

Title: Understanding Rwanda Household Electricity Demand

Stakeholder: Rwanda Energy Group (REG)

Theory of Change:

A critical element in effective electrification planning is understanding electricity demand, which serves as a fundamental input for determining the most suitable technologies and infrastructure investments. However, accurately determining household-level demand and growth trajectories is challenging due to data limitations. Traditional household surveys offer some insight into demand patterns but are expensive, geographically limited, and only provide a snapshot in time.

This study overcomes the challenge of limited household demand insight by analyzing electricity consumption data from 2013 to 2019 for over 800,000 grid-connected customers. This data, sourced from prepaid electricity purchases and provided by our partner, the Rwanda Energy Group (REG), allows us to comprehensively examine trends and influences on household electricity use. Our analysis aims to answer two key questions:

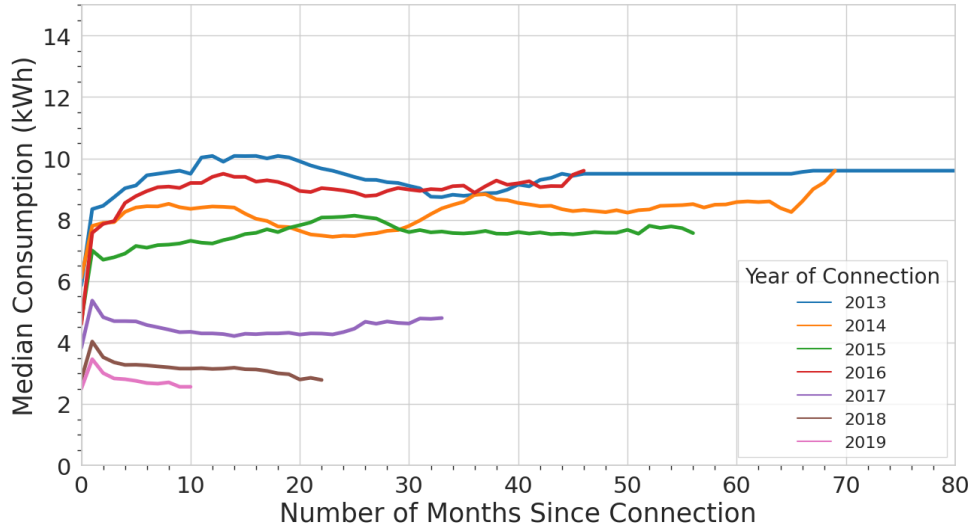
1. How has household electricity consumption evolved over time?
2. How do fluctuations in electricity prices influence household electricity usage?

By collaborating with REG and securing access to sensitive customer consumption data through memoranda of understanding, we ensure a robust and detailed analysis.

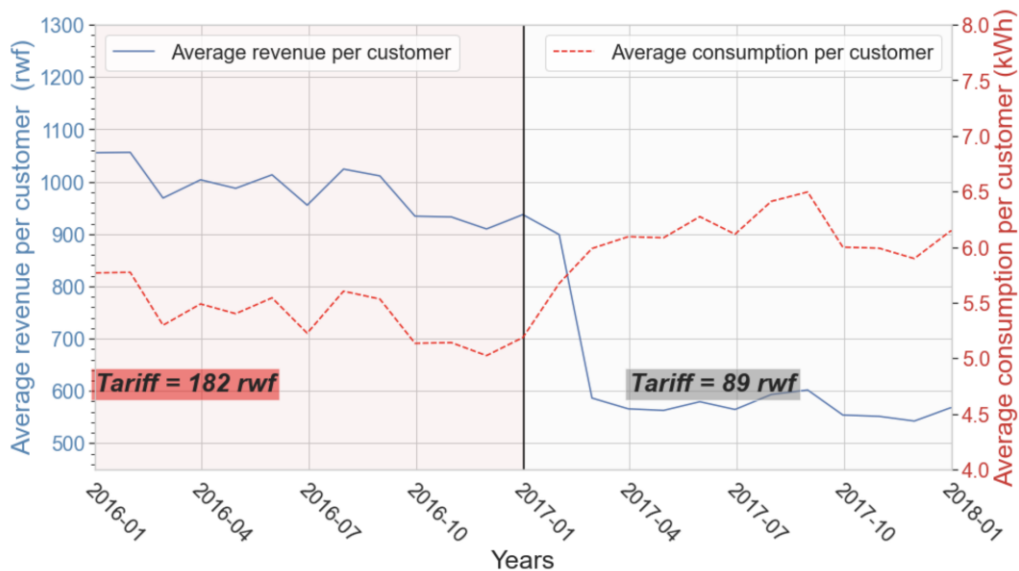
Technical Abstract:

Our innovative data analysis approach reveals insights into household electricity consumption patterns. The data indicates that newly electrified households, particularly in rural areas, consume less electricity compared to longer-term, typically urban, users. Additionally, there are notable differences in electricity usage levels between rural and urban households that got connected to the grid at similar times.

One key finding is the impact of the 2017 electricity price reduction for low-consumption households. When electricity prices were lowered for those using less than 15 kWh, households spent less on electricity overall, despite modest increases in consumption. This suggests that households are reallocating savings from reduced electricity costs to other essential expenses.



The figure above shows that newly connected customers use less electricity over time. There is a notable decrease in consumption for households connected in 2017 and later. This coincides with a policy change that allowed new customers to connect to the grid without any upfront cost, instead incorporating the cost into their electricity purchases.



The figure above shows the impacts of 2017 price change on customers whose average monthly consumption was below 15kWh prior to the change. We note an increase in electricity consumption but an overall decrease in electricity expenditure.

[Link to paper](#)