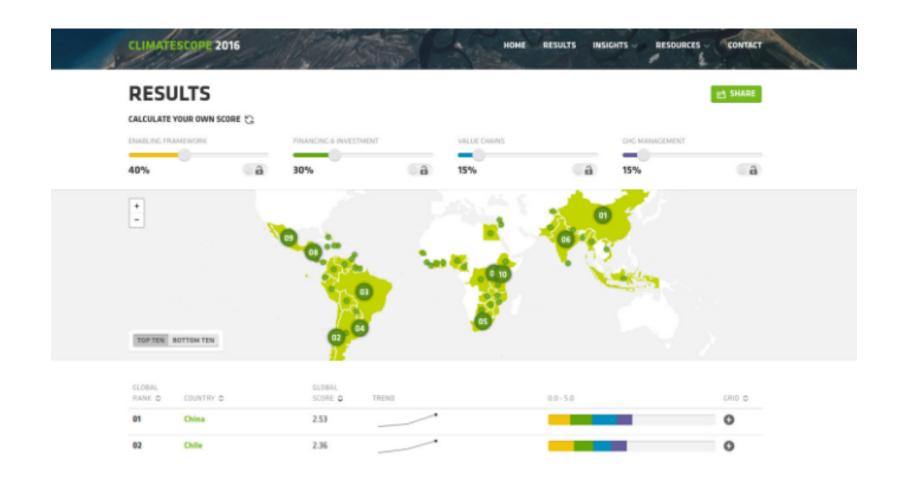
Tool 4: Global Solar Atlas (ESMAP - WB)

y & Extractives



Access solar power potential globally and perform simple RLD BANK GROUP electricity output calculation for any given location

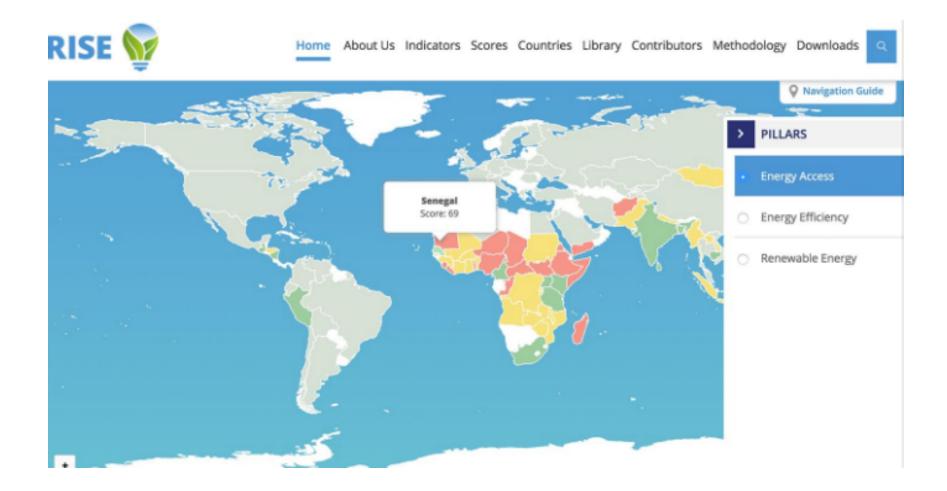
Tool 5: Climatescope (Bloomberg New Energy Finance)



Compare conditions for clean energy investment on and off the grid in 58 emerging markets.



Tool 6: RISE (World Bank Group)

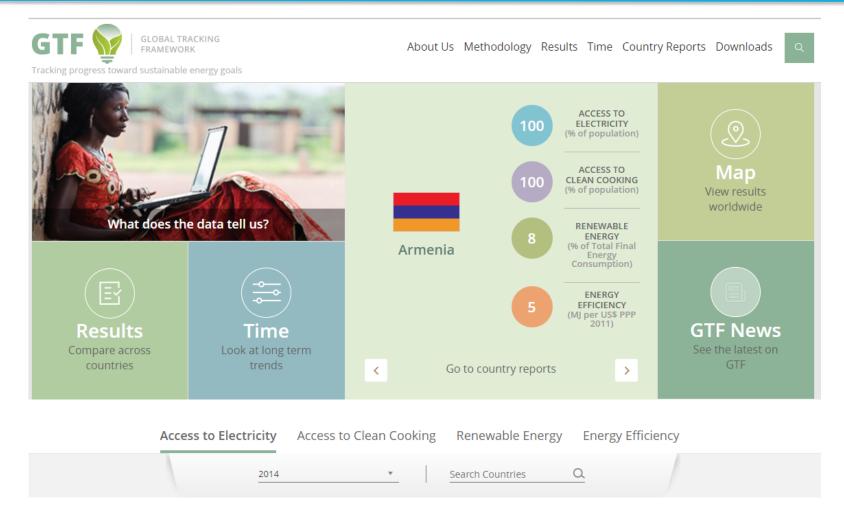




Regulatory Indicators for Sustainable Energy (RISE) is a comprehensive policy scorecard assessing the investment climate for sustainable energy in 111 countries.

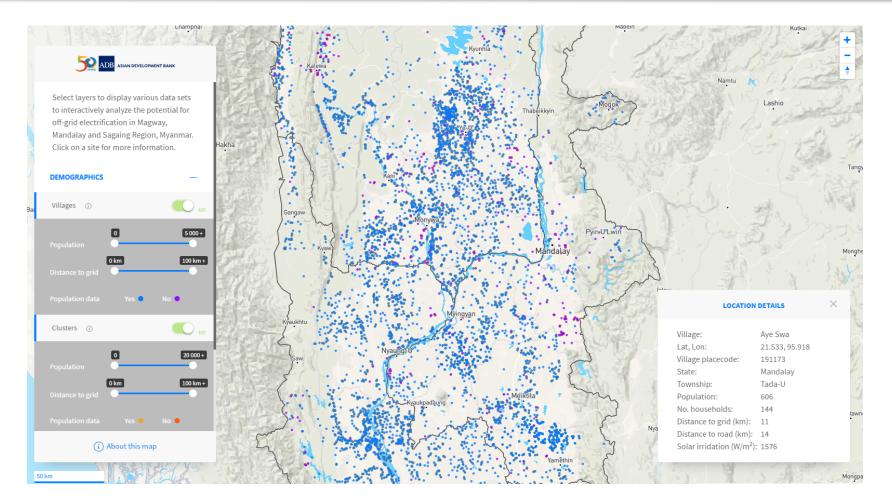
Tool 7: GTF (World Bank Group)

u & Extractives



Global Tracking Framework (GTF) provides a global dashboard to register progress on energy access, ORLD BANK GROUP energy efficiency and renewable energy.

Tool 8: Myanmar Off-Grid Analytics (Integration & Reiner Lemoine Institut)

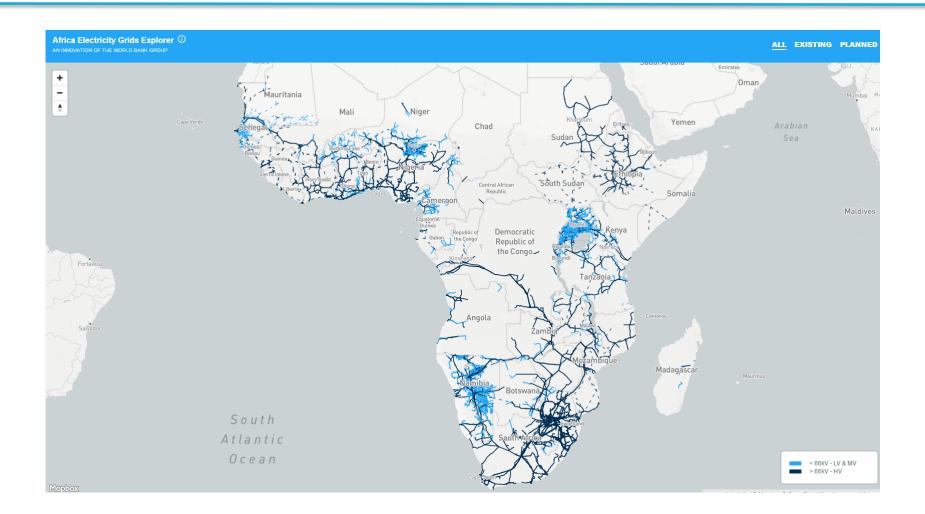


ORLD BANK GROUP

u & Extractives

Visualizes data of the current status of electrification and presents renewable energy potentials to showcase the offgrid investment potential.

