State Fragility initiative
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CASE STUDY

Energy Access Explorer: An open access tool to enable data-driven energy planning

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Effectively expanding energy access to unconnected and under-served communities relies on informed energy planning, which requires up-to-date data and fit-for-purpose analytical tools. The Energy Access Explorer is an online, open-source, interactive platform that combines and analyses geospatial datasets on energy supply, demand, and locational factors to identify high priority areas for energy access interventions.

DIRECTED BY

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FUNDED BY

The Rockefeller Foundation

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ACKNOWLEDGEMENTS

The author would like to thank Dimitrios Mentis of the World Resources Institute (WRI) and Emma Laswai of the Tanzania Renewable Energy Association (TAREA) for their contributions to this case study.

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1. Introduction

To effectively support energy access efforts, it's essential that energy planners have up-to-date data and analytics tools that convey key information on the unconnected and under-served populations that they're attempting to reach.[1] Geospatial portfolio planning is considered to be one of the key building blocks necessary to deploy mini grids at scale.[2] Vital elements include information on demand and affordability, as well as distribution of renewable energy resources and enabling infrastructure on the supply side.

Developing systems for data management and analysis can be costly and require specific technical expertise, including programming and Geographic Information System (GIS) skills, resources which are frequently beyond the capabilities of developing country governments (including sub-national governments), local energy companies, and local communities, and non-governmental organisations (NGOs). Not having access to these tools impedes different stakeholders' ability to make informed decisions about policy, programmes, and investments needed to further energy access.

Recognising this, a number of analytical tools have been developed by different companies, with most focusing on supply side data, fewer looking at demand data, and only a small number integrating both supply and demand data. These tools tend to be proprietary and require users to pay for access, thereby limiting access to only those entities with the financial means to cover access fees. This has contributed to governments' historical reliance on proprietary, short-term, consultancy-based solutions for energy planning, which are often expensive and impair governments' ability to develop their own energy planning capabilities.

Limited access to data and analytical tools severely restrains energy access efforts at a time when a staggering 685 million people worldwide remain without access to electricity.[3] To address this situation and to democratise access to data and analytical tools vital for energy planning, the World Resources Institute (WRI) led a collaboration with a range of international and national-level stakeholders to develop the Energy Access Explorer (EAE) tool.[4] This work has been supported by philanthropic funders, notably the IKEA Foundation, who saw the importance of making an open access solution available to inform energy access efforts.

The EAE tool provides open-access, granular data on demand, supply, and location-specific characteristics and an interactive data analytics tool to enable users to customise the analysis based on their interests

1 IEA et al., 2024.
2 WRI, 2019.
3 Cozzi et al., 2022.
4 WRI, 2019.

and needs. Furthermore, it is designed to be easy to use, not requiring users to have technical expertise, specific software, or data storage and processing capacity on their computers. The EAE tool has been collaboratively developed and managed and is not owned by any single organisation; rather, it's a shared resource to support and empower all entities working toward expanding energy access in the countries that the EAE tool covers.

2. Description of the tool

2.1 Purpose

EAE is an online, open-source, interactive platform that combines and analyses geospatial datasets on energy supply and demand and location-specific indicators to create a customised, multi-criteria analysis to identify and prioritise where energy access can be expanded and where socio-economic development can be linked to the needs of the poor. It aims to complement the cost optimisation planning tools of energy planners, providing a bottom-up reflection of energy demand and affordability.[5] It enables energy planning entities, clean energy entrepreneurs, donors, and development organisations to identify high-priority areas for energy access interventions and to determine where funding for energy projects can be used most impactfully.[6] It also functions as a Dynamic Geographic Information System, which enables entities with no or limited GIS capabilities to better store, process, manage, and update data in an easy and cost-effective manner, and it also serves as a data repository of up-to-date information that reduces software requirements and data transaction costs for both data providers and users.[7]

2.2 Datasets

The tool uses energy demand and supply data, as well as broader contextual data, and provides granular data and mapping at the 1 km^2 level, with higher resolutions (down to $250m^2$ or even $100m^2$) being possible for some geographies. The following data are included in the tool, with a more detailed outline of attributes included shown in **Figure 1**:

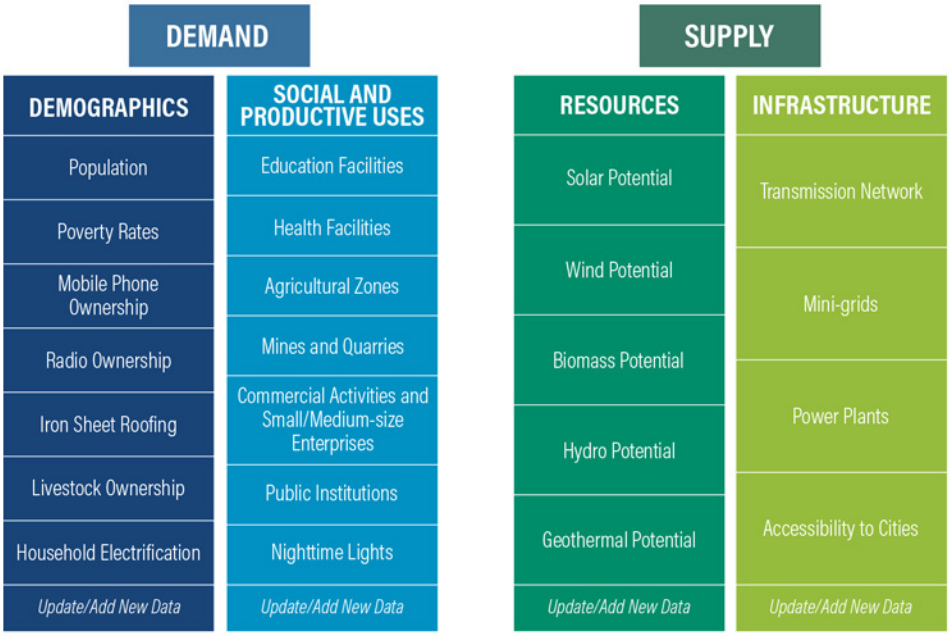
- **Energy demand:** The tool uses data on demographics (population density, poverty rates, asset ownership, etc.) and social and productive uses of energy (schools, health clinics, agricultural activities, etc.) to represent demand for energy services.

