IEA-Power Africa Data-Driven Electrification in Africa Webinar

Q&A

International Energy Agency

Data Utilization and Analysis

1. *How will the new or more granular data contribute to the next Africa Energy Outlook, and what new analyses and insights are anticipated?*

   The insights derived from the model are expected to play a crucial role in the next Africa Energy Outlook and Africa-related work, particularly by enriching our least-cost electrification strategies. When we applied the model to areas with electricity access in the initial countries under study, it unveiled significant discrepancies between actual electricity usage and prior expectations. Notably, in numerous buildings, the electricity consumption significantly trailed the established benchmarks for basic household electricity needs. Our investigations in Ghana, Senegal, and Uganda showed that a sizable segment of the population, despite being electrified, consumed electricity below the thresholds defined by the International Energy Agency's (IEA) basic and extended energy consumption bundles. As we expand the analysis to include additional countries, we anticipate further developing these insights. For an in-depth understanding, we encourage consulting our commentary.

2. *In what ways is OpenStreetMap (OSM) data utilized in your project?*

   We referenced OpenStreetMap (OSM) data for ground truth validation. However, it quickly became evident that, while OSM provides satisfactory coverage and accuracy in specific locales, its granularity is insufficient across our pilot countries. As a result, we chose to integrate Google's and Microsoft's building footprint datasets for a more comprehensive approach..

3. *Is the Ookla dataset on internet connection speed available comprehensively for the entire country?*

   Ookla's dataset displays uneven coverage throughout the continent, primarily attributed to the sporadic internet connectivity in Africa. This variation arises because the dataset is built on crowd-sourced measurements of internet speeds. Despite these limitations, we have regarded Ookla's dataset as a reliable and thorough representation of internet speeds across our pilot countries.

4. *How can we propose the inclusion of GIS model into your catalog?*

   The GIS Catalogue for Energy Planning is set to broaden its offerings with new models and datasets in future updates. Should you wish to suggest a product for potential inclusion, please reach out to us at GIS@iea.org.

5. *How do you ensure the accuracy of energy estimates per building, and which metrics are used to characterize the energy consumption of a building, including the potential role of street view maps?*

   The estimation's accuracy is validated by dividing the dataset into training and testing sets, and then evaluating the outcomes against the test set. For a more comprehensive insight, please refer to the methodology section.

6. *Have you considered both historical and current-year energy demands for each building in your analyses?*

   Yes, we have incorporated both historical and current-year energy consumption data for each building in our analysis. For further details, please consult the methodology section.

7. *How are load forecast patterns adjusted for climate and regional specificities?*

   The model has been trained on a diverse set of samples representing various regions, each with its unique climate, economical and social characteristics. This approach ensures that the load estimation patterns

are accurately adjusted for regional and climatic specificities. For further details, please consult the methodology section.

8. *Is it possible to estimate demand without direct observation of area activities?*

   The fundamental constraint of a remote sensing model lies in its capacity to only assess the exterior features of buildings. To bridge this gap, we've incorporated other geo-referenced datasets that act as indicators of economic activity, such as internet speeds, aiming to infer the activities occurring within buildings. Observations of a building's immediate environment can also provide insights into economic activities not directly visible, for example, a barn adjacent to cultivated land hints at agricultural operations.

9. *How does the data from utility companies account for households' use of alternative power sources alongside the grid?*

   A current limitation of the model stems from its reliance on ground truth data sourced solely from local utility companies. As a result, the model is unable to account for alternative power sources, like diesel generators or home solar systems, that may be used in conjunction with a grid connection.

Data Sources and Methodology

11. *How can new countries be added to the database?*

    For a new country to be included, it is vital to provide georeferenced electricity meter data. This data should encompass both grid-connected buildings and those relying on off-grid solutions, including minigrids and solar home systems, and can come from local utilities or relevant stakeholders. This information serves as crucial ground truth data for our mapping efforts. If you have access to such data and are keen on facilitating analysis for a new region, please contact us at GIS@iea.org.

12. *How does the model differentiate or specify electricity access by energy type?*

    The current version of the model does not distinguish between types of electricity access—such as grid connections, mini-grids, or home solar systems—primarily due to our reliance on data from utilities as the main data source. By collaborating with additional data providers and devising tailored methodologies, we aim to enhance the model's capabilities to differentiate among these access types, thereby enriching our analysis and understanding of electricity access.

13. *How are building objects linked to administrative entities for electrification projects?*

    Buildings are uniquely pinpointed using their latitude and longitude coordinates. Although it hasn't been applied in this instance, the integration of amenities offered by a building—like healthcare services, educational institutions, or government facilities—can be achieved by performing a spatial join with OpenStreetMap data on a standard GIS platform. This process would enable the association of specific services and facilities with their respective building locations, enhancing the richness and utility of the dataset.

Collaborations and Contributions

14. *How can individuals and organizations get involved with your projects, specifically in terms of collaboration?*

    All requests for collaboration can be directed to GIS@IEA.org.

Access and Updates to Resources

18. *Is the IEA catalogue accessible for free, or is it a premium service?*

The GIS Catalogue for Energy Planning is openly accessibly free of charge, however the catalogue itself consists of both open-acces and proprietary models and datasets.

19. *Are electrification shapefiles for specific areas of interest available upon request?*

    The Open Energy Maps platform currently allows for users to download GeoJSON layers of electricity access and electricity demand estimates for Senegal, Ghana, and Uganda. GeoJSON files are readily convertible into a Shapefile format.

Expansion and Coverage

22. *What is the current country coverage of your project, and are there plans for further expansion, including the addition of countries like Nigeria and Kenya?*

    The pilot countries for this project are Ghana, Senegal, and Uganda. Future updates will expand geographic coverage and the next three countries to be added are likely to be Kenya, Rwanda and South Africa.

Utilization and Capacity Building

24. *What are the key capacity-building needs for national energy planners to effectively use these tools and data?*

    Key capacity-building needs for national energy planners to effectively utilize these tools and data include mastering digital GIS tools such as ArcGIS, QGIS, and programming languages like Python or R. Additionally, there is a significant need for knowledge in GIS data storage and management to ensure efficient handling and utilization of geospatial data. Resources and training from our partners such as Climate Compatible Growth, KTH Royal Institute of Technology, World Bank, SE4All, and the World Resources Institute can provide valuable support in these areas. Some specific resources to consider include:

    - Geospatial data management for energy access modelling and planning
    - OnSSET/The Global Electrification Platform
    - Geospatial clean cooking access modelling using OnStove
    - Energy access explorer: data-driven, integrated and inclusive energy planning