Digital Finance for Energy Access in Uganda: Putting Mobile Money Big Data Analytics to Work

Dalberg Data Insights

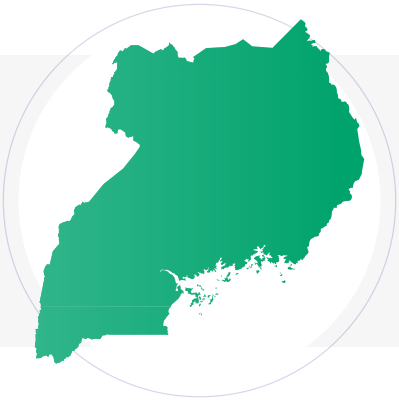
UNCDF CLEANSTART

Study Objectives and Motivation

80%

Ugandans lack access to reliable grid electricity. Energy is a basic need that directly supports people's health, education and livelihoods[1]

[1] Umeme, 2017



17%

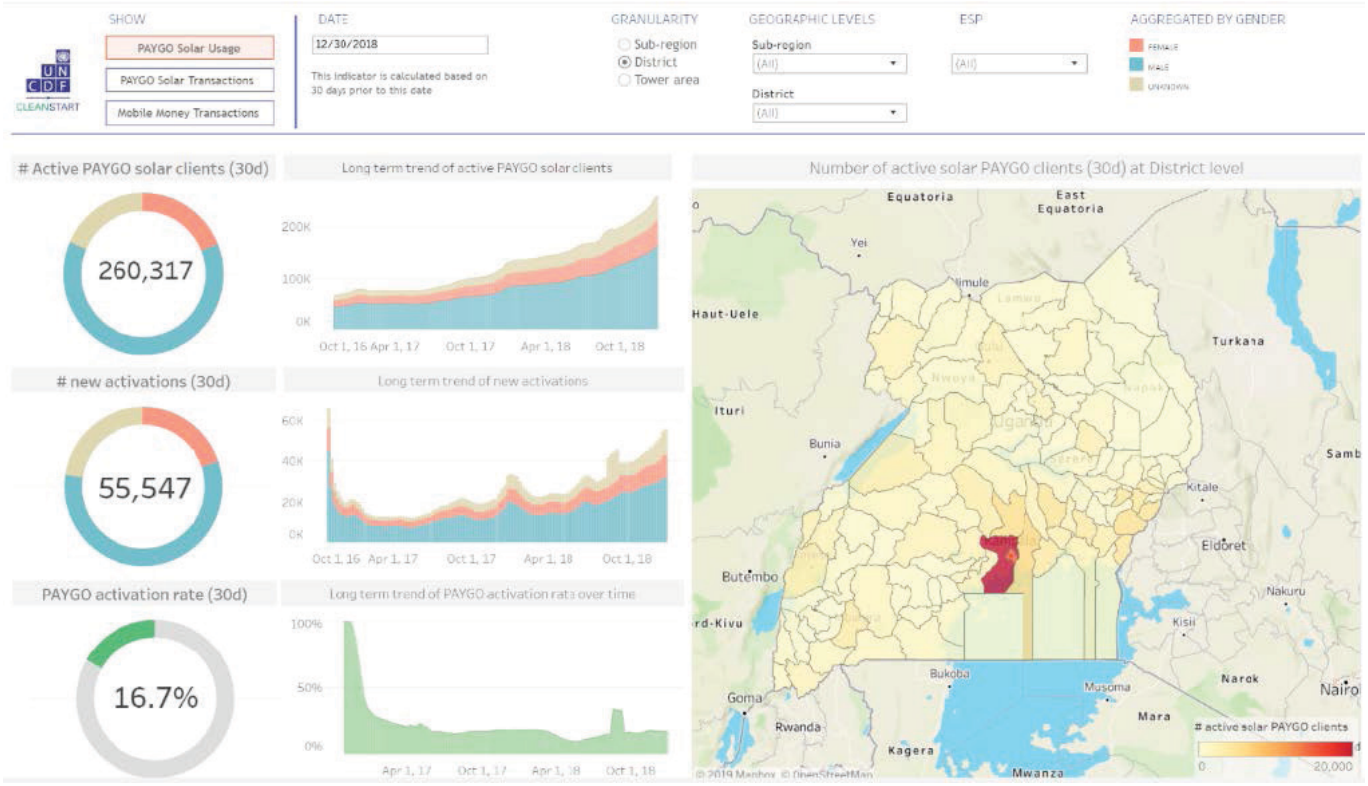
of Ugandan households use off grid solar devices. Yet the majority owns small solar lamps, which do not have the generation capacity to effectively tackle energy poverty[2]

[2] UBOS, 2017

Access to clean energy is a basic need that directly supports people's health, education and livelihoods, yet more than 30 million Ugandans live without electricity. The digital finance PayGo solar market is seen as a promising solution to improve energy access, but its growth is hindered by several information gaps. Customers lack information on solar products and companies lack information about customers and product demand. There is also limited understanding on the relationship between energy access and the use of wider digital finance.