- **Energy supply:** It uses current location-specific data on resource availability (solar, wind, and small-scale hydropower) and power infrastructure (transmission network, distribution network, generation network, mini grids) to represent energy supply.

5 WRI, n.d.
6 WRI, n.d.
7 WRI, n.d.

- **Contextual data:** The tool also includes important data on the environment (such as protected areas and forest cover), access to finance (such as the presence of finance service providers), and other elements useful to factor in (such as location of refugee settlements).

Figure 1. Demand and supply attributes included in the EAE tool[8]



When overlaid with one another, these datasets can enable better, more integrated visual analysis that includes all dimensions of energy access to support more effective energy planning, allowing decision-makers to bridge the gap between energy supply and demand to better understand communities that are under-served or do not yet have electricity access.[9]

In the process of developing the EAE tool, different attributes and their relevance for energy planning were discussed and validated in country-level workshops and consultations, ensuring that the data needs of local energy planners and energy businesses were reflected in the tool's development. National-level partners also helped to identify which entities held what data and sense checked whether information appeared to be up-to-date.

The EAE's data standard emphasises the importance of regular and robust data collection and updating, recognising that the tool can only provide informative analysis if the data on which it is based is accurate. Datasets are usually updated once a year or at a minimum every five years (depending on the source/data provider) to ensure that they are recent enough to guide informed decision-making.[10] Many of the datasets are public and are either in the public domain or can be downloaded under a Creative Commons or Open License, while some

8 WRI, 2019, page 4.
9 WRI, 2023.
10 WRI, 2019.

data is hosted and can be analysed on EAE but cannot be downloaded if the original data provider has required this constraint. Information on the sources of all datasets is included in the tool and can be accessed by clicking on the data point's information icon.[11] Certain broader aspects, such as political or ethical considerations, do not form part of the tool and would need to be analysed separately and used in conjunction with the EAE tool.[12]

2.3 Functionality

Customers can customise their analysis and geographies of focus based on their own criteria and through making use of the following possible functions:

- Selecting and overlaying different datasets.
- Applying buffer zones or filters to the data by editing values for inclusion, e.g., restricting data selection to within 5-10km of agricultural markets or within 1-5km of distribution lines.
- Ordering of data layers can be changed according to preference.
- Adjusting a layer's opacity to change emphasis or perspective.
- Altering the weight of specific data layers to increase their significance in the analysis, to place greater weight on some data points over others.
- Obtaining high resolution information for a certain location.
- Validating location-specific information by comparing the cell value with up-to-date satellite imagery, and datasets can be overlaid with satellite images.

Based on the user's selected datasets and filters, EAE produces an analysis that (i) maps areas that meet the stipulated filters, (ii) gives high-level figures on area share and population share that meet the stipulated filters (categorised from low to high potential), and (iii) identifies the highest priority areas for energy interventions.