Tool 9: Africa Electricity Grids Explorer (World Bank Group)



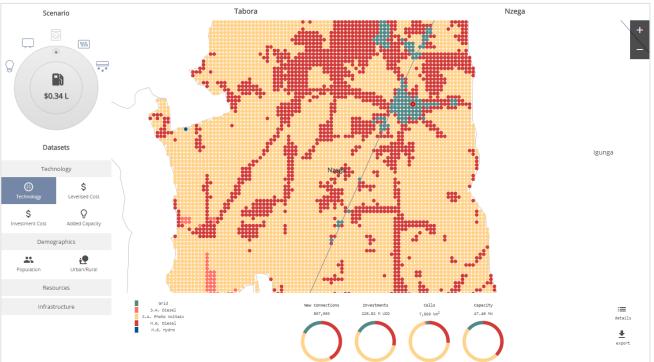
RLD BANK GROUP

u & Extractives

Explore the latest data on Sub-Saharan Africa's electricity grids and infrastructure.

Tool 10: High Definition Least Cost Options Plan (KTH + WB)





Cells				New Connections		Capacity		Investments	
	7,899 km²			867,903		47,396,205 W		228,815,912 USD	
	M.G. Hydro	1 km²	0.01 %	95	0.01 %	3,218 W	0.01 %	37,497 USD	0.02 %
	S.A. Diesel	117 km²	1.48 %	3,178	0.37 %	153,378 W	0.32 %	210,513 USD	0.09 %
	Grid	177 km²	2.24 %	151,750	17.48 %	6,541,066 W	13.80 %	37,744,659 USD	16.50 %
	S.A. Photo Voltaic	5,545 km²	70.20 %	343,790	39.61 %	22,896,100 W	48.31 %	125,928,362 USD	55.03 %
	M.G. Diesel	2,059 km ²	26.07 %	369,090	42.53 %	17,802,443 W	37.56 %	64,894,881 USD	28.36 %



CASE STUDY 1:



Development of Open Source Online Tool for Identifying High Level Off-Grid Market Opportunities (support to IFC)

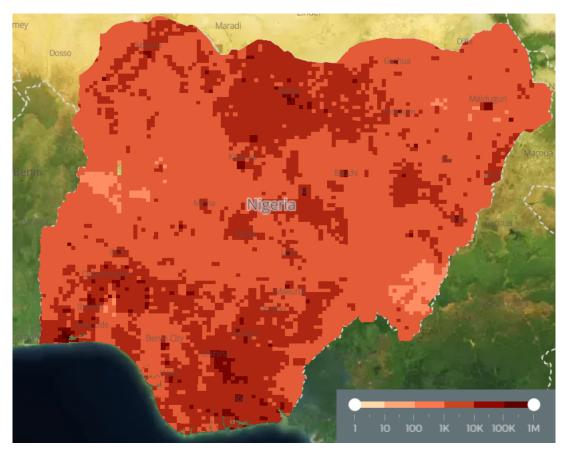


Using GIS Analytics in private sector advisory

- ➢ GIS data is of limited use without both visualization and analytics
- Exploiting GIS data often requires specialized skills and software and is a challenge for smaller private sector players
- IFC aims to facilitate energy practitioners' access to GIS based data analytics to address lack of market information
- Off-grid Market Opportunity tool developed to fill 3 main gaps:
 - 1. Data gap with making available and leveraging geospatial data in markets where basic data is scarce
 - 2. Capacity gap with providing a analytical tool that allows users to get results from data easily
 - 3. Analytical innovations gap with developing the tool as open source software



Where are the people?





Are they served by the grid?



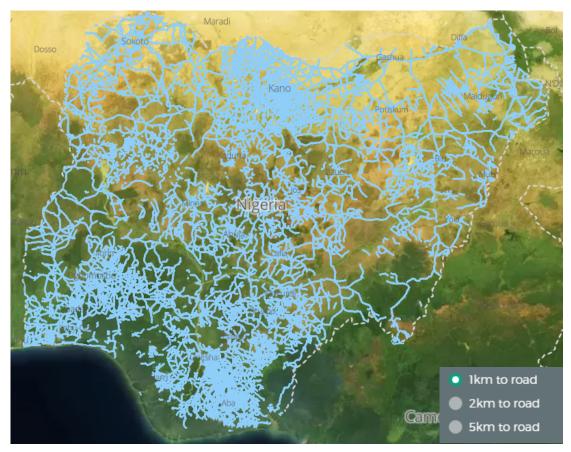


Do they have mobile phone coverage?



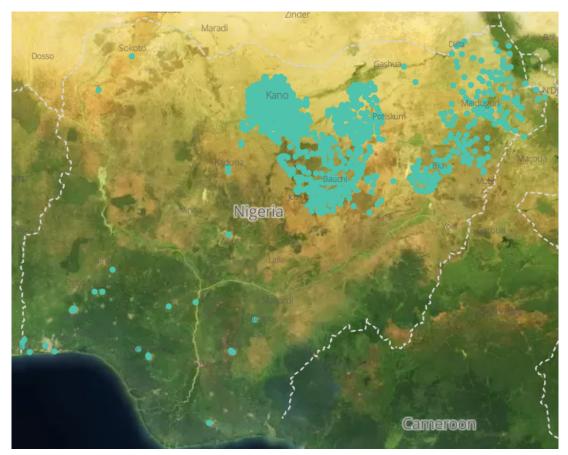


Are they close to an existing road?



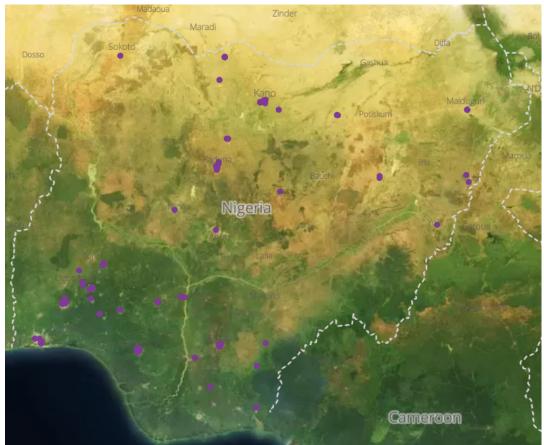


Where are the healthcare facilities?



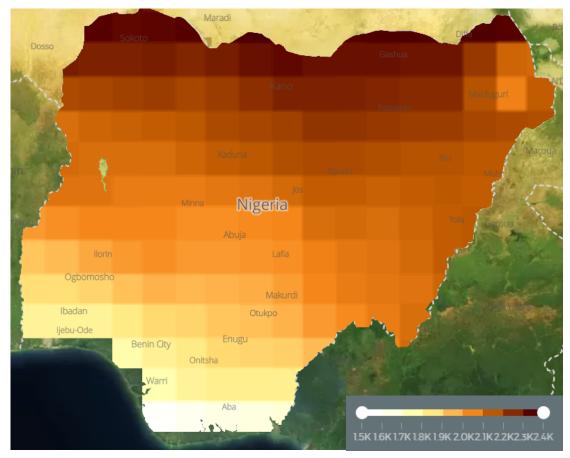


Where are the schools?





Is the solar resource sufficient?





In Nigeria, how many people live in...