THIS BIG DATA RESEARCH INVESTIGATES THE GROWTH OPPORTUNITIES OF THE PAYGO SOLAR MARKET IN UGANDA. IN PARTICULAR, IT TRACKS ENERGY EXPENDITURE OF CUSTOMERS AND ESTIMATES THE ADDRESSABLE MARKET. THE STUDY DRAWS CUSTOMER INSIGHTS ON SOLAR PRODUCT AND PAYGO SATISFACTION, AND WHETHER PAYGO LEADS TO WIDER FINANCIAL INLCUSION. IT ALSO MEASURES THE IMPACT OF MOBILE MONEY TAXATION ON DIGITAL FINANCE.

THE DIGITAL ENERGY FINANCE DASHBOARD PROVIDES INSIGHTS ON SOLAR MOBILE MONEY TRANSACTIONS TRENDS



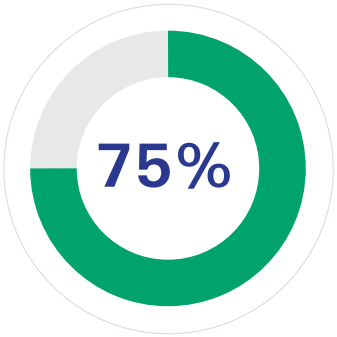
Methodology

SUPPLY-SIDE DATA - DIGITAL FINANCE TRANSACTIONS FOR SOLAR PAYMENTS

On the supply-side, we leverage mobile money data from MTN from 2016 to 2018 to gain digital energy finance market-level insights. The data covers 11.5 million transactions to 672,236 customers, representing around 75% of the digital energy finance PayGo market. We use mobile money transactions data to analyze the penetration of mobile money and solar PayGo, its historical growth, to estimate consumers' ability to pay and to assess whether digital energy financing leads to digital financial inclusion.

DEMAND-SIDE DATA - TELEPHONE SURVEYS WITH SOLAR CUSTOMERS OVER THREE YEARS

On the demand side we conducted three surveys in collaboration with Schatz Energy Research Centre (SERC). 424 customers were surveyed over three years to investigate solar home system adoption and its influence on household quality of life. The survey offers insights on the type of solar products purchased, as well as how individual customers are adopting and using the product over time and what value the product creates for customers.



BIG DATA DASHBOARD REPRESENTING AROUND **75%** OF THE PAYGO DIGITAL ENERGY FINANCE MARKET IN UGANDA

424 CUSTOMERS WERE INTERVIEWED OVER TIME, WHO STARTED IN 2016 WITH:

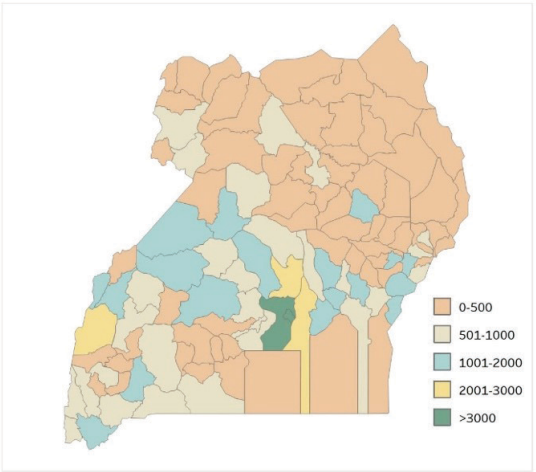
- Small Portable Lamps, singe lights (n = 171)
- Medium Mini Solar Home Systems (n = 129)
- Large Solar Home Systems (n = 124)

Outcomes and Insights

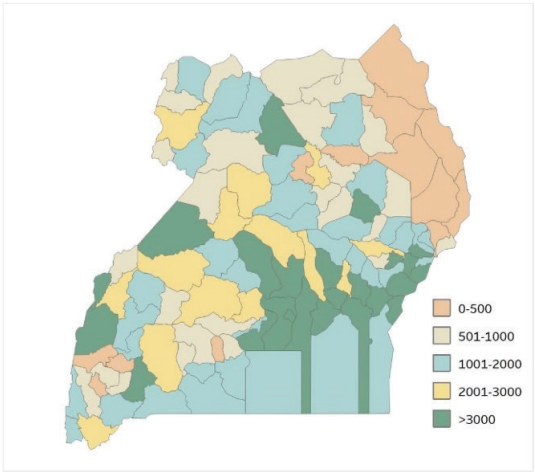
UGANDA IS A RAPIDLY GROWING NICHE SOLAR PAYGO MARKET WITH AROUND ONE MILLION CUSTOMERS