11 WRI, 2019.
12 WRI, 2019.

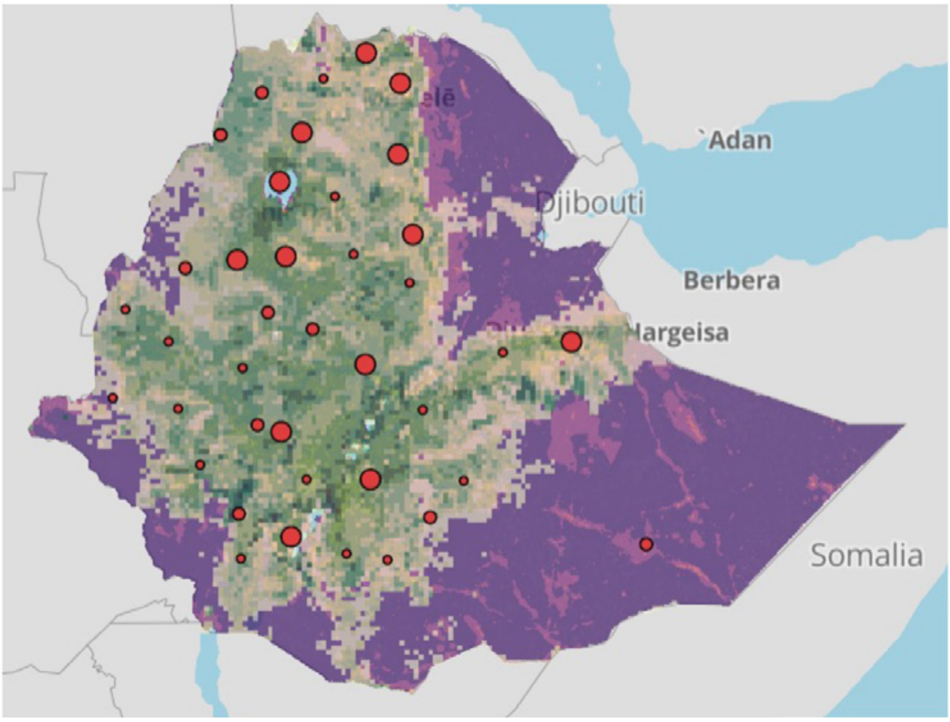
3. Demonstration example: Ethiopia

The functionality of the EAE tool is demonstrated below through a simplified example using data from Ethiopia. The Ethiopia EAE tool is a collaboration with the Ethiopian Ministry of Water and Energy and the Ethiopia EAE Working Group.

3.1 Select demand-side datasets

In this example, population density, Relative Wealth Index, crop growing areas, and markets for agricultural produce and livestock have been selected from the possible demand side datasets. The mapping produced is shown in **Figure 2** below, with no filters applied on values and all data points set at 3 out of 5 on importance.

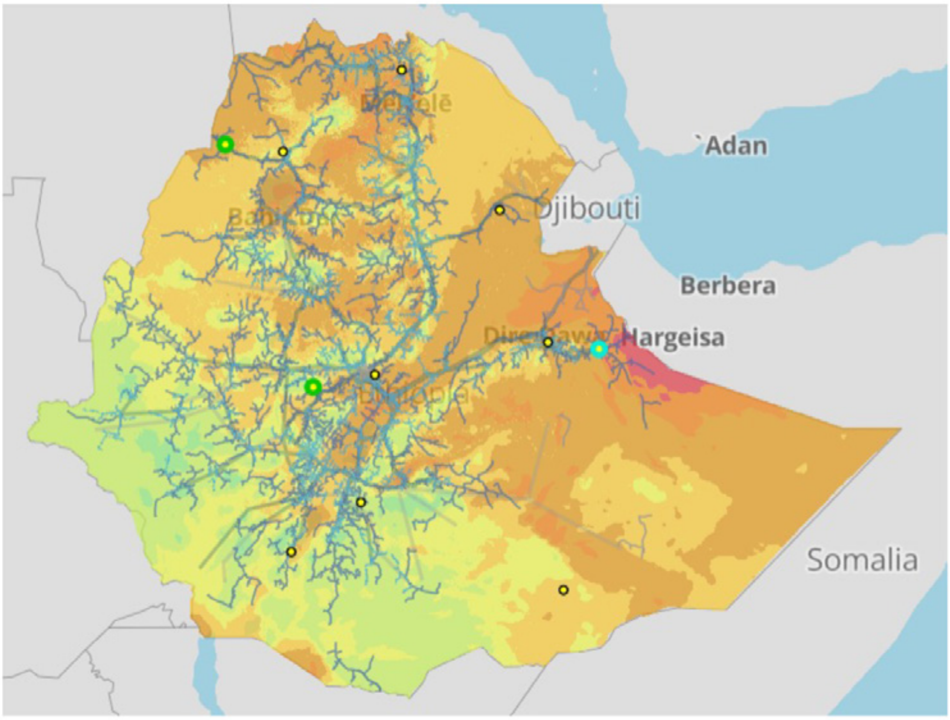
Figure 2. Demand-side mapping: Population density, Relative Wealth Index, agricultural crops, and markets for agricultural produce and livestock



3.2 Select supply-side datasets

In this example, Global Horizontal Irradiance, transmission lines, distribution lines, solar PV and hybrid solar-diesel mini grids have been selected from the possible supply side datasets. The mapping produced is shown in **Figure 3** below, with no filters applied on values and all data points set at 3 out of 5 on importance.