- ✓ Densely populated areas (<1,000 per km2)? 125.91M</p>
- ✓ At least 5 km away from the grid? 109.17M
- ✓ Have cellphone coverage?
 154.46M
- ✓ Less than 1 km from an existing road? 84.22M
- ✓ In areas >2K GHI solar potential? 69.58M



All of these 5 parameters combined?

30.34M

Where?

What would be my annual revenue with 20% of market at \$200 per HH per year?

\$ 252.84M / Year

BANK GROUP



"This is a great tool!" **Moya Connelly, Vice President of Deutsche Bank Trust Company Americas**

"Congrats on this great new tool! As you know, it will be very helpful for companies like Fenix."

Lyndsay Handler, CEO of Fenix International

"This is amazing! Hats off to the IFC" **Tristan Kochoyan, CEO and Founder of Power:On**

"I am interested to explore the scope and opportunity of extending the coverage of the tool to the Caribbean. The intention would be to support energy access initiatives as well as energy transition opportunities"

Glynn Morris, Programme Leader at GIZ

"Thanks so much for this! In fact, this came at the right time when we are developing our own rural electrification planning tool. This surely could contribute to the work we are doing." **Alicia de Guzman, Rural Electrification Administration, Philippines DoE**



Caveats, learnings and way forward

- Results are as good as the data is
- Technical limitations due to complex calculations in the background affecting speed
- Results can be improved easily with better data and new parameters, as well as new infrastructure
- User demonstrations and trainings are key for adoption



Project Specific Support - CLSG Regional Interconnection Project with Access Impact (support to WB Africa Team)



TEAM REQUEST

We are working actually on an AF for the parent project to increase via a new electrification's component. This component is envisaged in FY18 to finance the electrification of communities near the transmission line and its substations in Liberia and Sierra Leone to further increase the development impact of the CLSG regional transmission line and enhance the social acceptance and protection of the high voltage transmission lines by the local communities.

The electrification will be done from (i) the SWS technology (electrification of 3 earthwires) or from (ii) conventional technology from the HV/MV substation.

In order to analyze and determine the best option to feed the village/communities depending the localization of the village/communities and the distance to the future HV/MV substations, I would like to have a map with two layers (i) the population (village/communities) identified along the line (ii) the line routing of the CLSG line.



INPUT 1

WorldPop population dataset showing the estimated people number per grid-cells at 100m by 100m resolution



INPUT 2

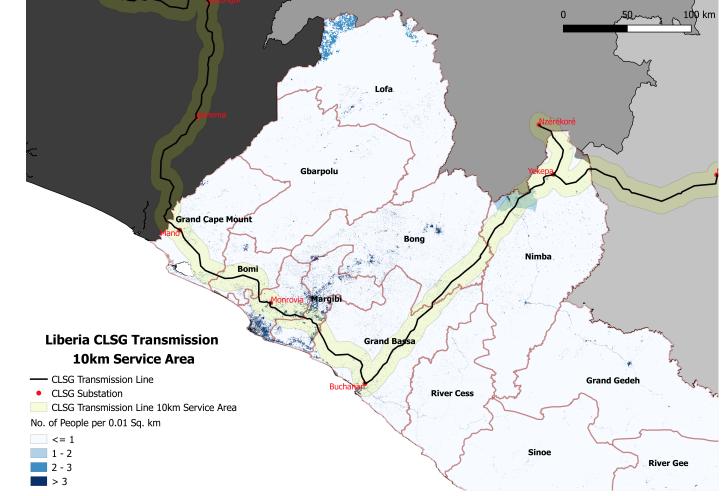
CLSG Liberia – Sierra Leone – Ivory Coast Transmission Grid GIS Dataset





Modelisation of 10km service area

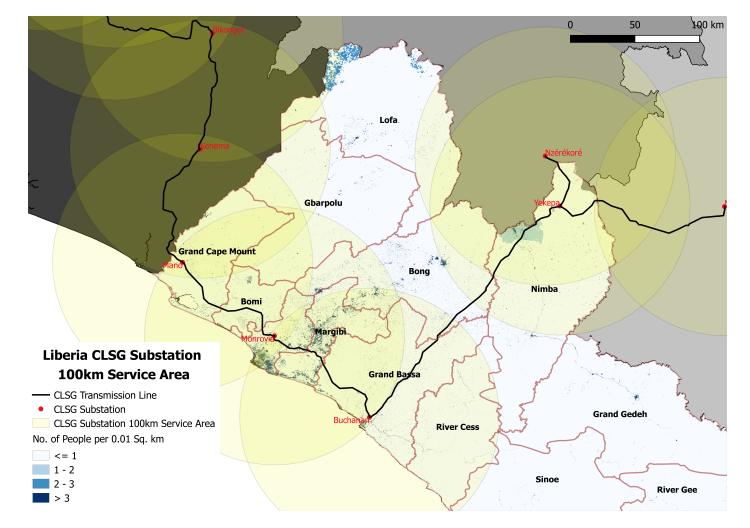
OUTPUT 1





OUTPUT 2

Modelisation of 100km substation service area





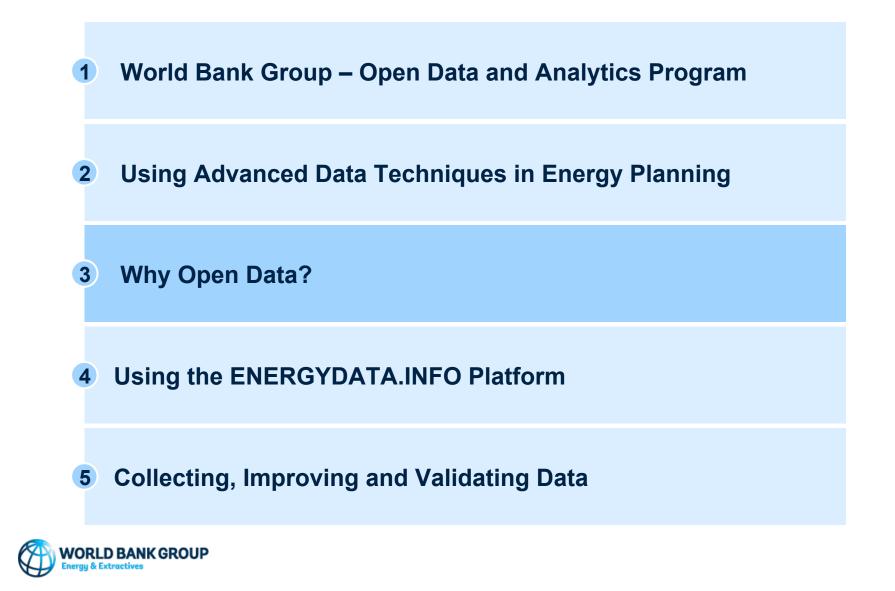
OUTPUT 3

Detailed results table

А	В	С	D	E
Country	Total Populaiton	Buffer Type	Pop in Buffer	Pop in Buffer Percent
Sierra Leone	6,205,385	10km Line	780,037	12.6%
Sierra Leone	6,205,385	100km SS	4,111,362	66.3%
Liberia	4,396,869	10km Line	647,292	14.7%
Liberia	4,396,869	100km SS	3,307,335	75.2%
	Sierra Leone Sierra Leone Liberia	Sierra Leone 6,205,385 Sierra Leone 6,205,385 Liberia 4,396,869	Sierra Leone 6,205,385 10km Line Sierra Leone 6,205,385 100km SS Liberia 4,396,869 10km Line	Sierra Leone 6,205,385 10km Line 780,037 Sierra Leone 6,205,385 100km SS 4,111,362 Liberia 4,396,869 10km Line 647,292



Overview



What is Open Data?



Open data and content can be **freely used**, **modified**, and shared by anyone for any purpose

- Technically open: accessible online, in open formats, without registration barriers
- Legally open: clear licensing with minimal restrictions on use, re-use or redistribution
- Sufficient metadata and documentation



What is Open Data?

