

## Energy access and forced migration

### Planning sustainable energy solutions for refugee settlements in Sub-Saharan Africa

Department: Sustainable Development

Research group: Energy and Resources

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#### Project description

Ensuring access to affordable, reliable, and modern energy to forcibly displaced populations living in settlements is essential to running water, sanitation and hygiene facilities, to powering communal and private spaces (schools, health centres, homes, and businesses) and is part of the 'leave no-one behind' agenda cutting across all the Sustainable Development Goals (SDGs). In the longer run, it is also essential to support livelihood opportunities and self-reliance, together with mitigating land degradation and greenhouse gas emissions.

Yet, recent estimates indicate that 94% of forcibly displaced people living in camps lack access to electricity, and 81% can only rely on basic fuels for cooking – typically firewood and charcoal. With increasing displacement patterns (117.3 million people globally in 2023), a consensus has emerged on the urgent need to implement market-based and development-oriented energy solutions in refugee communities in line with SDG 7 – Affordable, Reliable, and Sustainable Energy.

To support this goal, we have been collaborating with the United Nations High Commissioner for Refugees (UNHCR) in Geneva (Switzerland) and the European Commission's Joint Research Centre in Ispra (Italy) since 2019. Together, we conducted techno-economic analyses of renewable mini-grids, as one of the most efficient solutions to provide reliable and affordable electricity access to populations living in refugee settlements in Sub-Saharan Africa (SSA).

A major obstacle in this research line is the scarcity of reliable data. In our previous collaboration, we gathered information for 300 refugee settlements manually from available public sources ([Baldi et al., 2022](#)). More recently, we conducted about 1400 in-person interviews across six refugee settlements. This allowed us to estimate the latent energy demand for different types of loads and assess the Willingness To Pay for reliable electricity. Interestingly, UNHCR now maintains a geo-localised database that includes, in one up-to-date package, the number of refugees in SSA and the type of settlement. Also, they are willing to share this geolocated data with us.

With this information, the assistant activities will be the following:

- Collect and update geospatial data at the continental level related to energy, water, food, and ecosystems to provide a comprehensive understanding of the contextual conditions that will support the study.
- Analyse socio-economic and technical data from the UNHCR dataset and the interviews;
- Compute an optimisation model for solar mini-grids, including sizing the system and optimising implementation costs for the geo-located refugee settlements;
- Study alternative business models by analysing the geospatial costs of electricity production, electricity prices, and the resulting affordability for end-users.
- Integrate the results in the open-access Platform: [Clean Energy Access Tool](#) and link these findings with the UNHCR database for enhanced accessibility and cross-sector collaboration.

#### Job Requirements

- Geo-data analysis, energy modelling, and Python programming skills.