Active nr of solar PayGo customers:

December 2016



December 2018

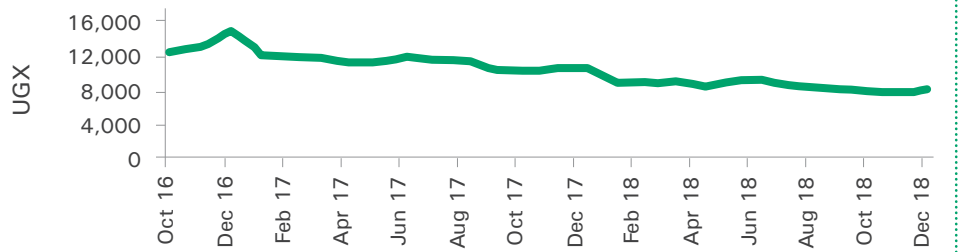


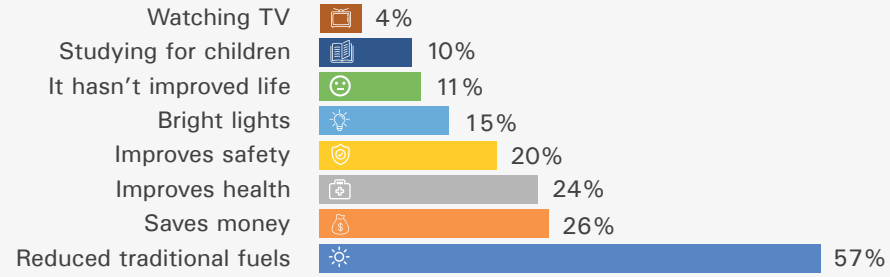
There is room for expansion, as only 12% of the households are currently served and there are only 10 districts with more than 5,000 active PayGo customers

Districts such as Masindi, Kriyandongo, Gulu, Lira, Busia, Mbarara, Hoima have more than 60 percent mobile money adaption but less than 20 percent of households have electricity access. These districts could be the primary target areas for energy companies to accelerate off-grid solar usage. Overall, it is estimated an additional 3.5 million households could be electrified using solar home systems.

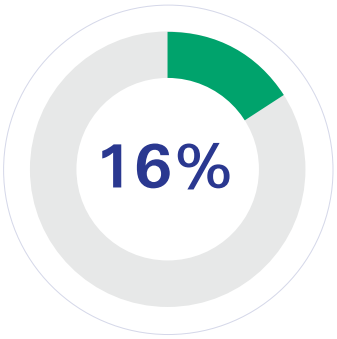
PayGo makes solar more affordable as it allows to make frequent and smaller transactions (reducing from US$3 to US$2). Medium and large systems became more affordable for low income people. Around 32% of the customers in the demand side survey lived below US$3.1 per day.

Average Transactional Value dropping over time





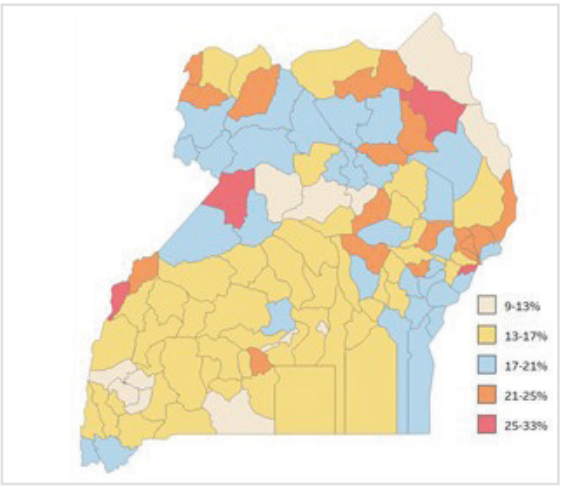
People highlighted the solar systems impacted their household's quality of life by reducing traditional fuels, often in combination with saving money and improving health and safety



PAYGO LEADS TO WIDER DIGITAL FINANCIAL INCLUSION FOR AROUND **16% OF THE CUSTOMERS**

ABOUT **107,000 UGANDANS** STARTED USING MOBILE MONEY BECAUSE OF PAYGO

Mobile Money Activation Rate of PayGo customers, December 2018:



UGANDA'S MOBILE MONEY TAX LED TO A TEMPORARY SLOW-DOWN IN PAYGO ACTIVATIONS. LIKEWISE, PAYGO PURCHASES QUICKLY RECOVERED WHEN THE TAX WAS CANCELLED. THIS INDICATES THAT TAXATION REGIMES IMPACT ENERGY ACCESS

49% of customers purchased an extra solar product since their first purchase.