DataPortals.org Home Add a Portal Browse Contribute About

Data Portals A Comprehensive List of Open Data Portals from Around the World

524 Data Portals listed »





- Open Data increases use/-reuse of data
- Open Data can reduce costs
- Open Data enhance reputation and provide positive appreciation for organization
- Improve data quality



- Openness, Transparency & Accountability
- Improve Public Services
- Innovation & Economic Value
- Public Sector Efficiency



Why are developing countries doing Open Data?

All these:

- Openness, Transparency & Accountability
- Improve Public Services
- Innovation & Economic Value
- Public Sector Efficiency

Plus:

- Support Broader Government Agenda
- Answer Specific Development Questions



Budget transparency & improved service delivery in Uganda

Home	About	Budget Library	Budget Dashboard	Register	Login				
	MINISTRY OF	FINANCE PLANNIN	et Inform	VELOPMENT		0			
C Free Hotli	ne 0800 229 22	29 (f) Mon –	Fri 9am – 5pm (I	budget@finan	ce.go.ug	(Quick S	earch X-XXX-XXX		header
Kn	OW	1		Your Local Budge	et Your N	lational Budg	et The Budget Library		
Yo	ur			This tool enables budget informatio			Select Region	-	
				allocated and uti level. The tool o	details informa	ation on	Select District	-	
Bu	ug	et		plans and perfo financial details. T	The tool allows	users to	Select Sub County	•	
transparency a funds by allowi	nd accountabili ng you to acces	on website promote: ity in the use of publ ss and give feedbac ent budgets and	ic	provide feedback their local area.	on service de	nivery in	SEARCH & REPORT		

RECENT PHOTOS

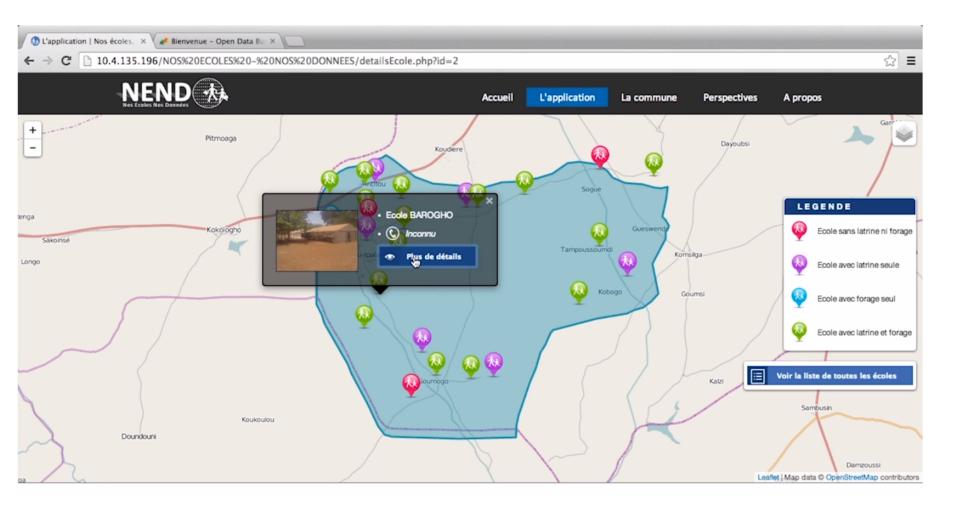




Finance minister hails initiative..



Opening education data in Burkina Faso





Teacher absenteeism in Nigeria

Location-specific data in Benin City

Select a story from the options below. These visualizations utilize data collected in 2013 and published on the <u>Edo State Open Data</u> <u>Portal</u>.

Maps were made using <u>Tilemill</u> and hosted by <u>Mapbox</u>. You can use both of these tools for free.

Getting to school Bus stops and their proximity to selected schools in Benin City.

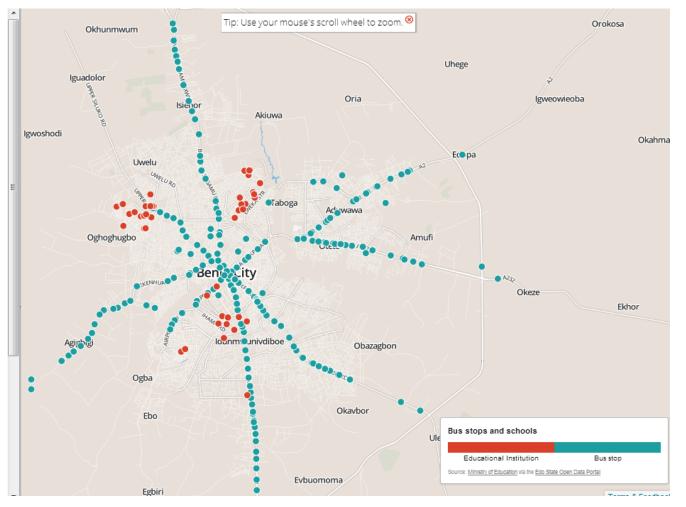
Tracking illegal waste dumping Legal and illegal waste dump locations in Benin City.

Churches and shops Over 70 religious institutions mapped alongside shops and bars in Benin City.

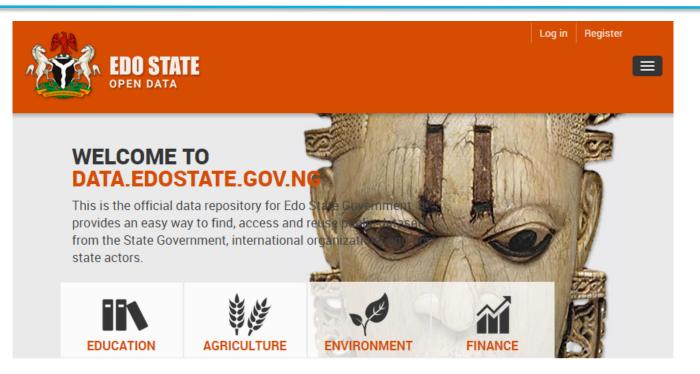
Healthy travel Selected hotels and health care organizations mapped in Benin City.

This website was made in support of the launch of the Edo State Open Data Portal. The goal of this website is to demonstrate how free and open tools can leverage open data for visual storytelling.





Official data repository for Edo state - http://data.edostate.gov.ng



We hope this data will become a platform for improving transparency, catalyzing innovation, and enabling social and economic development. We encourage all users to leverage the information in this portal to develop tools and applications which benefit all Edo State citizens.

RECENTLY UPDATED DATASETS

List of Tractors in M.O.A.N.R

The list of tractors owned by the Ministry of Agriculture and Natural Resources and the state of

LATEST BLOG POSTS

Bridging the gap between Government and the Public by Digitalization

Rridging the gap between Covernment and the



Tools to get started: Open Data Toolkit - http://opendatatoolkit.worldbank.org

THE WORLD BANK Working for a World Free of Poverty English Español Françai	is عربى Русский 中文 ト Search Q
Home About Data Research Learning News Projects & Operations Publications Countries Top	pics
Data	
This page in English Français Open Government Data Toolkit	घ f У 8+ in
Welcome to the Open Government Data Toolkit	♠ Open Government Data Toolkit
The Open Government Data Toolkit is designed to help governments, Bank staff and users understand the basic precepts of Open Data, then	> Open Data in 60 Seconds
get "up to speed" in planning and implementing an open government data program, while avoiding common pitfalls. We suggest that you begin	> Open Data Essentials
reading here. Getting started with Open Data can be easier	> Starting an Open Data Initiative
than many people think. If you have data in a <u>re-usable electronic form</u> , a <u>publicly accessible</u> online place to put it and an <u>open license</u> , then	> Technology Options
you're well on your way.	> Demand and Engagement
We update the OGD Toolkit frequently with new information. If you have suggestions or corrections, please <u>send us feedback</u> .	> Supply and Quality of Data
	Readiness Assessment Tool
	> Technical Assistance and Funding
BANK GROUP	

