



Uganda Off-Grid Energy Market Accelerator

The role of digital financial services in reaching unserved populations

Insights and opportunities

May 2019

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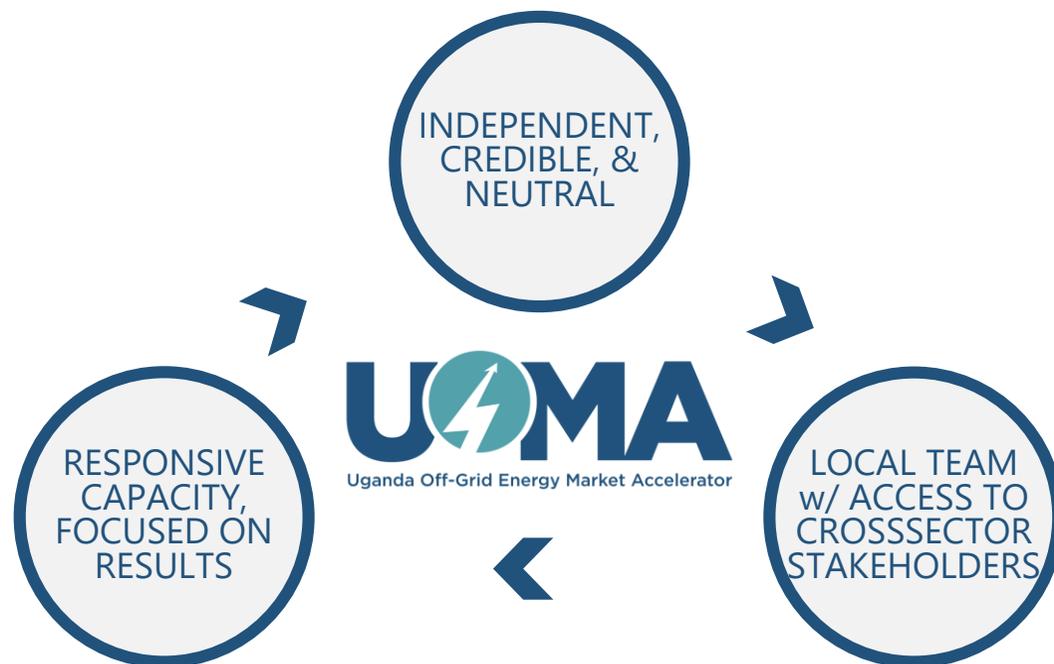
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Introduction

Uganda Off Grid Energy Market Accelerator (UOMA) is a dedicated and neutral intermediary, focused on scaling off-grid energy access



We accelerate the off-grid energy market in Uganda through:

- **Research & Insights:** providing data, analysis, and insights to businesses, investors, development partners, and policy-makers
- **Coordination:** coordinating industry actors and resources to increase efficiency; and
- **Direct Interventions:** catalyzing interventions where necessary to reduce barriers to off-grid energy access.

Focus of this report is on innovative models that can leverage digital financial services to accelerate access to energy

Increased mobile phone technology and digital services has created an array of new business models and opportunities for off-grid energy

- This report focuses on how DFS has helped increase access to off-grid energy in rural Uganda, and what opportunities for growth lie in the sector; initial hypotheses on how DFS supports the dissemination of OGE are below:



Access

Stakeholders can increase access to both SHS and DFS through data sharing and new distribution networks



Awareness

OGE product distributors can leverage existing DFS educational programs to increase awareness



Affordability

DFS and the associated large volume of data can inform new forms of payment that increase affordability

We centered our approach on the following high-level questions:

- What is the current state of DFS for OGE in Uganda?
- Which innovative DFS models and partnerships can be applied to OGE?
- How does regulation impact DFS for OGE?
- What market challenges and opportunities exist for DFS in OGE?