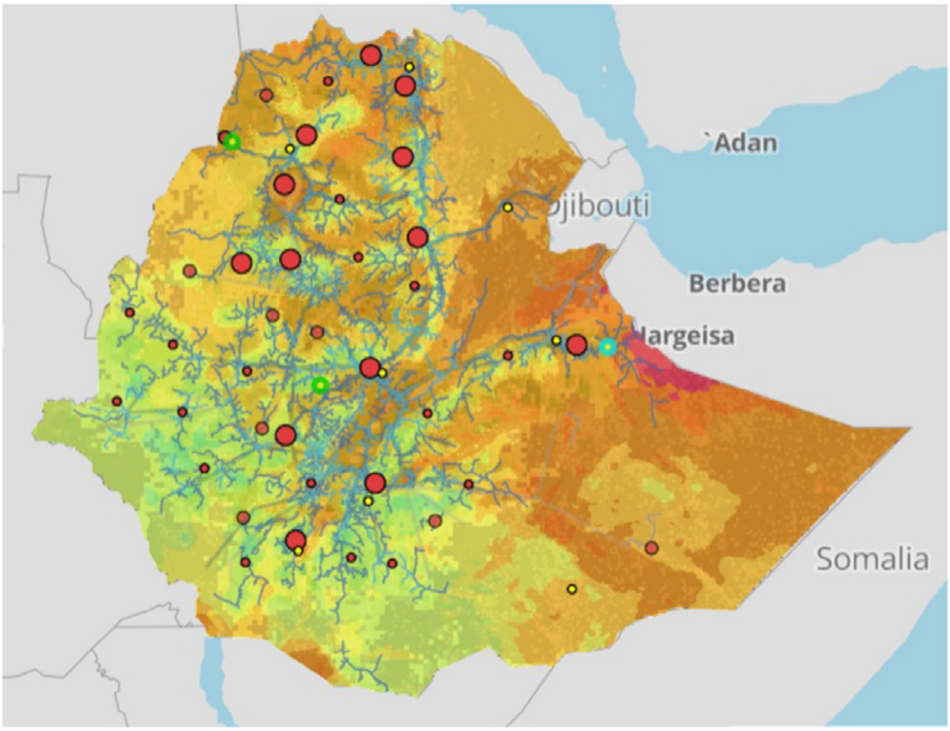
Figure 3. **Supply-side mapping: Global Horizontal Irradiance, transmission lines, distribution lines, and mini grids (solar and solar-diesel hybrid)**



3.3 Overlay demand and supply datasets

The selected demand and supply datasets can then be overlaid with one another, producing the mapping shown in **Figure 4**. It is possible to further customise the analysis to include filters on data values and adjust the weighting given to any specific data points, e.g., to set filters on close proximity to schools and health care facilities, high population density, and areas that are not served by existing distribution systems. The area and population under analysis (i.e., that meet the criteria set on e.g., filters) will automatically adjust based on user selections.

Figure 4. Demand and supply datasets (with data points noted above) overlaid on one another



4. Analysis

Once the chosen datasets have been overlaid and the desired filters applied to data values, the EAE tool offers an analysis view that represents a customised, high resolution, multi-criteria analysis based on the data and filters selected. For each km^2 on the map, the tool calculates four indices:

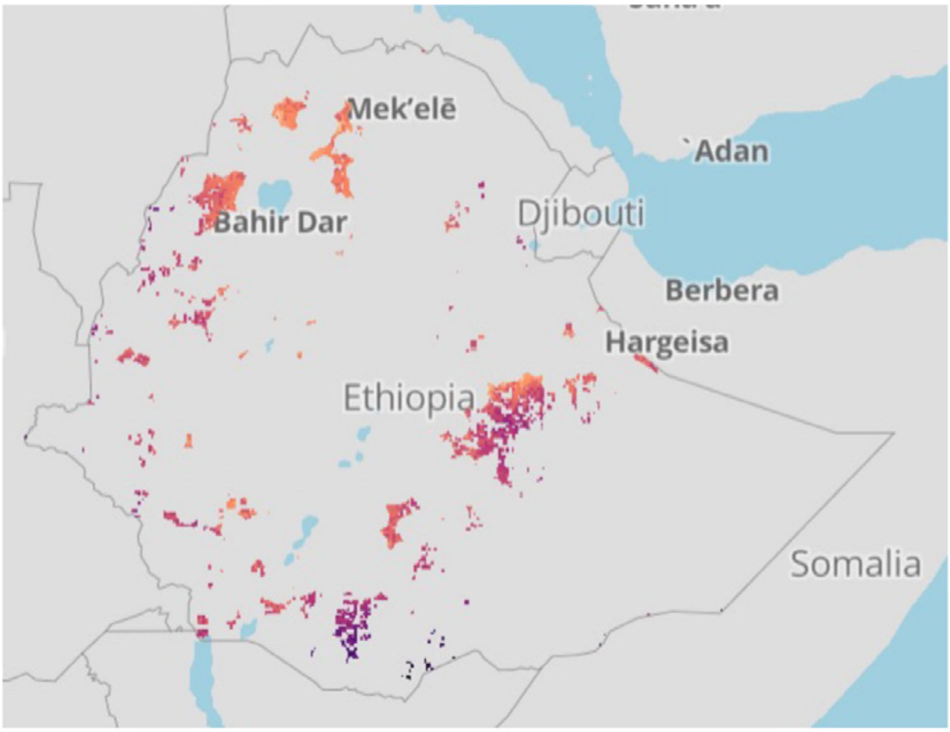
- **Energy Access Potential Index** – indicates high-priority areas where access to energy should be expanded.
- **Demand Index** – indicates areas of high demand.
- **Supply Index** – indicates areas of high potential supply.
- **Assistance Need Index** – identifies areas where financial assistance is needed the most.

For each index, values range from low to high potential.

4.1 Mapping areas that meet selected data and filters

The EAE Analysis setting then maps the areas that satisfy the filters placed on the datasets – in this case, areas within 200km of agricultural markets and over 20km away from distribution lines. These are relatively strict filters, intended in this example to show the tool's ability to identify areas that meet narrow criteria. The mapping results can be seen in **Figure 5** below.

Figure 5 EAE analysis showing the locations that satisfy the set example criteria



4.2 Area and population analysis

The EAE analysis also provides high-level snapshots of each of the indices, displaying the area and population that meets selected data and filters as both an absolute number and as a percentage of total area and total population of the country. The indices for the example analysis are shown in **Figure 6**. As noted above, relatively strict filters were applied for the example analysis, resulting in area and population values of 49,222km^2 and 2,260,054 people, respectively, that fulfil the set criteria, being categorised as low to high potential as shown in **Figure 7**.