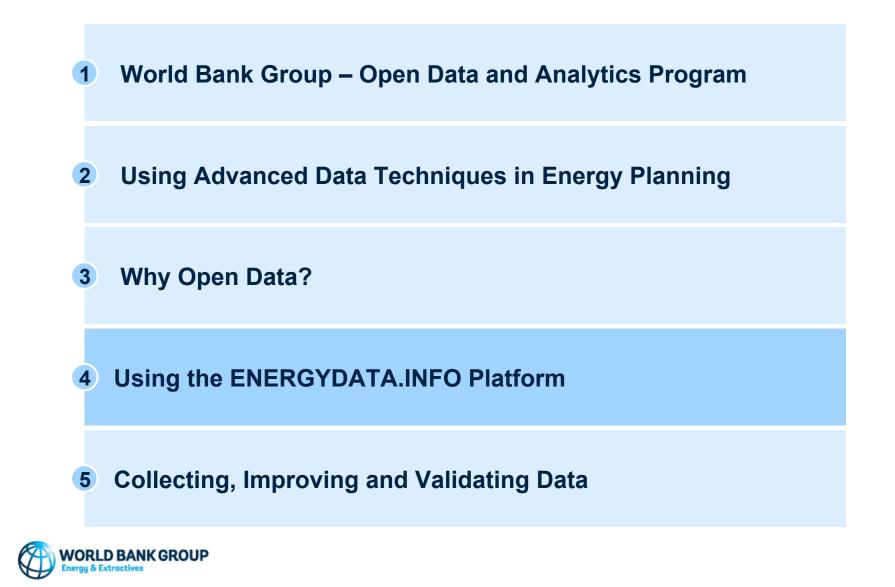
Key lessons for success

- Start small, learn, & grow
- Perfect is the enemy of the good
- Engage the public and civil society





Overview



Register an account

					Count	Log in Registe
ENERGYDATA.INFO	Apps	Datasets	Organizations	About	Search	C
/ Registration						
Why Sign Up?		_				
Create datasets, groups and other exciting things	Register f	or an A	ccount			
	Username:	username				
	Full Name:	Joe Bloggs				
	Email:	joe@example	.com			
	Password:					
	Confirm:					
		I agree to the large to the	ne Terms of Use			
						Create Account



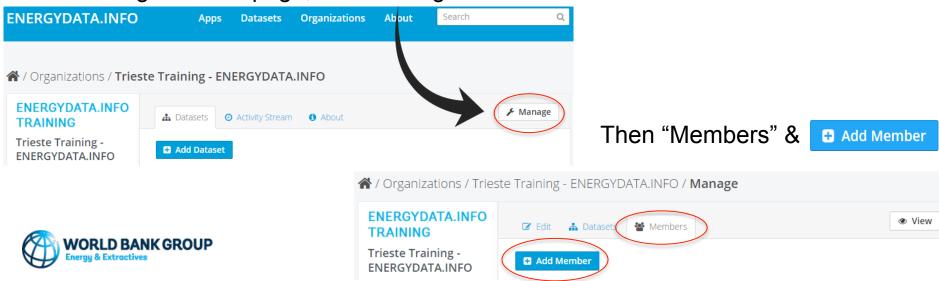
ADDING AN ORGANIZATION

Eligible organizations can be added to energydata.info by submitting a request

2 ADDING MEMBERS TO AN ORGANIZATION

Managers of an organization can directly add members to their organization

From the organization page, click Manage

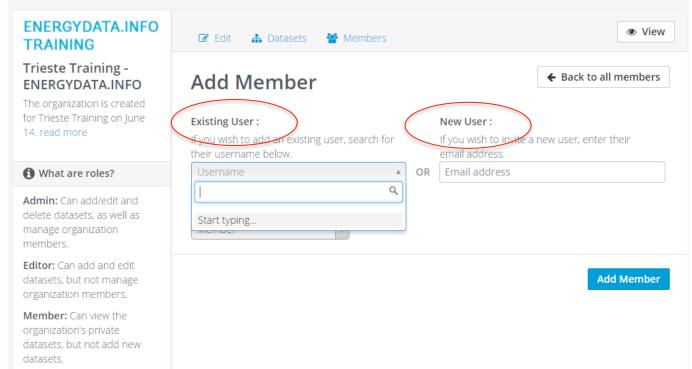


ADDING MEMBERS TO AN ORGANIZATION

- Add an existing user by typing user name
- > Add a new user by sending an invitation email to the user's email

From the organization page, click Manage and then

A / Organizations / Trieste Training - ENERGYDATA.INFO / Manage





2



There are three different types of members:

- Admin (complete access, add and edit datasets and members)
- Editor (add and edit datasets)
- Member (view private datasets, but not add or edit)

/ Organizations / Trieste Training - ENERGYDATA.INFO / Manage ENERGYDATA.INFO View 🕼 Edit 🛛 🚠 Datasets 🛛 🚰 Members TRAINING Trieste Training - Back to all members Add Member ENERGYDATA.INFO The organization is created for Trieste Training on June Existing User : New User : 14. read more If you wish to add an existing user, search for If you wish to invite a new user, enter their their username below. email address. Email address OR 🚯 What are roles? Admin: Can add/edit and Role: delete datasets, as well as manage organization Member members. Q Editor: Can add and edit Add Member datasets, but not manage Admin organization members. Editor Member: Can view the Member organization's private datasets, but not add nej stasets.





A / Organizations / Trieste Training - ENERGYDATA.INFO / Manage

ENERGYDATA.INFO TRAINING	🕼 Edit 🔥 Datasets 🛛 🚰 Members	View
Trieste Training - ENERGYDATA.INFO	Add Member	
The organization is created for Trieste Training on June 14. read more	1 members	
14. read more	User	Role
	💥 Naichen Zhao	Admin 💉 🗙



FIND THE DATASET OF INTEREST

- Click on "Datasets" button
- Use Search bar, Filtering bar (countries etc.)

	ENERGYDATA.INFO	Apps Datasets Organizations	About	Search	Q			
	倄 / Datasets							
	▼ Countries Uganda (32)	Add Dataset						
/	Tanzania, United Re (18) Nigeria (16)	Search datasets			Q			
	Zambia (15)	274 datasets found	0	rder by: Relevance	¢ •			
	Ghana (15) Pakistan (12)	ECOWAS region - Hydropower potential in Sub-	catchment	areas (2016)				
	Myanmar (10) Liberia (9)	This dataset shows subareas (sub-catchments) for West Africa and the estimated hydropower p well as several other interesting attributes for hydropower development COUNTRIES: Sierra Leone, Guinea-Bissau, Nigeria, Benin, Guinea + 9 REGIONS: Africa PUBLISHED YEAR: 2016						
	Congo, The Democrat (9) Malawi (8)							
	Show More Countries	FORMATS: GeojSON						

FIND THE DATASET OF INTEREST

> Other Filtering bar - on the left side of the "Dataset" page

▼ Region	T Published Date	Т оріс	▼ Organizations		
Africa (65)	2016 (34)	Demographics (97)	World Bank Group (93) +		
Airica (05)	2017 (31)	Transmission and di (72)	WorldPop (79)		
East Asia and Pacific (14)		Energy access (44)	GIZ (29)		
Latin America & Car (13)	2015 (14)	Renewable energy (27)	Columbia University (15)		
	2014 (9)	Resource assessments (21)	ECREEE (11)		
South Asia (11)	2007 (4)	Power system and ut (20)	KTH Royal Institute (10)		
Middle East and Nor (11)	2013 (1)		Facebook (8)		
Europe and Central (9)	2015 (1)	Solar (18)	Lawrence Berkeley N (6)		
	2010 (1)	Extractive industries (10)	Innovation Energie (5)		
	2008 (1)	Energy demand (10)	Nigerian Rural Elec (3)		
		Wind (9)	Show More Organizations		
		Show More Topic			