Glossary

API | Application programming interface

AML | Anti money laundering

DFS | Digital financial services

G2B | Government-to-business

GSM | Global system for mobile communication

ICT | Information and communications technology

IT | Information technology

KYC | Know your customer

M2M | Machine-to-machine

MFI | Microfinance institution

MM | Mobile money

MMO | Mobile money operator

MMSP | Mobile money service provider

MNO | Mobile network operator

OGE | Off-grid energy

P2B | Peer-to-business

P2P | Peer-to-peer

PAYG | Pay-as-you-go

SACCO | Savings and credit cooperatives

SAAS | Software as a service

SFI | Supervised financial institution

SHS | Solar home systems

UG | Uganda

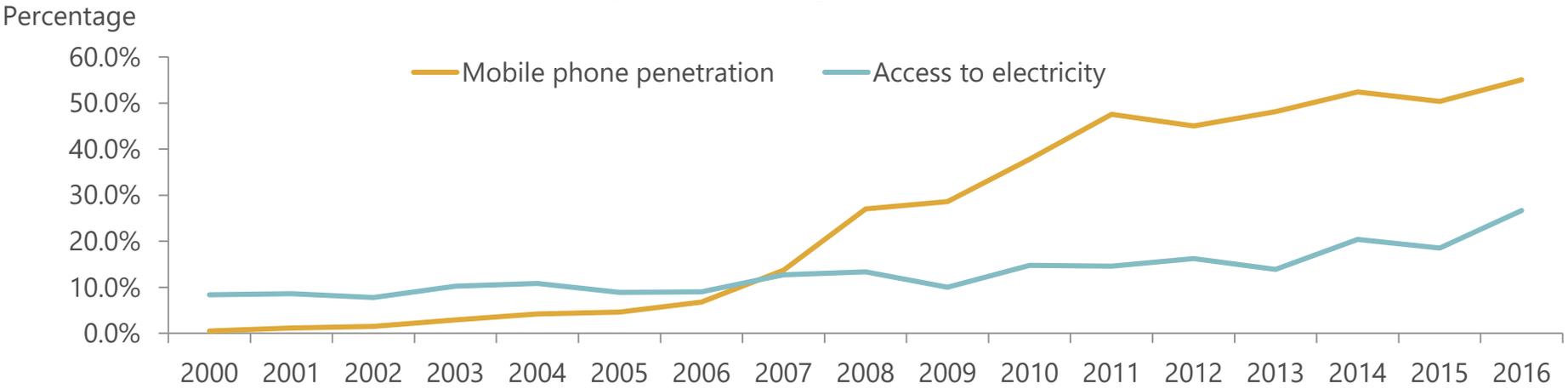
VAS | Value-added services

VSLA | Village savings and loans association

Background

Greater access to phones compared to grid electricity in UG provides an opportunity to reach unserved through mobile tech

Mobile phone penetration vs electricity access in Uganda^{1,2}



Grid access has grown over the years but not as fast as phone use; this disparity creates the opportunity to reach unserved populations using mobile technology

- Despite significant growth in access to grid electricity (doubled between 2000 and 2015), over 80% of the population remain unserved (only ~1.3M households have energy access).³ In 2030, 2M households in Uganda are forecasted to still remain without access to electricity^{1,2}
- In contrast a majority of the population (55%) has access to mobile phones, allowing for off-grid energy companies to unlock new models of energy services such as affordable bill payments and M2M connectivity e.g. system monitoring and troubleshooting^{1,4}

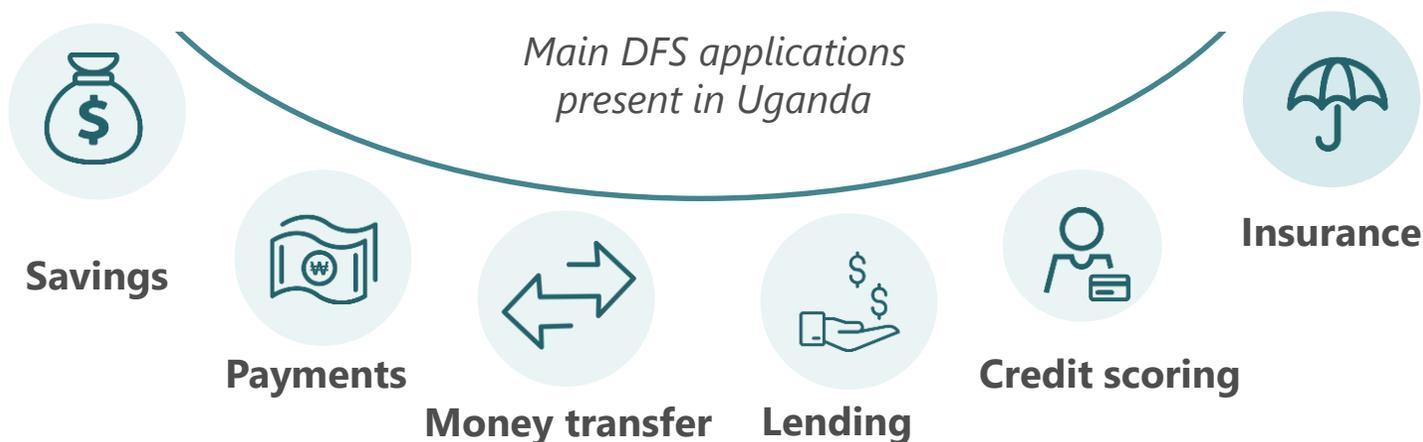
Sources: ¹ World Bank, Access to electricity (% of population), [Link](#). ² World Bank, Mobile cellular subscriptions (per 100 people), [Link](#). ³ Uganda Off-grid strategy ⁴ GSMA, Accelerating the Pay-As-You-Go (PAYG) Utilities sector through mobile money, [Link](#).