Figure 6 EAE indices showing area and population share in areas that satisfy set criteria

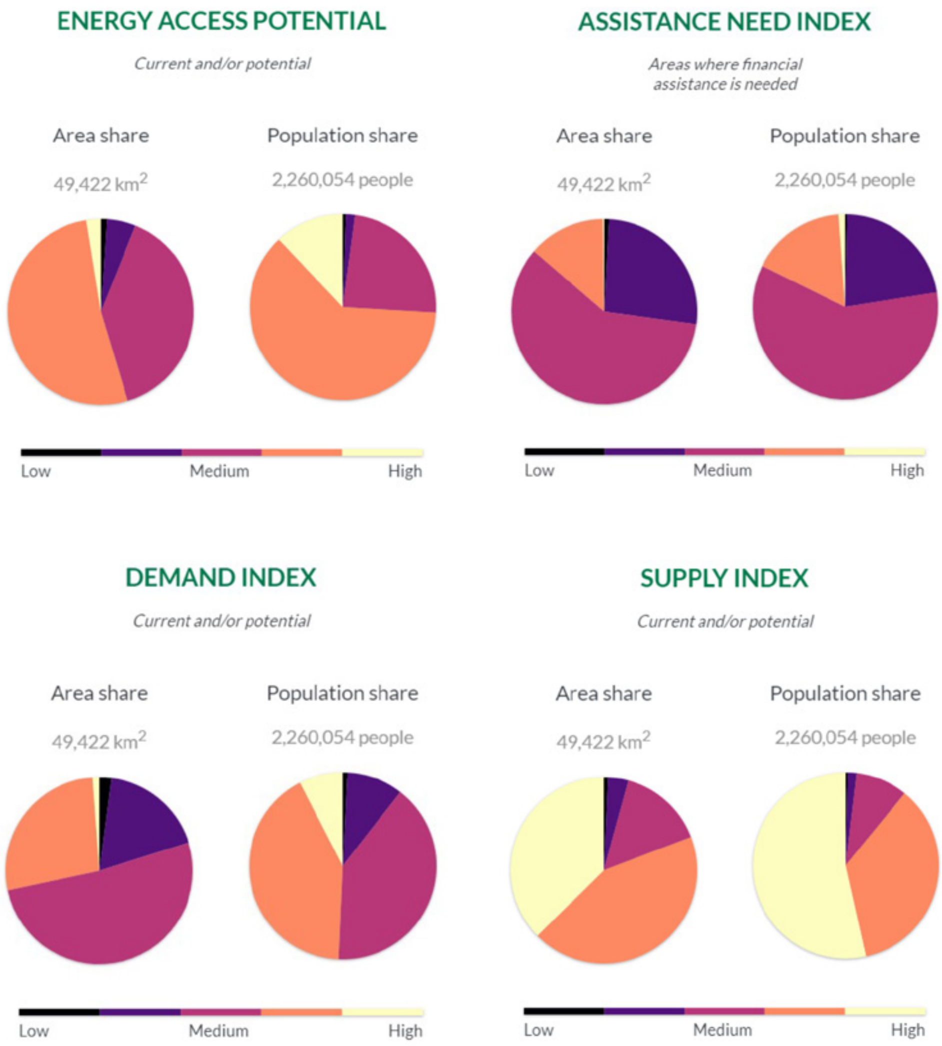


Figure 7 Area share and population share falling into categories low to high potential

Share of area for each Index in km²

	low	low-med	medium	med-high	high
Energy Access Potential	12,325	35,880	538,303	1,401,957	271,589
Demand Index	18,700	219,709	907,651	943,023	170,971
Supply Index	8,244	35,106	203,336	803,962	1,209,406
Assistance Need Index	8,203	500,124	1,352,385	373,806	25,536

Share of population for each index

	low	low-med	medium	med-high	high
Energy Access Potential	12,325	35,880	538,303	1,401,957	271,589
Demand Index	18,700	219,709	907,651	943,023	170,971
Supply Index	8,244	35,106	203,336	803,962	1,209,406
Assistance Need Index	8,203	500,124	1,352,385	373,806	25,536

4.3 Identification of Top Locations

The EAE analysis function also identifies high-priority locations, with the Top Locations tool directing users to the locations with the highest energy access potential, based on the data layers selected and filters applied. The high-priority locations identified in the example analysis for Ethiopia, based on both Demand Index and Supply Index information, are shown in **Figure 8** and **Figure 9** below. The tool also identifies areas scoring high on the Assistance Need Index, as shown in **Figure 10**, being areas where external financing is needed to support expanding energy access.