CHECK NIGERIA HEALTH FACILITY DATASET

- > Click on "Nigeria" in Country filtering bar
- Use Search bar

2

	ENERGYDATA.INFO	Apps	Datasets	Organizations	About	Search	Q		
	☆ / Datasets								
	▼ Countries								
	Uganda (32)	Add Dataset							
	Tanzania, United Re (18)	NIGERIA HEALT					0		
$\left(\right)$	Nigeria (16)								
	Zambia (15)	274 datase	ts found		Order k	Relevance	\$		
	Ghana (15)								
	Pakistan (12)	FCOWAS region	- Hydronowei	r potential in Sub-	catchment area	s (2016)			
	Myanmar (10)	This dataset shows		otential as					
	Liberia (9)	well as several other							
	Congo, The Democrat (9)		Bissau, Nigeria, Beni	in, Guinea + 9					
	Malawi (8)	P	REGIONS: A						
	Show More Countries		FORMATS:						



NIGERIA HEALTH **FACILITY** DATASET PAGE

3

- Organization
- Description
- **Data and Resources**
- > Additional Info

Organization health facility. The database includes 34,139 health facilities info in Nigeria. takes-open-data-further/ Nigerian Rural Electrification Agency The Nigerian Rural Electrification Agency (REA) was created by the Electric Power Sector Reform Act in 2006. The agency exists to facilitate the provision of Additional Info affordable power... read more Field Value C Social Google+ Twitter Facebook ▲ License

A / Organizations / Nigerian Rural ... / Nigeria - NMIS health ...

🚠 Dataset

Groups

Nigeria - NMIS health

facility data (2014)

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Nigeria - NMIS health facility data (2014)

Related

🖋 Manage

The Nigeria MDG (Millennium Development Goals) Information System - NMIS health facility data is collected by the Office of the Senior Special Assistant to the President on the Millennium Development Goals (OSSAP-MDGs) in partner with the Sustainable Engineering Lab at Columbia University. A rigorous, geo-referenced baseline facility inventory across Nigeria is created spanning from 2009 to 2011 with an additional survey effort to increase coverage in 2014, to build Nigeria's first nation-wide inventory of

O Activity Stream

The goal of this database is to make the data collected available to planners, government officials, and the public, to be used to make strategic decisions for planning relevant interventions.

For data inquiry, please contact Ms. Funlola Osinupebi, Performance Monitoring & Communications, Advisory Power Team, Office of the Vice President at funlola.osinupebi@aptovp.org

To learn more, please visit http://csd.columbia.edu/2014/03/10/the-nigeria-mdg-information-system-nmis-

Suggested citation: Nigeria NMIS facility database (2014), the Office of the Senior Special Assistant to the President on the Millennium Development Goals (OSSAP-MDGs) & Columbia University

Data	and Resources	
JSON	NMIS health facility data	📌 Explore 🗸
csv	NMIS health facility data	→ Explore -
Addi	la a l'Inde	

Field	value
Author	Ms. Funlola Osinupebi
State	active
Last Updated	May 8, 2017, 18:21
Created	May 4, 2017, 18:17
Торіс	Energy demand; Energy access
Country	Nigeria
Region	Africa
Status	Complete
Coordinate Reference System	WGS84
Published year	2014
Start date	2009
End date	2014





- > Preview the csv file
- Download the dataset \triangleright

Data and Resources



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Process Datasets – Optional Practice

SUBSET ALL HEALTH FACILITIES WITH PHCN CONNECTION

- Use Excel Filter function by column "phcn_electricity".
- > Open csv file in QGIS or ArcGIS to subset

2 Re-SAVE CSV / GEOJSON FILE TO SHAPEFILES > Use QGIS or ArcGIS



Uploading new datasets

- > Users must be either editors or administrators to upload new datasets
- In order to add a new dataset, follow these steps:

1	Click	on 'Dataset	s'				
		ENERGYDATA.INFO	Apps Datasets	Organizations	About	Search	Q
		倄 / Datasets		2	Click or	n 'Add D	ataset'
		▼ Countries					
		Uganda (32)	Add Dataset				
		Tanzania, United Re (18)	Search datasets				Q
		Nigeria (16)					
		Zambia (15)	274 datasets found		Orde	Order by: Relevance	
		Ghana (15)					
		Pakistan (12)	ECOWAS region - Hydropowe	r potential in Sub-	catchment ar	eas (2016)	



Uploading new datasets

3 Enter Metadata

- Mandatory fields: the title, description, Topic, Country/ Region, Published years
- Datasets should be named according to the following schema: Region/Country - Name (Date)
- Example: Kenya Electricity Transmission Network (2017)
- Metadata should be added as accurately and completely as possible
- This ensures that data can be traced and the relevant people can be contacted
- Metadata and tags also help to search the database quickly

/ Datasets / Create Dataset What are datasets? 1 Create dataset 2 Add data A CKAN Dataset is a collection of data * Title: eg. A descriptive title resources (such as files), together with a * URL: energydata.info/dataset/<dataset> Edit description and other information, at a fixed URL. Datasets are what * Description: eg. Some useful notes about the data users see when searching for data. You can use Markdown formatting here License: CC0 1.0 License definitions and additional information can be found at opendefinition.org Organization: Trieste Training - ENE.. . * Topic: Country: * Select at least one country or region Region: * Select at least one country or region Status: Source: http://example.com/dataset.json Author: Joe Bloggs Author Email: joe@example.com Published eg. 2010 Publish date of source data year: Start date: eg. 2008 Earliest data point in the dataset. E.g. 15-Jul-2008 or 2008 End date: eg. 2009 Latest or most recent data point in the dataset. E.g. 15-Jul-2009 or 2009 Coordinate eg. WGS84 For geographic data, the name Reference of the coordinate reference System: system used for the co-Group: To keep track of a group of datasets (e.g. from one project) give each dataset the same group name. They can then be found by searching for:

Custom Field: Key:

group:"my group"

Value:



Uploading new datasets

4 Upload files one by one, giving each a unique name and description, as well as specifying the format

ENERGYDATA.INFO		Apps	Datasets	About	Search	۹
😭 / Datasets / Create D	ataset					
What's a resource?	1 Create dataset			2 Add data		
A resource can be any file or link to a file containing useful data.	File:	🗅 Upload 🛛 🍳	Link			
	Name:					
	Description:	Some useful notes a	about the data			
5	Click finis	h once t	he pro	cess	is comple	ete
	Format: (eg. CSV, XML or JSO? This will be guesse		ve blank if you wis	•	
			F	Previous	Save & add and	Finish



Preferred formats for geospatial data

- Geospatial data is normally used by GIS (Geographical Information Systems) software, and is used for data where the geographical aspect is emphasized
- There are two types of geospatial data:
- Vector data represents points (e.g. power stations), lines (e.g. power lines) and areas (e.g. water bodies) with geographical coordinates and attributes. It is normally used to represent categorical data.
- Raster data represents continuous, both quantitative (altitude map) and qualitative (land use types) in a manner similar to a photograph, using individual pixels to represent data points.
- Vector data should be uploaded as GeoJSON (or Shapefile if necessary)
- Raster data should be uploaded as a GeoTIFF





Preferred formats for time-series and other data

- Time series data is data with a time-varying element, representing changes over a time period, such as data from a wind measuring station.
- This data frequently also contains geospatial element (the location of a measuring station), but may not have precise coordinates.
- This data emphasizes the time-variation and metadata (location, name, type) associated with it.
- Other data could be any general energy-related data, such as electricity prices. This might not have any geospatial element, except for an associated country/region.
- This data is typically stored as a CSV or Excel file, which can easily be explored with standard software.



Managing, deleting and API links

MANAGING A DATASET

With the required permission you can:

- Modify the information and metadata for a dataset
- Add or update the data resources tied to it
- Re-order the resources (affecting which will be previewed on the main page)
- Delete a dataset

1

2

API ACCESS

Certain data types (CSV among others) allow data to be created, updated and queried through API access, allowing automated interaction with datasets.