A plethora of digital financial services have emerged in Uganda over the past decade for last mile customers

Digital financial services are making traditional financial services more accessible by offering new means of access

- The main components of digital financial services include:
 - **A digital transaction platform**, provided by MNOs or aggregators
 - **Retail agent networks**, provided by the MNOs and aggregators who increase accessibility of products and services to customers
 - **A digital device**, including mobile, electronic cards, or biometrics
- Digitization has contributed to a significant decline in the proportion of Uganda's population that is financially excluded, from 43% in 2006 to 22% in 2018¹



Uganda has been ranked 3rd globally in a survey on financial and digital inclusion due to its country-level commitments and regulatory environment²

In Uganda, DFS are regulated by relevant laws across the Finance and ICT Ministries*

	<u>Governing institutions</u>	<u>Relevant laws</u>
Ministry of Finance, Planning and Economic Development	<ul style="list-style-type: none"> • Bank of Uganda (BoU) • Uganda Revenue Authority (URA) • Financial Intelligence Authority (FIA) • Capital Markets Authority (CMA) • Uganda Microfinance Regulatory Authority (UMRA) 	<ul style="list-style-type: none"> • Microfinance and Deposit Taking Institutions Act • Bank of Uganda Act • Financial Institutions Act • Mobile Money Guidelines • Financial Consumer Protection Guidelines • Uganda Revenue Authority Act • Anti money laundering Act • Microfinance Institutions and Money Lenders Act 2016
Ministry of ICT	<ul style="list-style-type: none"> • Uganda Communications Commission (UCC) • National Information Technology Authority (NITA) 	<ul style="list-style-type: none"> • Computer Misuse Act • Electronic Signatures Act • Electronic Transaction Act

- **While Banks hold escrow accounts and conduct daily reconciliations, they are not allowed to provide services through agents**
- **MMOs need to be in partnership with a SFI**
- **The MMSPs are required to hold an Escrow account in their partner SFI equivalent to the MM platform issued to both customers and agents**

Regulatory collaboration is structured in a memorandum of understanding between BoU as regulator and UCC as licensor

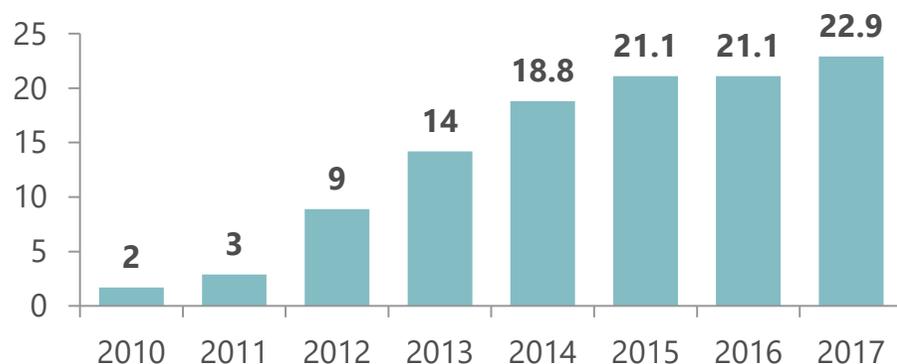
Note: Additional DFS relevant regulation can be found in the appendix

Sources: Intermedia, *Digital Pathways to Financial Inclusion*; Ortusa Advocates, *A summary of the fintech and e-payments landscape in Uganda*, [Link](#).

Mobile money grew rapidly with an initially supportive regulatory environment allowing enrolment of agents & customers