Figure 8 High priority locations for energy interventions (Demand Index information)

#	Regions	Zones	Woredas	Long/Lat	Population density ppl/km²	Relative Wealth Index RWI	Markets km (proximity to)	Crops Metric ton
1	Amhara	Central Gondar	Tegede	[37.3846, 13.3557]	613	0	1	6917
2	Tigray	Western	Tsegede (TG)	[37.3846, 13.3644]	671	0	2	6917
3	Tigray	Western	Tsegede (TG)	[37.3846, 13.3819]	557	0	4	6917
4	Tigray	Western	Tsegede (TG)	[37.3756, 13.3906]	544	0	5	6917
5	Tigray	Western	Tsegede (TG)	[37.3846, 13.3906]	596	0	5	6917
6	Tigray	Western	Tsegede (TG)	[37.3756, 13.3994]	528	0	6	6917
7	Tigray	Western	Tsegede (TG)	[37.3846, 13.3994]	553	0	6	6917
8	Tigray	Western	Tsegede (TG)	[37.3935, 13.4081]	516	0	7	6917
9	Tigray	Western	Tsegede (TG)	[37.3935, 13.3994]	565	0	6	6917
10	Tigray	Western	Tsegede (TG)	[37.4025, 13.4081]	517	0	7	6917
11	Tigray	Western	Tsegede (TG)	[37.3756, 13.4693]	616	0	12	1698
12	SNNP	Konso	Karat Zuria	[37.6271, 5.3140]	516	0	21	454
13	Amhara	North Gondar	Beyeda	[38.4446, 13.1283]	224	0	< 1	4159
14	Amhara	North Gondar	Beyeda	[38.4446, 13.1196]	157	0	1	4159
15	SNNP	Konso	Karat Zuria	[37.6361, 5.3229]	750	0	22	68
16	SNNP	Konso	Karat Zuria	[37.6361, 5.3140]	971	0	22	454
17	Amhara	North Gondar	Beyeda	[38.4356, 13.1196]	153	0	1	4159
18	SNNP	Konso	Karat Zuria	[37.6361, 5.3050]	717	0	22	454
19	SNNP	Konso	Karat Zuria	[37.6451, 5.3229]	1018	0	23	68
20	SNNP	Konso	Karat Zuria	[37.6451, 5.3140]	1161	0	23	454

Figure 9 High priority locations for energy interventions (Supply Index information)

#	Regions	Zones	Woredas	Long/Lat	Global Horizontal Irradiation kWh/m²	Minigrids km (proximity to)	Transmission lines km (proximity to)	Distribution lines km (proximity to)
1	Amhara	Central Gondar	Tegede	[37.3846, 13.3557]	2093	5	60	25
2	Tigray	Western	Tsegede (TG)	[37.3846, 13.3644]	2078	4	61	26
3	Tigray	Western	Tsegede (TG)	[37.3846, 13.3819]	2071	3	62	28
4	Tigray	Western	Tsegede (TG)	[37.3756, 13.3906]	2078	3	64	28
5	Tigray	Western	Tsegede (TG)	[37.3846, 13.3906]	2069	2	63	29
6	Tigray	Western	Tsegede (TG)	[37.3756, 13.3994]	2086	3	65	29
7	Tigray	Western	Tsegede (TG)	[37.3846, 13.3994]	2076	2	64	29
8	Tigray	Western	Tsegede (TG)	[37.3935, 13.4081]	2087	1	64	31
9	Tigray	Western	Tsegede (TG)	[37.3935, 13.3994]	2068	1	63	30
10	Tigray	Western	Tsegede (TG)	[37.4025, 13.4081]	2080	1	63	31
11	Tigray	Western	Tsegede (TG)	[37.3756, 13.4693]	2189	9	71	28
12	SNNP	Konso	Karat Zuria	[37.6271, 5.3140]	2074	27	79	20
13	Amhara	North Gondar	Beyeda	[38.4446, 13.1283]	2179	1	43	25
14	Amhara	North Gondar	Beyeda	[38.4446, 13.1196]	2184	1	43	24
15	SNNP	Konso	Karat Zuria	[37.6361, 5.3229]	2075	28	78	21
16	SNNP	Konso	Karat Zuria	[37.6361, 5.3140]	2074	28	79	21
17	Amhara	North Gondar	Beyeda	[38.4356, 13.1196]	2170	< 1	44	24
18	SNNP	Konso	Karat Zuria	[37.6361, 5.3050]	2074	28	80	21
19	SNNP	Konso	Karat Zuria	[37.6451, 5.3229]	2075	29	78	20
20	SNNP	Konso	Karat Zuria	[37.6451, 5.3140]	2074	29	79	20