Reporting issues and requesting changes on GitHub

- The website source is code is openly available on GitHub at: github.com/energy-data/energydata.info
- By creating a free GitHub account, you can report issues and participate in the development of energydata.info. In order to do so, please follow these steps:
 - **1** Go to github.com/energy-data/energydata.info/issues

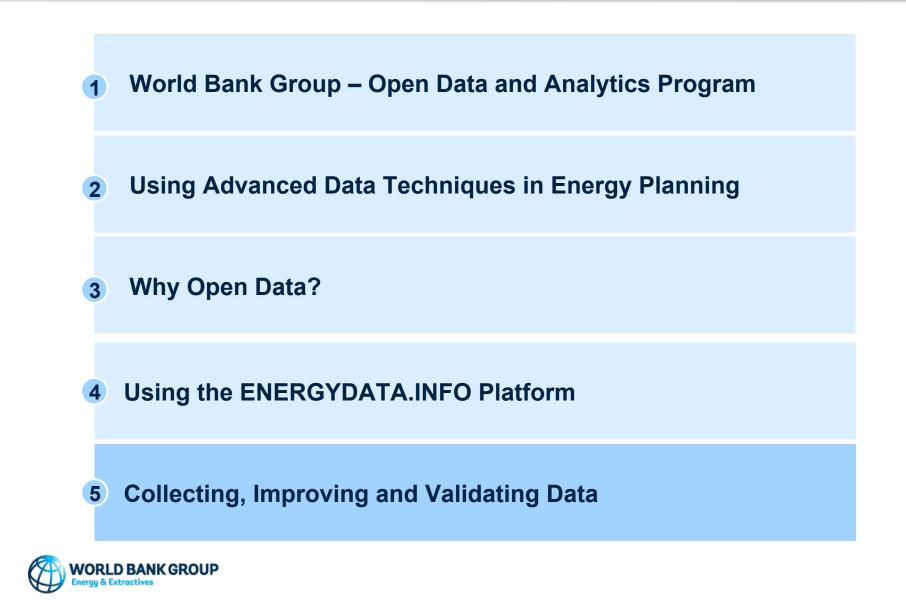


2 you would like to see. This message will be publicly visible and you can track the developers' response.





Overview







Geo-located demand load centers

Where do people live – census data (or similar) represented with settlement points(villages, towns, cities) or enumeration areas

Liberia

- Example Liberia
 2008 Census:
 Geo-located settlement dataset
 ~13,000 points
- If no census data?

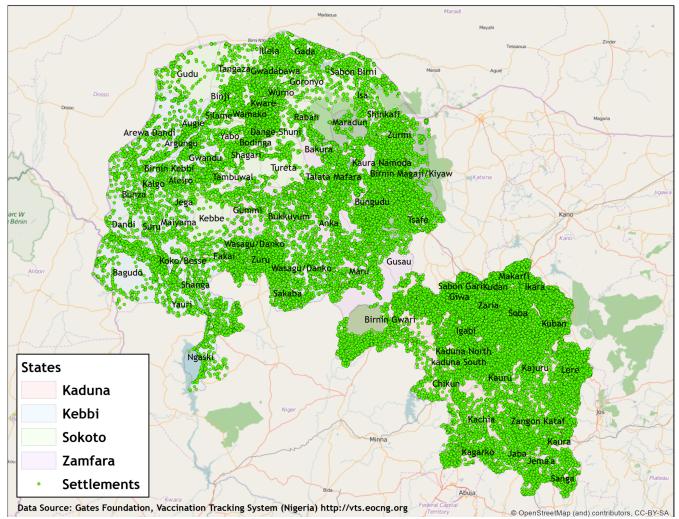
Other demand load centers:

- Social facility demand:
 hospital, school, commercial center,
 public lighting, government building etc.
- Industrial demand: mining site, factories etc.



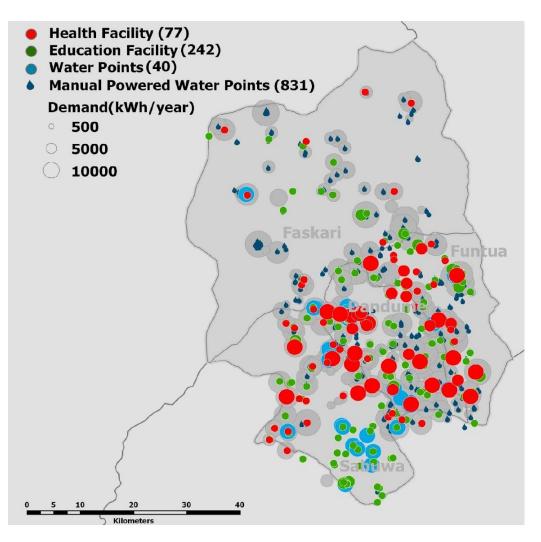
Geo-located demand load centers – if no census data

Nigeria 4 states - Populated settlements (Gates Foundation Polio Vaccination Project)





Geo-located demand load centers - Other demand load centers



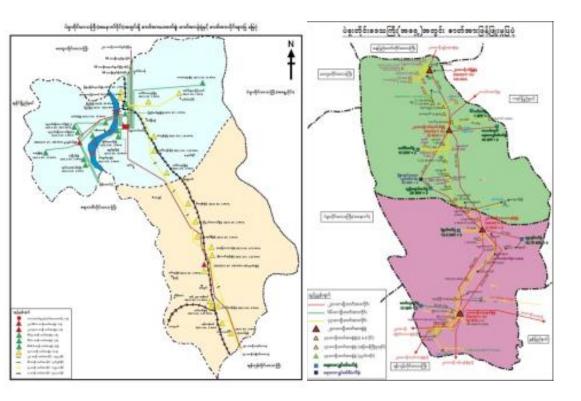
- Multi-sectorial survey data for electricity planning
- Survey data for 4 LGAs in Nigeria
- Clinics, schools, water points for health & education facility, plus farming irrigation

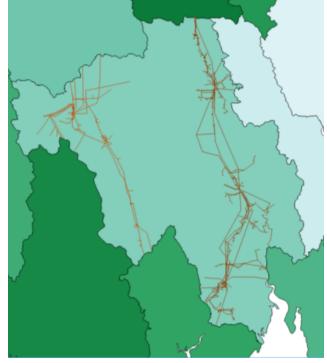






Geo-located existing distribution/medium voltage grid lines – digitizing grid lines in Myanmar





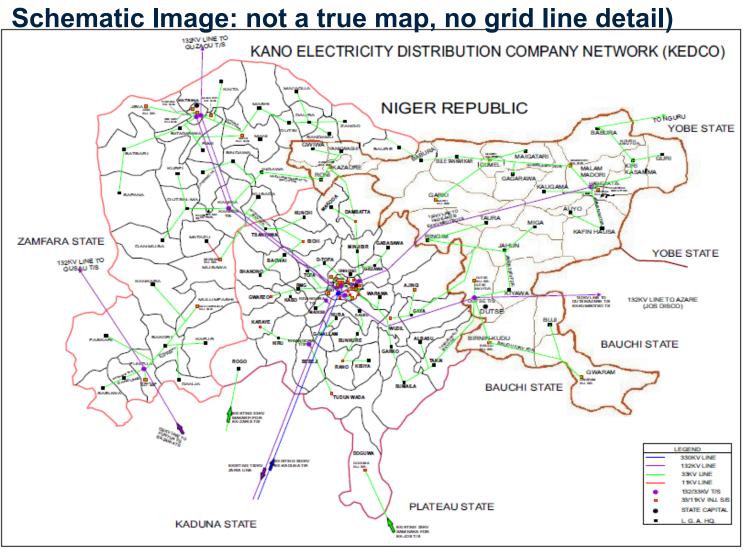
State, district and township level MV line maps. (sample jpegs above for Bago Region)

Geo-reference and digitize to create GIS files.

(Bago Region MV file digitized).