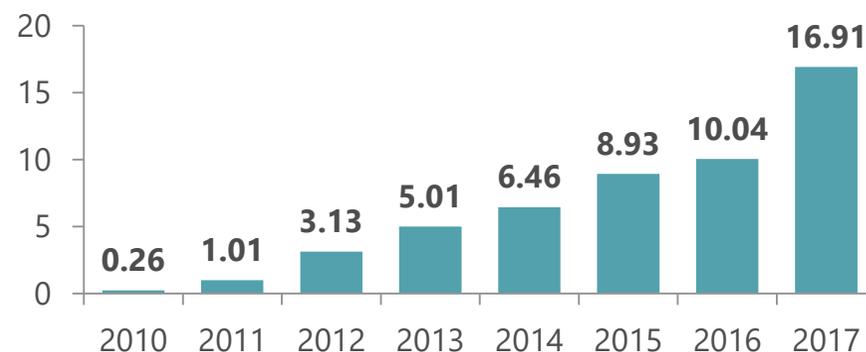
Mobile money registered customers¹

Millions



Value of annual transactions¹

USD Billions

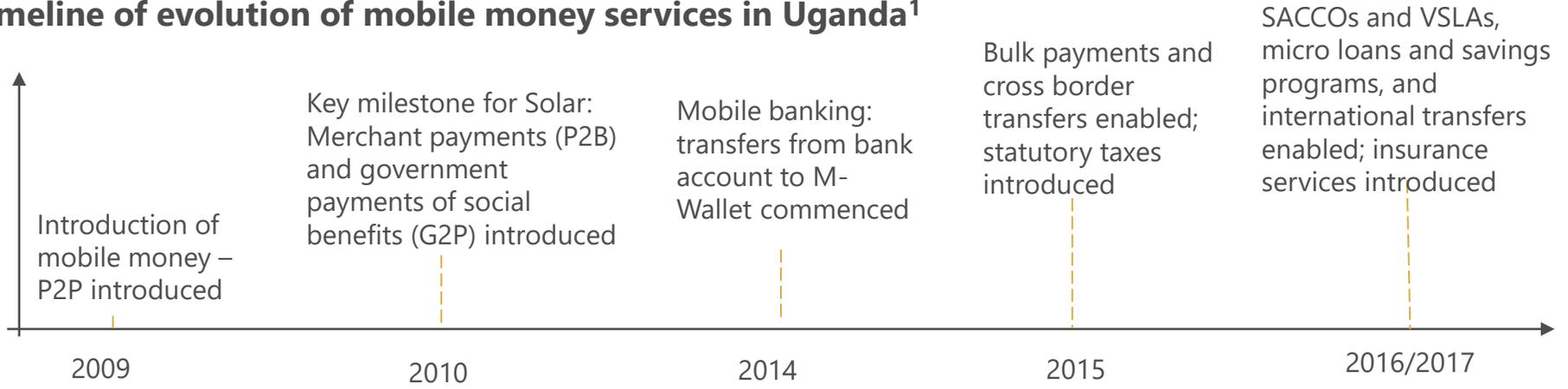


Mobile money use has seen significant growth since its introduction; favorable regulation during its infancy and increased demand for domestic remittances have played key roles in rapid expansion

- Number of users have significantly grown from 2M in 2010 to 22M in 2017 with the value of transactions growing from USD 260M to USD 16.9B over the same time period¹
 - To date, there are seven mobile money schemes: MTN mobile money, Airtel money, M-Sente, Ezee money, M-cash, Africell money, and Smart Telecom²
 - MNOs play a leading role of service provision, with commercial bank playing secondary role of holding customer cash in escrow accounts^{2,3}

Mobile payments created a significant opportunity for off-grid energy to expand as PAYG increased affordability and access

Timeline of evolution of mobile money services in Uganda¹



Solar companies participate in the entire value chain making products affordable for off-grid users



- A major issue in providing off-grid products to low-income customers is affordability, so solar companies out of necessity vertically integrated to offer financing for their products
- These vertically-integrated PAYG energy companies design systems and software, distribute products, finance systems, and provide on-going after-sales support
- Strong mobile money infrastructure in Uganda allowed for rapid scale in the space of PAYG

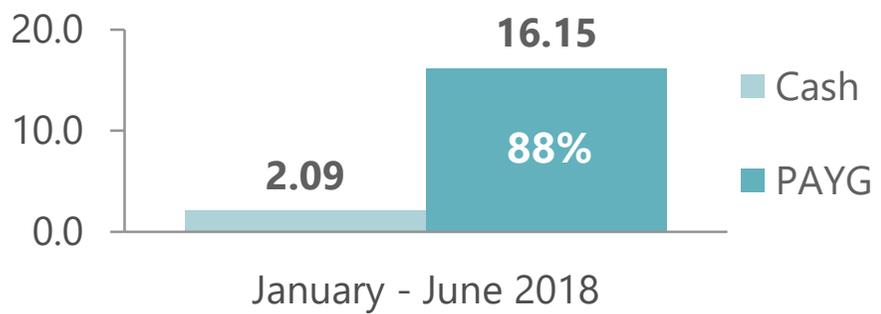
The PAYG model is attractive to both operators and customers, driving significant scale in the sector

PAYG in Solar

- The PAYG business model allows customers to access pre-paid energy services with mobile payments without the need to purchase a system out-right
- PAYG can support automated payments and credit services to consumers, reducing risk of potential default

Total value of pico product and SHS sales in Uganda, H1 2018¹

USD millions



PAYG drivers

Company facing



Scalability

- Energy companies can hire fewer agents to collect money allowing for low cost expansion to the areas that most require energy²

Customer facing



Affordability

- PAYG smooths payments over time to avoid large upfront costs, and mobile payments reduce transaction times²

While some companies have adopted PAYG business models, there is still opportunity for other operators to embrace the use of PAYG

Sources: ¹ GOGLA, Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, 2018, [Link](#). ² UOMA interviews and consultations ³ Waldron, "Financial Inclusion and Off-Grid Solar: Three Takeaways", [Link](#).

Emerging trends

Non-energy DFS players have entered the market and provide the opportunity to increase efficiency at points across the value chain



MNOs

- MNOs are considered the primary service providers providing the market with communication channels for which digital financial services take place
- MNOs in the country support MM payments and transactions facilitated through agents who have capacity to include distribution of solar



Financial institutions

- Financial institutions include Banks, MFIs and SACCOs, each of these organizations with different levels of reach in Uganda
- Financial institutions have customer accounts, data and trust which can be leveraged to increase access and awareness of solar products