Figure 10 Locations with highest scores on Assistance Need Index

#	Regions	Zones	Woredas	POI	Long/Lat	EAI	ANI	Demand	Supply
1	Amhara	Central Gondar	Tegede		[37.3846, 13.3557]	high	med-high	high	high
2	Tigray	Western	Tsegede (TG)		[37.3846, 13.3644]	high	med-high	high	high
3	Tigray	Western	Tsegede (TG)		[37.3846, 13.3819]	high	med-high	high	high
4	Tigray	Western	Tsegede (TG)		[37.3756, 13.3906]	high	med-high	high	high
5	Tigray	Western	Tsegede (TG)		[37.3846, 13.3906]	high	med-high	high	high
6	Tigray	Western	Tsegede (TG)		[37.3756, 13.3994]	high	med-high	high	high
7	Tigray	Western	Tsegede (TG)		[37.3846, 13.3994]	high	med-high	high	high
8	Tigray	Western	Tsegede (TG)		[37.3935, 13.4081]	high	med-high	high	high
9	Tigray	Western	Tsegede (TG)		[37.3935, 13.3994]	high	med-high	high	high
10	Tigray	Western	Tsegede (TG)		[37.4025, 13.4081]	high	med-high	high	high
11	Tigray	Western	Tsegede (TG)		[37.3756, 13.4693]	high	med-high	high	high
12	SNNP	Konso	Karat Zuria		[37.6271, 5.3140]	high	med-high	high	high
13	Amhara	North Gondar	Beyeda		[38.4446, 13.1283]	high	medium	high	high
14	Amhara	North Gondar	Beyeda		[38.4446, 13.1196]	high	medium	high	high
15	SNNP	Konso	Karat Zuria		[37.6361, 5.3229]	high	med-high	high	high
16	SNNP	Konso	Karat Zuria		[37.6361, 5.3140]	high	med-high	high	med-high
17	Amhara	North Gondar	Beyeda		[38.4356, 13.1196]	high	medium	high	high
18	SNNP	Konso	Karat Zuria		[37.6361, 5.3050]	high	med-high	high	med-high
19	SNNP	Konso	Karat Zuria		[37.6451, 5.3229]	high	med-high	high	high
20	SNNP	Konso	Karat Zuria		[37.6451, 5.3140]	high	med-high	high	med-high

All analysis results, together with the parameters selected for the analysis, can be downloaded in GIS format or as a full report that can be exported in pptx format to allow further editing by users.

As has been demonstrated above, by using the EAE tool, a user can identify the best locations to focus their energy access efforts to bring energy to unconnected people. This would generally be in areas that are (i) unserved by electricity, (ii) have a high population density, (iii) high solar potential, and (iv) relatively high average income.

5. Development and ongoing management of the tool

While WRI led on the development of the tool, it was a highly collaborative process and ongoing data management and data governance is owned by various local working groups, ensuring that the tool is effectively owned by stakeholders at the national and sub-national level.

The EAE tool was initially developed in Kenya, Uganda, and Tanzania, with WRI working with local government and non-governmental entities to identify functions that reflect user requirements and datasets that would need to be collected and built into the platform. This involved undertaking the following:[13]

- Literature review around the data and methods used for geospatial energy planning and mapping.
- Energy access mapping survey to gather information on the quality, availability, and utilisation of geospatial data in energy access mapping and to capture information on what a range of stakeholders (including civil society, government, development finance institutions, and academia) found useful about existing energy access mapping tools and the data and analysis gaps that they faced in their energy access efforts.
- Engaging with local stakeholders and gathering their inputs to ensure that EAE is relevant to their contexts and able to provide the data and analysis needed for their energy planning purposes.

EAE is now available for another five countries, namely Ethiopia, Zambia, Nigeria, India, and Nepal, and there are additional countries that will be launched in coming months.

Updating datasets is the responsibility of local entities and each geography (be it the national or sub-national level) establishes its own Energy Access Working Group to coordinate on data management and data governance. Working group members comprise key data providers, including government departments and line ministries, with the roles and responsibilities of each member being clearly outlined in each working group's framework document.

On the data governance side, clear roles and responsibilities are assigned to each working group member, with the working group's framework document providing a clear understanding of what data each member is responsible for updating and at what frequency. As working groups are established for each geography, data governance happens simultaneously at different geographical levels in a country.

13 WRI, 2019.

For example, in Kenya, each county is responsible for developing their own energy plan, which is to be updated every three years and integrated into the national plan, resulting in both county and national governments having their own working groups.

Working groups meet on a quarterly basis to exchange data in a standardised format. This practice builds trust between different data providers and helps to overcome obstacles of government bureaucracy, enabling data to be unlocked that data providers may otherwise be reluctant to share with one another.

On the data management side, data providers upload both updated datasets and meta data (which provides information on the data) through the tool's backend. GIS processes are automated at the tool's backend to ensure that data providers do not need technical expertise to update data, therefore minimal time and resources are needed to maintain and keep data up to date.

6. The perspective of a national-level partner in the EAE initiative

The Tanzania Renewable Energy Association (TAREA) is WRI's chief national-level partner for the EAE tool in Tanzania. TAREA is an industry association for renewable energy companies in Tanzania and represents the interests of these private sector entities in Tanzania.

TAREA's experience with the EAE tool should be seen, at least in part, in the context of previous energy data efforts in Tanzania. Prior to the EAE tool being developed, the World Bank had developed a Mini Grid Data Portal for Tanzania, with a consultant being hired to develop the portal, upload data to it, and hand over the portal to the Rural Energy Agency for ongoing maintenance. However, within two years, the portal's functionality began to decline, data was not being updated, and there was a lack of clarity about who was responsible for its maintenance. Eventually, access to the portal ceased, seemingly due to the subscription fee for the portal's hosting not having been paid. Renewable energy companies and government energy planners had lost access to their main energy planning tool.

Therefore, when WRI began to develop a new planning tool, TAREA was willing to support the effort, to enable their members to regain access to the energy data needed to inform their business decisions and expansion efforts. This time around, greater emphasis was placed on ensuring government ownership of the platform, that the tool would be maintained over time, and that it would be available for public use.