63%	Solar Portable Lamps owners making another purchase
39%	Small SHS owners making another purchase
39%	Large SHS owners making another purchase

3.5 - 4 PayGo Payments per month. Transaction values US$3.1 to US$2 per month. People making more frequent payments at smaller average values of US$2.

88%

Of customers are satisfied with PayGo

68%

of the customers were satisfied with the solar home system three years after the purchase

Of customers lived below US$3.1 per day[3] compared to 69% for Uganda overall[4]

32%

PayGo Solar Users as of Dec 2018. 110.000 new mobile money users due to PayGo solar home systems

672,000

[3]Umeme, 2017; [4]UBOS, 2017

Recommendations

RECOMMENDATIONS FOR ENERGY AND FINANCIAL SERVICE PROVIDERS

Expand energy services in geographical locations with high mobile money penetration. Districts with high mobile money adoption but little access to the grid represent a potential addressable market for off-grid solar.

Use customers transaction data to develop affordable and flexible financing methods for solar PayGo home systems. Analyzing information on people's financial behavior, transaction frequency and amounts, their ability to pay for solar assets and purchase additional products over time, can enable companies to design user-centric and low-cost product financing methods that enable energy access.

RECOMMENDATIONS FOR THE UGANDA SOLAR ENERGY ASSOCIATION

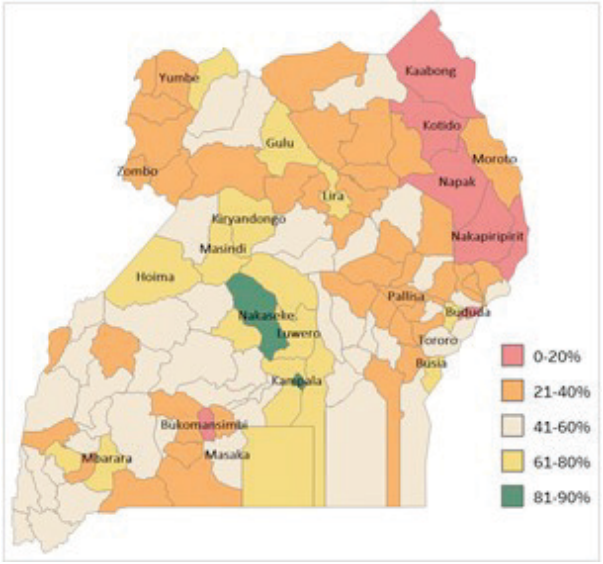
Use mobile money data to track and accelerate off-grid energy market of Uganda. The digital energy finance dashboard can help identify target expansion areas. It shows solar digital payment transactions frequency and amounts, which indicates customer's ability to pay. The dashboard can monitor market growth at different levels (province, district and tower level) in real time. This can be used to inform investors of the potential of the Ugandan solar sector. Finally, the dashboard can help tailor financing solutions and solar products to the needs of local markets.

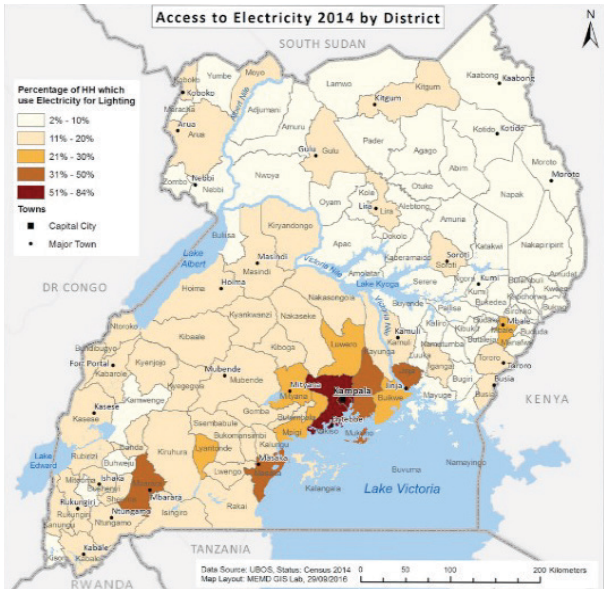
RECOMMENDATIONS FOR POLICY MAKERS

Use digital finance transaction insights for grid electricity planning. The average monthly payment for solar PayGo is a reliable indicator for energy expenditure and can also be interpreted as the household's ability to pay for electricity, which can be used for planning electrification projects.

Implement policies aimed at improving energy access and digital payments for PayGo solar purchases.
Fewer people purchased PayGo systems as soon as the mobile money taxes was announced. Likewise, we found the PayGo purchases quickly recovered when the tax was cancelled.

Percentage of Mobile Money access, Dec 2018:





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