Geo-located existing distribution/medium voltage grid lines – field mapping grid line in Nigeria



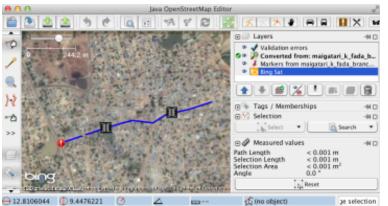


Geo-located existing distribution/medium voltage grid lines – field mapping grid line tools

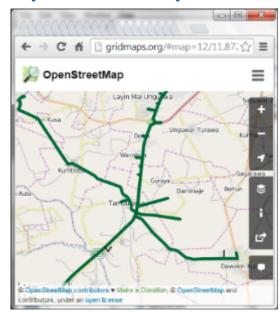
OSM Tracker



JOSM



OpenStreetMap



Android smartphone app Useful for: tracking lines recording points



- > A desktop application
- Useful for:
 - Editing track data to create clean system map
 - Uploading data to server & handling conflicts from multiple users working on the same data
- Online platform established to host mapped grid data
- Accessible by multiple users, password protected
 - technical staff and managers can view mapping progress and see the grid system in detail or as a whole

Geo-located existing distribution/medium voltage grid lines – field mapping grid line in Nigeria

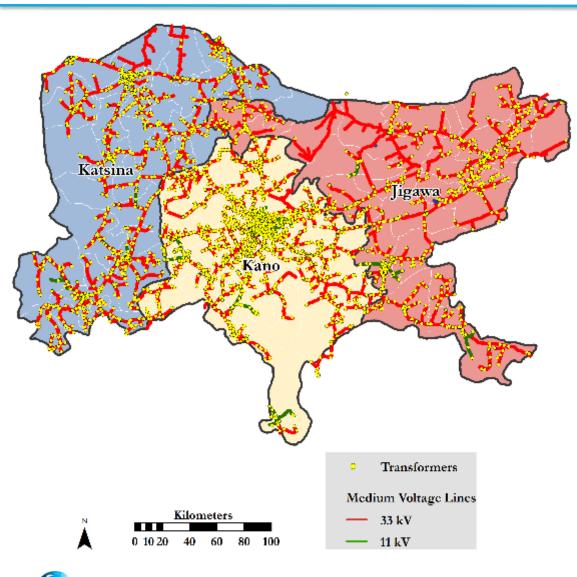




Capture of MV line using OSMTracker in truck Editing MV line data and upload to cloud-based system



Geo-located existing distribution/medium voltage grid lines – field mapping grid line in Nigeria results



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Covers 3 states:

Kano, Jigawa, Katsina, total population: ~23 million total area: ~68,000 sq km

Training:

One week initial training with Android smartphones and open-source editing software Utility trains its own staff to multiply the mapping workforce

Utility mapping:

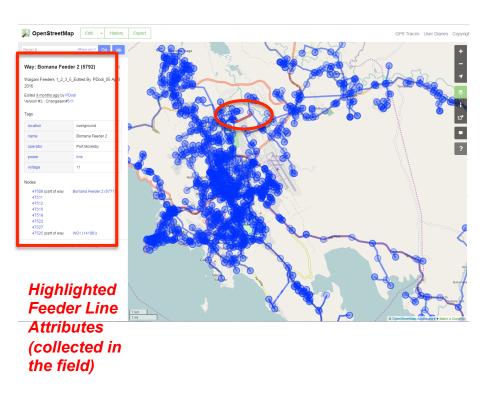
- ~4 months, ~12 teams/vehicles
- ~10,000 km of MV line mapped

1 vehicle covers 20-100 km per day, depending on urban/rural

Map data includes:

MV line paths Transformers Sub-stations Generation sites

Geo-located existing distribution/medium voltage grid lines – field mapping grid line in Nigeria results



Cloud grid line data platform

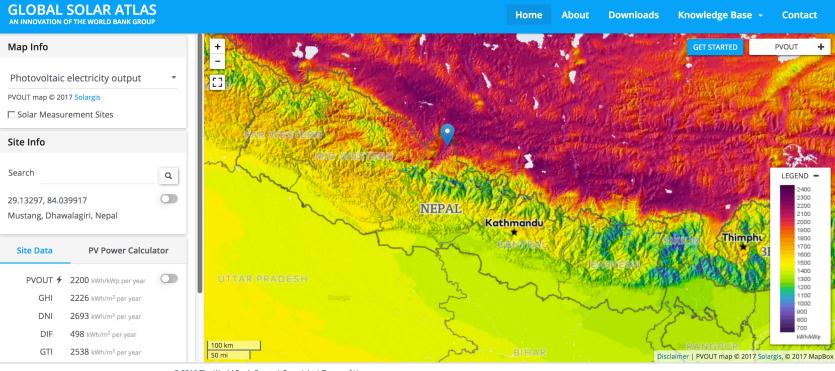
BENEFITS

- More efficient asset mapping with accurate distance measurement
- Provides inventory of utility assets for O&M and load flow analysis
- Facilitate electrification planning exercises
- Easily use of Open Street Map (free tools) & cellphones
- Easily updatable, available online for future data gathering
- Easily editing online or free desktop software



Geo-located existing & potential generation site

- Existing & planned generation sites
- Renewable energy resource mapping and location identification: hydro power for Nepal
- Solar and Wind: Global Solar Atlas http://globalsolaratlas.info/





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3 Technical & cost & financial parameters



Technical & cost & financial parameters – Household Demand in kilowatt-hours per year (kWh/yr)

Demand level corresponds with appliances

50 kWh/year per HH?

250-500 kWh/year per HH?

1,000 kWh/year per HH?

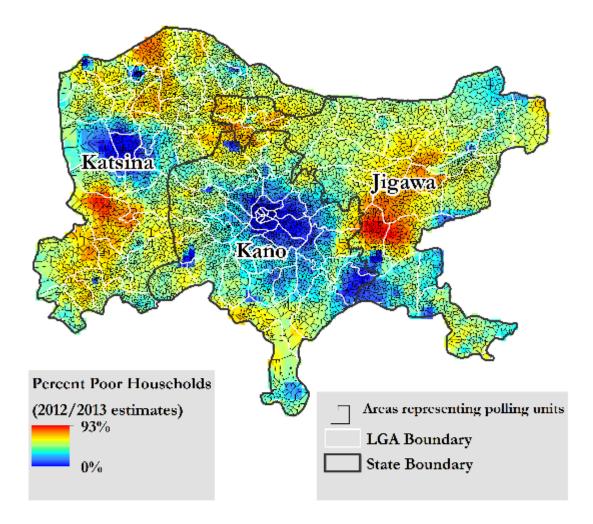
Low (~140 Wh/day): lighting, cell phone (lantern? home PV system?)

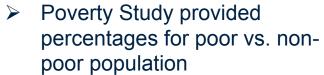
Med (~1 kWh/day): small TV, fan (solar or hybrid micro grid?)

High (~3 kWh/day): above uses + cooking, refrigeration (microgrid, grid?)



Technical & cost & financial parameters – Household demand in kilowatt-hours per year (kWh/yr) with poverty rate





- According to utility bills and interviews, obtain household demand in kWh/year for poor and non-poor households
- Combining poverty study percentages and these two demand values, calculate a weighted demand for each populated settlement



Technical & cost & financial parameters – Other important parameters

- > Technical parameters:
 - System loss for grid, mini-grid, off-grid including distribution loss & generation loss
 - > Available transformer, diesel generator, solar panel sizes in local market
 - Operation & maintenance cost as percent of initial cost
 - ► Etc…

Cost parameters:

- > Procurement cost for equipment: transformer; diesel generator; distribution line etc.
- Labor cost: system installation cost
- Transportation cost
- ➢ Etc…

> Financial parameters:

- Interest rate
- Project time duration

Data collection methods:

- Previous procurement documentation
- Interviewing utility engineer & planning officers
- Other resources research organization, NGOs etc.

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Thank you!

For additional information, please contact:

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