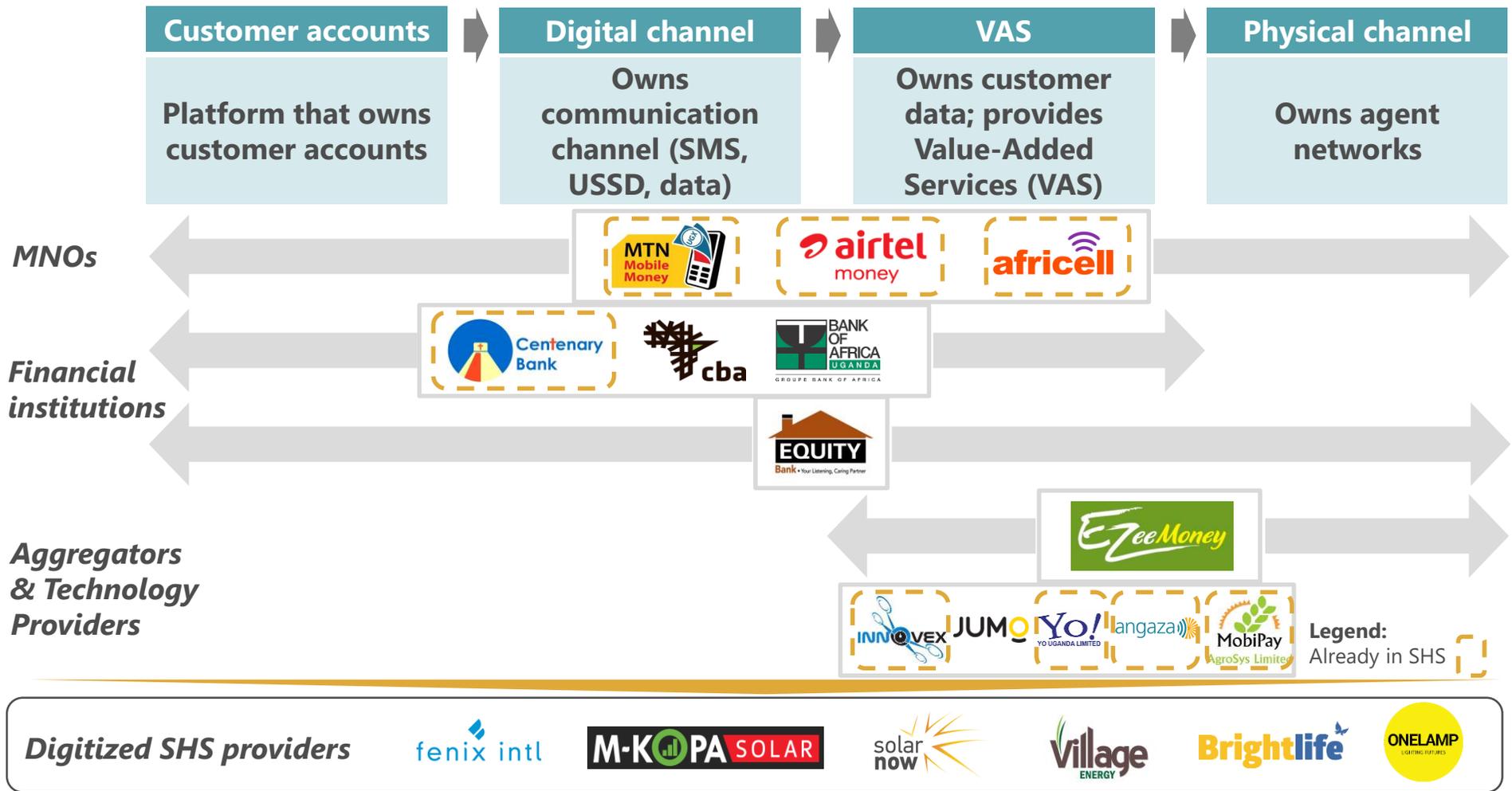


Aggregators & Tech. providers

- Aggregators, e.g. Yo! Uganda in collaboration with technology providers have supported digitization efforts for the last mile customers in Uganda including technologies that support seamless payments for solar
- Their established agent networks provides opportunity for increased awareness and distribution of solar

There are several types of actors working across the DFS value chain providing infrastructure, digital solutions, and human capital

DFS value chain has four key functions, with some business models incorporating all or outsourcing¹

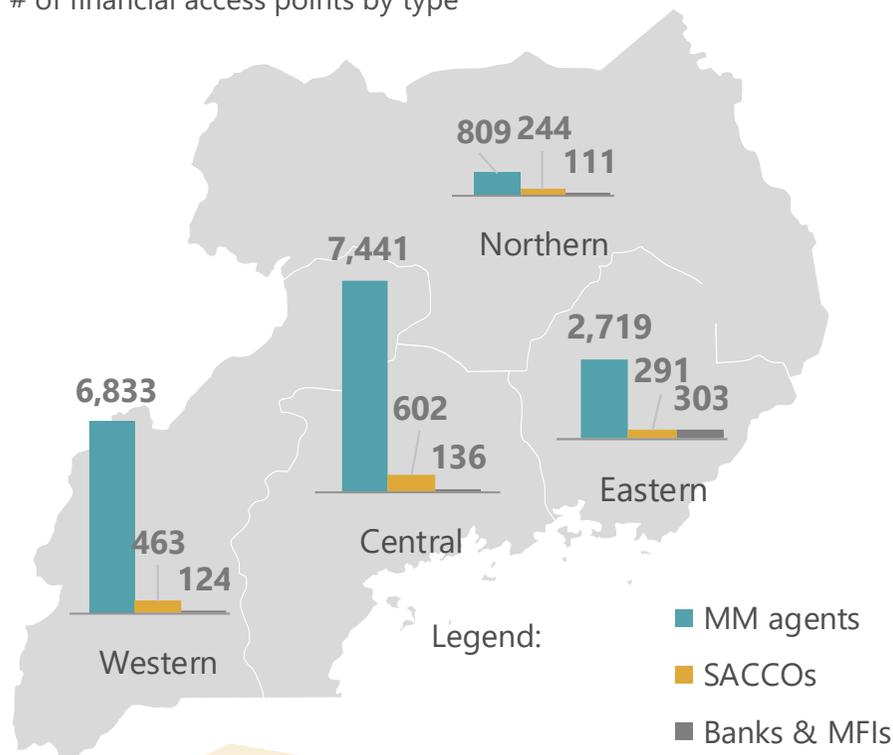


Note: Not all ecosystem players have been represented in the image; value chain analysis based on CGAP analytical framework set in: Claudia McKay, Greg Chen, and Peter Zetterli, Business Models in DFS with adjustments

