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Abstract title: **Prediction of the energy consumption for populations living in energy poverty using modern methods of information technology**

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ABSTRACT

This research develops a methodology using information technology tools and data analysis to identify specific cost-effective measures which could provide households in conditions of energy poverty better access to energy. The methodology consists of analyzing a dataset of 10.000 households and 1.200 variables to identify characteristics of adopting off-grid technologies. Furthermore, emerging impacts of off-grid technologies are evaluated and finally, a predictive model to assess the potential for households to move into a higher tier in energy access is proposed. Identifying ways to use data to drive impact has become possible through the advances in computational and data technology. The approach presented in this research will include a combination of an iterative process between statistical analysis and data analysis, known as data science. The data is analyzed using information technology tools such as Python and its open source libraries and frameworks for machine learning and data analysis. Energy consumption in populations living in energy poverty is described by energy access, which is determined through a set of attributes that capture key characteristics of the energy supply as described by the Multi-Tier Framework (MTF). The MTF is a methodology developed by the World Bank to understand what prevents a household from moving to a higher tier of access to affordable, reliable, sustainable, and modern energy in alignment with the Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all. This research compares two approaches (i) classifying the dataset according to a logistic classification based on the MTF by using the energy access assessment tool "HEDERA toolkit" developed by HEDERA Sustainable Solutions and (ii) classifying the dataset based on machine learning methodologies to cluster similar households according to the 1.200 variables. Households with similar features grouped into a common cluster as in (ii) may show different tier levels according to the classification as described in the MTF as in (i). This difference in the two approaches (i) and (ii) allows to determine specific sets of variables or features, which indicate that providing these features to households in the same cluster, but at a lower tier, could enable an improvement in tier and ultimately better access to energy.