Picturing access to energy for all in sub-Saharan Africa

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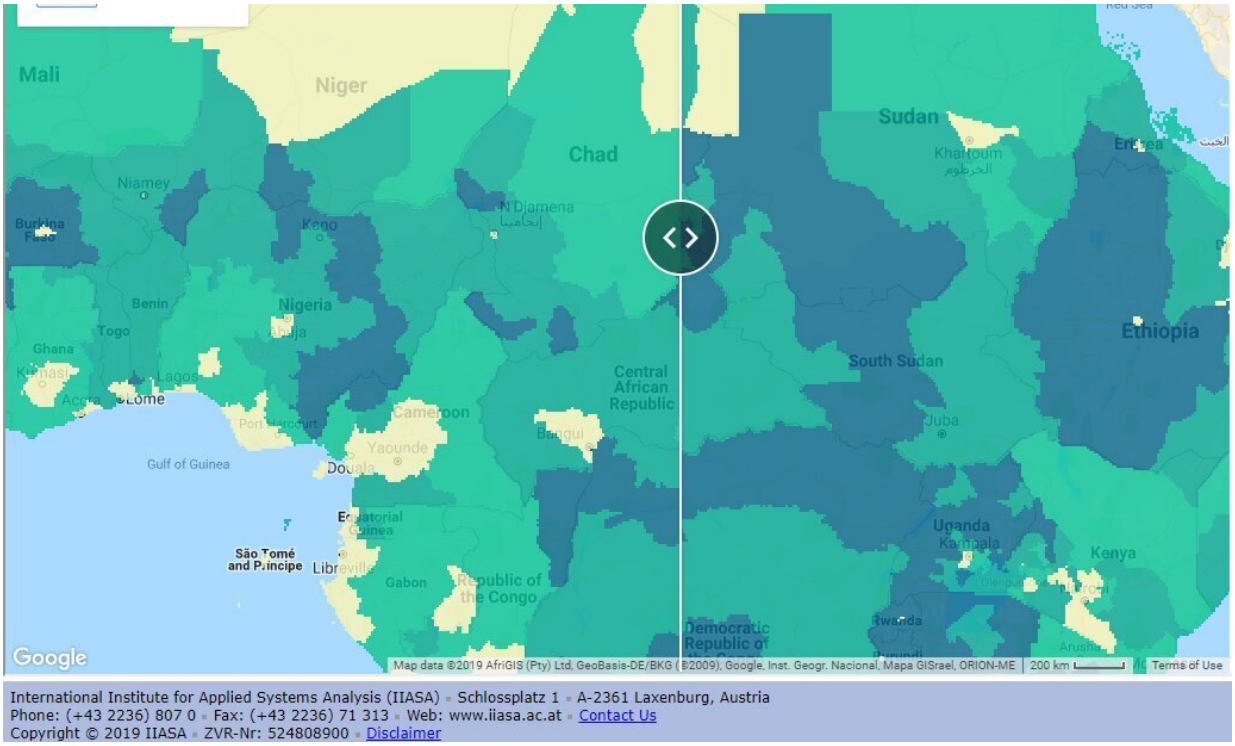

Screenshot: GDESSA - Gridded Dataset for Electrification in Sub-Saharan Africa interface. http://gdessa.ene.iiasa.ac.at/gdessaInterface.html

The U.N.'s Sustainable Development Goal 7 (SDG 7) aims to ensure access to affordable, reliable, sustainable and modern energy for all populations by 2030. Access to electricity services is, of course, a key priority under this goal, particularly due to the strong interconnections it

has with other development objectives. Sub-Saharan Africa remains the region with the largest electricity access deficit in the world, with a projected nine out of 10 people living without electricity in 2030, despite progress. Planning for expanding electricity infrastructure and prioritizing financial support in sub-Saharan Africa requires up-to-date information on the status of electricity access and use at sub-national scales. Official statistics for tracking and monitoring developmental indicators, however, usually only tell a very limited story, and care is needed to interpret them. Achieving this ambitious goal globally therefore presents significant challenges.

In their study published in the journal *Scientific Data*, researchers from IIASA and the Future Energy Program at the Fondazione Eni Enrico Mattei (FEEM) in Italy examined the precision with which nighttime satellite images can be converted into spatially detailed maps of electricity access in sub-Saharan Africa. They further investigated whether remotely sensed data on light intensity could provide a proxy for electricity access quality beyond a binary measure of access and if it could help to identify regions that lack access to electricity, as well as hotspots where progress in terms of providing access is stalled or regressing. The team's satellite-derived dataset provided an accurate prediction of not only where people have access to electricity and where not, but their measure of light intensity could also provide an accurate proxy for the amount of residential electricity consumption in a particular area.

"We were able to use our derived indicators to track, within each country, progress toward electricity access over the last five years and where critical hotspots of people without access or high latent electricity demand remain," explains Giacomo Falchetta, a researcher at FEEM and lead author of the study. "The results revealed large inequalities in progress towards universal access to electricity, both across and within nations in the region."

According to the researchers, some countries show robust improvement in electricity access in just five years, while others show a stagnant or even deteriorating situation, particularly in areas where population growth is taking place at a faster rate than provision of access to electricity. While progress in terms of expanding electricity infrastructure in urban areas has generally been more rapid than in rural areas, the results indicate that some urban areas still experience electricity access deficits. These trends suggest that changes in the status of electricity access are potentially closely related to internal as well as international migration flows on the African continent and beyond. Moreover, the study provides an open-access, updatable, replicable proof-of-concept of how satellite derived data can be used to track and monitor progress towards development objectives like universal electricity access. It can aid in planning and prioritizing support for infrastructure expansion, and it may also substantially lower public costs for data collection.

The published open access dataset resulting from this work can support both policymakers and private firms in their investment decisions to prioritize financial support and plan electricity infrastructure expansion projects in the region. The dataset can of course also be used by the research community for electrification modeling and poverty and vulnerability assessments, and it can raise awareness among civil society on the issue of electricity access in sub-Saharan Africa.

"Our dataset provides a useful complement that is easily updatable and can help assess progress with providing electricity access, as well as inequalities in electricity use at a fine sub-national scale. This can be an invaluable input to efforts aimed at meeting SDG7," concludes study coauthor Shonali Pachauri, a researcher with the IIASA Energy Program.

A dynamic interface to browse and download the data can be accessed

on the IIASA website.

More information: Falchetta G, Pachauri S, Parkinson S, & Byers E (2019). A high-resolution gridded dataset to assess electrification in sub-Saharan Africa. *Scientific Data*, DOI: 10.1038/s41597-019-0122-6