MNOs: Wide agent distribution presents partnership opportunities to overcome last mile distribution challenge, particularly with MM

Distribution of financial access points by region¹

of financial access points by type



While number of MM agents is much lower in the rural northern and eastern regions, SACCOS and other FIs maintain coverage

MM agents are a crucial asset to MNOs

- Mobile money agents are primarily responsible for registering customer accounts and facilitating customer cash deposits and withdrawals
- In Uganda, MTN and Airtel alone account for ~92% of MM agent presence* and other telecoms account for the remaining 8%

Partnership with MM agents provides opportunity to support increased access to solar for the last mile customers

- MM agents account for 87% of all financial access points
- Local presence provides low cost distribution channel for solar products
- Central region has widest coverage and Northern region has the lowest with agents in the regions serving ~1,500 people and ~10,300 people respectively^{1,2,3}

Note: * Calculated as the percentage of agents providing services for only MTN, Airtel, or both; a portion of the remaining ~8% may also provide MM agent services for MTN or Airtel

Sources: ¹ The mix, Uganda - Institution Type Analysis, [Link](#). ² Uganda population growth (annual %), World bank, [Link](#). ³ National population and housing census, Uganda Bureau of Statistics, [Link](#).

MNOs: Partnerships with telecoms have allowed off-grid companies to expand their distribution network to last mile customers

SHS providers are leveraging MNO distribution channels and points of sale. Examples include:



- Brightlife Uganda has partnered with Africell in the distribution of efficient cookstoves¹
- The stoves are bundled with mobile phones which can be powered using the device



- Fenix has developed a co-branding and solar distribution partnership with MTN Uganda²
- Fenix expanded to Zambia partnering exclusively with MTN Zambia



- Orange has partnered with BBOXX in the distribution of solar products in West Africa³
- The partnership targets distribution of 400 – 500K solar kits in the next 5 years

Advantages to customers



Access

The partnerships leverage trusted distribution networks already accessed by last mile customers



Awareness

Co-branding and product availability through trusted channels increases awareness

Note: These examples do not comprehensively all relevant partnerships

Sources: ¹ Finca Canada, "From the Corporate World to Social Enterprise", [Link](#). ² Prinsloo, "Cell Phones Bring Power to Africans Living Off the Grid", [Link](#). ³ Mieu, "Orange to Roll Out Solar Project Targeting African Consumers", [Link](#).

MNOs: Partnerships with telecoms have allowed solar operators to improve ease of payments to last mile customers

SHS providers leverage MM technology, predominantly provided by MNOs to support payment models. Examples include:



- Mobisol Rwanda uses MM platform provided by MTN to run its rent to own model¹
- The MNO also provides communication services e.g. customer care hotline and SMS notifications



- PEG Ghana worked with several MNOs across countries to pilot Solar-as-a-Service models²
- Customers use MM to make pre-payments for solar on a continual usage basis



- M-KOPA Solar's customers in Kenya pay for solar over time through Safaricom's M-Pesa system
- M-KOPA and Safaricom have previously partnered on distribution and co-branding of solar kits

Advantages to customers



Affordability

Mobile payments technology makes solar products affordable by allowing for companies to spread solar payments over time

Note: These examples do not comprehensively all relevant partnerships

Sources: ¹ Mobisol, *Mobisol partners with MTN & Tecno to increase connectivity in rural Rwanda*, [Link](#). ² GSMA, *PEG Ghana: Licensing Solar-as-a-Service in a new market*, [Link](#).

FIs: In Uganda, banks have shown interest in solar despite facing market challenges

Banks in Uganda have participated in the solar market to finance consumer products

- Some banks have worked independently or have partnered with institutions to provide consumers with loans for solar products¹
- Centenary bank, in collaboration with Mastercard and M-KOPA Solar, participated in the launch of PAYG quick response (QR) payment technology which aims to make solar payments affordable, efficient and secure²



Despite the interest to participate in solar, banks in Uganda have faced challenges in reaching last mile customers such as:

- Lack of sufficient SHS market knowledge to development loan products, making it difficult for banks to compete with PAYG players' flexible payment options
- Higher collateral requirements not readily covered by last mile customers
- Slower bank loan approval processes compared processes of PAYG companies
- Reputational issues caused by negative experiences of poor SHS products previously distributed through the banks' networks³

There are significant opportunities for off-grid operators to partner with banks for credit financing and solar distribution

FIs: The digitization of SACCOS creates an opportunity to increase solar access to rural populations where they operate