TAREA worked with WRI to ensure that data points aligned with industry needs, that different holders of data were consulted and persuaded to contribute their data to the EAE tool, and that out-of-date data was replaced with more recent data. TAREA also engaged its members to identify new mini grids that needed to be included in the data, together with mini grid information such as GPS coordinates, energy source, generation capacity, communities served, etc., as well as to identify mini grids that had stopped operating after a period of tariff-setting disputes with the Tanzanian government had led to a number of developers withdrawing from the country.

The Tanzania EAE Working Group comprises a range of government and industry stakeholders, who meet quarterly to verify data and approve data sharing, and also communicate with one another on an ongoing basis via informal channels. While some government data providers were initially concerned about sharing their data, TAREA outlined to them how valuable their data would be for energy planning efforts and fears have been allayed through continuous collaboration on the initiative.

The EAE Tanzania platform now has 70 datasets, including data on mini grids, which has been integrated into the platform. The mini grid database was collaboratively compiled by a number of private and public sector actors, following agreed data standards, and represents an example of a collaboration between actors and sectors to build a data resource that supports energy planning and enables clean energy companies to better target their energy access efforts. The mini grid dataset contains information on each mini grid location, name, system capacity, energy source technology, and ownership. It shows that, of the 135 mini grids currently recorded in the dataset, most of them are solar (55.6%), followed by hydropower (23.0%) and that 70% of the systems are privately owned. Mini grid dataset information will be periodically updated and in future will include additional attributes such as size of population served, communities/villages served, and connection/operating status.

Use of the EAE Tanzania tool has become quite common – TAREA members and other mini grid developers are able to use the tool to inform decisions around where to expand energy access efforts and government officials are better able to advise on policy development and budget setting. With the EAE tool providing the most comprehensive and recent data available on Tanzania's energy access status, both TAREA and government entities also have to deal with fewer broad queries from investors and developers, allowing them to focus on more critical tasks.

TAREA and WRI are now collaborating on the second phase of the EAE tool's development, which involves incorporating more detailed data on the productive use of energy (PUE) across Tanzania. This will include mapping PUE stakeholders across the country, identifying economic activities taking place, understanding what energy is currently being used and where activities could benefit from energy access or cheaper or more reliable energy supply.

7. Successes to date

When the EAE tool was first developed, there were hopes that it would reach 15 institutional users. Today, it has had more than 23,000 users to date, with almost half of users being women. Until the EAE tool, most of these users did not have access to the granular data they needed for their energy planning purposes, and many of them had not previously been included in energy planning conversations. Access to the EAE tool has changed this.

WRI received a 2023 GEO SDG award from the Group on Earth Observations (GEO) and the Earth Observations for Sustainable Development Goals Initiative (EO4SDG). The EAE tool received the Civil Society Award, which "recognises the productivity, innovation, and exemplary efforts in the use of Earth observations to support sustainable development."[14] In conferring the EO4SDG award to EAE, it was noted that EAE is achieving real impact by enabling energy solutions to reach further, being a critical tool to help energy planners (be they governments, utilities, companies, and development organisations) to identify where households, schools, and clinics are being left behind.[15]

8. Lessons learned

Effectively expanding energy access to reach the hundreds of millions of people who still lack access to electricity requires energy planners – policymakers, energy companies, development organisations, local communities, and others – to have access to accurate data and informative data analytics tools to guide their efforts. These essential resources should be available to everyone seeking to advance energy access, not just to those entities who have the technical expertise needed to build and operate their own systems or who have the financial resources to pay for proprietary data and consulting services.

In this context, the successes of EAE highlights certain key lessons:

1. **Open-access data and analytical tools are of critical value to users.** The EAE tool's provision of open-access, granular data on demand, supply, and location-specific characteristics and its interactive data analytics tool that enables users to customise analysis based on their interests and needs are critical resources in the energy planning space, making an important contribution to the democratisation of data and data analytics for energy planning. Such an initiative is of fundamental importance for users who lack the resources needed to pay for proprietary data or analytical tools, making it possible for everyone to actively participate in energy planning and energy access expansion efforts in their countries.

14 WRI, 2023.
15 WRI, 2023.

2. **Platform expansion or customisation and updating data should need minimal resources.** The EAE platform has been built in such a way as to enable data to be updated by data providers and the platform to be expanded to include new datasets or otherwise customised with minimal resource requirements. These processes have been simplified and do not require any specialist expertise. This ensures that ongoing data management and any further platform developments are much easier and less costly compared to proprietary solutions.

3. **Local ownership of the EAE tool is fundamentally important.** The EAE tool is a co-led, co-created data initiative with local partners and data providers at the core of the initiative. It has been developed through close and continuous engagement with local stakeholders to ensure the relevance of the data and analytics and that it reflects the needs of energy planners on the local level. As a result, it has a higher chance of being utilised by local stakeholders to inform decision making. Additionally, having working groups at each geographic level ensures coordination across sectors, thematic areas, and government line ministries and departments, reducing inefficiencies and bureaucracy and facilitating joint data sharing.

4. **An effective sustainability plan is essential.** The EAE tool was developed with a sustainability plan in place from the beginning, reflected clearly in a platform that requires minimal time and expertise for data management and platform development and where country platforms are jointly owned and managed by local data providers. Local working groups are responsible for data management and can adjust the platform to include new datasets or customisation possibilities based on evolving local needs and emerging information. While WRI played a key role in enabling the EAE tool's development, it did so with long-term local ownership, management, and usage in mind.

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