The EnerSHelF Project Inter- and transdisziplinary research on Energy Supply for Health Facilities in Ghana

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As in many West-African countries, Ghana often experiences electricity grid instability as well as power outages. Both lead to considerable impairments in the health sector. Electricity from photovoltaic systems (PV) is a sustainable alternative, but the PV market in Ghana is largely untapped. The German-Ghanaian project EnerSHelf (brings together experts from science and practice from a wide range of disciplines who jointly develop technical and political-economic solutions for improving and disseminating marketable PV-based energy solutions for healthcare facilities in Ghana.

The EnerSHelF project (https://www.bmbf-client.de/en/projects/enershelf) builds on results and activities during the EnerSHelF Definition project which was conducted in 2017 to assess the on ground energy situation (availability and reliability) of health facilities of different types (CHPS up to teaching hospitals), with differing energy demands and sources, and at various rural and urban locations across Ghana.

The project design follows an inter- and transdisciplinary (engineering and development economics) approach. On the one hand the project focuses on developing, applying and evaluating technological solutions (case studies). On the other hand it addresses interdependencies between technology development, technology adoption & technology diffusion by embedding the development of technological solutions into the institutional and socio-economic context in Ghana (survey data analysis/ case studies).

Here we will present the project idea and first project results. A simulation model für a PV-hybrid-system is used to simulate the energy situation of a hospital in Ghana. The influence of different seasons and weather conditions on the PV yield and the entire system is investigated for the period from February 2016 to February 2017.

We used PV and load measurement data from a hospital in Akwatia, Ghana, as a model input. We also used the detected power outages registered in the data set. Using this data set, we investigated the influence

of season and infrastructure (PV and battery size) on the operating mode of the system. We found, that especially during the rainy season in August the PV output decreases and consequently a lot of energy has to be provided by the public grid and the generator. Another significant decrease in PV yield is observed in January due to dust storms during the Harmattan season. The results have been published in Bebber et al., 2021 (https://doi.org/10.18418/978-3-96043-091-9).