The digitization of SACCOS can increase potential solar offerings

- SACCOS, a subset of traditional grassroots financial structures, are managed by members who share a common social bond and not only provide a local presence but also a social network
- SACCOS allow members to make deposits and take on loans with flexible structures i.e. allowing for the seasonality of farmers income



- Companies such as Ensibuuko and FutureLink Technologies are digitizing SACCO operations. Digitization makes it easier to bundle services such as insurance, credit, and SMS alerts

1600
estimated number of SACCOS in Uganda

2x
number of SACCOS compared to banks and MFIs in the Northern region²

SACCOS in solar



Access

- SACCOS are predominantly in the rural areas of Uganda and can act as solar distribution partners providing access to existing customers



Awareness

- Member days can be used to provide education on solar products to customers
- SACCO branches can act as information touch points for consumers



Affordability

- SACCO account to mobile wallet integration lowers transaction costs
- Customer data can inform finance structuring and pricing for OGE products

Aggregators: Aggregators also integrate with SHS companies and provide increased access to a rural customer base

Aggregators are driving the digitization of end users in last mile locations throughout Uganda



Customer

- Aggregators provide education on DFS and enroll customers
- Enable digital bill payments and receipts, and increase access to markets

Aggregator

- Provide account-to-account integration e.g. between bank accounts and mobile wallets
- Provide VAS services including bulk payments and bulk SMS
- Facilitate credit purchase of solar
- Support account monitoring and customer data reports
- Reduce security concerns of cash transactions

Merchant/donor

- Aggregators provide visibility into the value chains to support business decisions
- Facilitate collections and lower the costs of transacting with last mile partners

Deep engagement with last mile customers provides the opportunity to increase the reach of off-grid companies

Aggregators: Partnership with aggregators has contributed to financial inclusion and digitization of services to last mile customers

Aggregators can provide benefits for the off-grid sector as they have done in other sectors

Distribution

- MobiPay AgroSys has launched a network of agents called Digital Community Entrepreneurs to sensitize farmers to DFS and sell them mobile phones and solar systems¹
- Such channels provide access to last mile customers and opportunity for local agents

Digitized payments

- Companies like Yo! Uganda and MobiPay AgroSys have developed technology which allows for bulk payments, merchant payments, and other VAS
- Bulk payment options protect farmers from market inefficiencies of middlemen

Aggregators in solar



Access

- Most aggregators in Uganda engage with customers through their agent networks
- SHS companies can leverage these local networks



Awareness

- Aggregators already provide DFS education to customers
- SHS companies can utilize this model to also increase awareness of solar



Affordability

- Aggregators lower cost of integration with MNOs*
- Aggregators can specialize in building of payments infrastructure

While increasing uptake in DFS is difficult, solar provides the easiest use case to aggregators so long as products are affordable

Note: MNO integration would typically cost USD 15K - 30K and take 4-6 months for implementation¹

Sources: ¹ UNCDF, *Digital Community Entrepreneurs: Testing Their Effectiveness in Driving Uptake of Digital Financial Services in Rural Areas of Uganda*, 2019, [Link](#). CGAP, "Aggregators: The Secret Sauce to Digital Financial Expansion," [Link](#).

Additional products in DFS have not only increased financial inclusion to rural populations but also helped the OGE market grow

Credit scoring



Customer data from OGE MM transactions has been used to provide credit scores

- Credit scores are not only used in the solar sector but also provide are also being used to provide other financial products to customers
- Fenix uses the technology to provide access to loans for solar^{1,2}

Insurance



Partnerships between SHS and insurance providers provide access to affordable insurance

- Azuri is leveraging its customer reach to increase access to low cost micro insurance products from APA²
- The micro-insurance product, *Hospicash*, provides income and funeral cover

Asset finance



DFS is helping SHS providers create value by financing home use products to consumers

- Alongside solar, M-KOPA Solar provides financing for home improvement products to customers who have completed payments³
- Customers can access financing for more lights, cooking stoves, smart phones, and water tanks

Emerging technologies such as blockchain provide opportunity for increased energy access by making solar even more affordable

With blockchain, consumers are able to access borderless, low cost and efficient decentralized financial services

- Traditional banking structures and fees contribute to high transaction costs for mobile transactions
- Blockchain permits a zero fee solution while still allowing payments across P2P networks
- Vendors can maintain ledgers to track and account for assets in carbon accounting

Advantages of blockchain to consumers

- Borderless
- Low cost
- Efficient
- Decentralized

Blockchain in solar

In Uganda, blockchain is currently being tested for on-grid applications

- CleanPath Emerging Markets Uganda (CPEM), the Ugandan government, and the Ugandan Ministry of Energy and Mineral Development have partnered in a USD 1.5B infrastructure project to enable Ugandans to purchase solar using \$DALA tokens¹
- \$DALA is a digital currency provided by WALA, a blockchain-powered financial services platform

Applications also exist to increase energy access for the unserved

- M-PAYG hopes to build a blockchain-based payment solutions for solar²
- Startups such as BitLumens provide blockchain powered platforms with a focus on renewable energy
- Established off-grid energy companies are also piloting cryptocurrency for carbon accounting³

Challenges and opportunities

Limited consumer education and other market challenges will continue to affect DFS for energy access

- 1 Limited knowledge and trust in DFS and solar services**
 - Though knowledge of PAYG is rising, rural populations in Uganda have limited knowledge of other DFS capabilities and use cases; digital payment solutions may not be readily embraced
 - Energy may be important to customers who have the ability to pay. However, other priorities like food and school fees often take precedence.
- 2 Seasonality of farmers' income**
 - A majority of the rural population are farmers and with seasonal incomes
 - DFS payment models (e.g. lease-to-own models) for solar are riskier since a farmer may lack cashflow at certain points in the year
- 3 Regulation of DFS creates potential limitations in its use to increase solar access**
 - Taxation of mobile money, which increase costs, creates a disincentive for use by last mile customers*
 - Difficulty in the onboarding of informal and semi formal merchants and agents who may not meet the KYC requirements makes it more difficult to expand agent networks
- 4 Technical integration challenges**
 - Potential challenges arise from connecting SHS mobile payment APIs with MNOs, or from integrating digitally with banks to process payments

Note: * When MM Transaction Tax was at 1%, PAYG solar providers experienced 10-15% average reduction in MM transactions (volume) per customer¹

Sources: ¹ UNCDF, "Understanding the Consequences of Mobile Money Taxes in Uganda", [Link](#).

Partnerships at the intersection of DFS and OGE can continue to increase energy access across Uganda across the value chain



Legend: ■ Opportunity areas highlighted for partnership

By leveraging the unique value proposition of DFS providers, the off-grid energy sector can innovate to lower the barriers to energy access in Uganda

 Access	 Awareness	 Affordability
<ul style="list-style-type: none"> • End users can access OGE products through more local distribution points as provided by MNOs, FIs, and aggregators • OGE companies can leverage the trust already earned by SACCOS and other partner networks 	<ul style="list-style-type: none"> • Off-grid companies can leverage programs in SACCOS that educate end consumers • Co-branding with MNOs and aggregators can increase the familiarity and salience of off-grid energy products 	<ul style="list-style-type: none"> • Available data on last mile customers from DFS transactions can better inform OGE companies on ability to pay • New financing products can lower costs for customers and provide increased certainty for OGE companies

UOMA is pursuing partnerships with DFS and OGE providers through piloting of innovative business models

In parallel to continued research, UOMA is working to identify stakeholders with interest and capacity to partner, design, and test necessary proof-points of emerging business models

Pilot support activities

1 Pilot design and planning

- Articulating plans and timelines for scalable solutions with identified partners including designing of innovative pilots and identifying required incentives

2 Implementation support

- Providing targeted support for data collection and analysis and hypothesis testing for pilot redesign

3 Investment readiness support

- Developing investor materials, building requisite internal processes, and facilitating introductions to investors

UOMA's current work

- UOMA was engaged by a DFS provider to conduct market research for a solar distribution model that utilized the company's field agent network
- The company had already built out agent networks in the Northern and Eastern Regions, but wanted to assess viability for the Western Region
- UOMA conducted research alongside the operator to ascertain product preferences and ability/willingness to pay in Western Uganda to inform the new distribution strategy



**For more information and to discuss potential
for collaboration, you can reach us at:**

contact@uoma.ug

Kampala, Uganda

Appendix

Regulation ensures customer protection through identification, disclosure, system interoperability, and market competition



Account identification

- AML and KYC require MM agents to identify and monitor customer transactions
- KYC requirements prescribe that customers provide a means of identification when carrying out transactions through MM agents



Customer protection

- The Financial Consumer Protection Guidelines promote fair and equitable financial services practices towards consumers
- The MM Guidelines provide that MMSPs should provide customers with conditions for which client data must be disclosed under terms of use



Competition and Interoperability

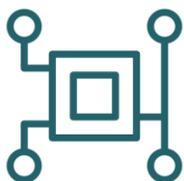
- The MM Guidelines require that MM service providers do not engage in anti-competitive practices that would inhibit market competition
- MMSPs are obligated to utilize systems capable of becoming interoperable with other payment systems in Uganda and internationally



Taxation

- 10% excise duty on all money transfers in Uganda including mobile transactions¹
- 0.5% tax on MM withdrawals
- Registration of MM agents is required for mobile money transfers to enforce collection of income taxes

Though regulation concerning all forms of digital transactions and cryptocurrency has not yet been enacted



Digital transactions

- The Electronic Transactions Act recognizes electronic transactions as well as electronic agents, internet service providers (ISPs), automated transactions, intermediaries, originators, data messages and e-Government services
- Consumer protection is ensured as electronic service providers must maintain records including cancellation of transactions after receipt of services
- The Electronic Signatures Act recognizes electronic signatures as data in electronic form which may be used to identify the signatory in relation to the data message and indicate the signatory's approval of the information contained in the data message



Money lending

- Microfinance Institutions and Money Lenders Act 2016 prescribes that only registered companies can engage in money lending business
- Though there is an absence of specific rules applicable to digital money lending platforms, in an application to UMRA, interested businesses should highlight that their business is a digital money lending platform and demonstrate adherence to general DFS regulation

There has not been any regulatory guidance from the BoU or CMA on Initial Coin Offerings (ICOs) and Security Token Offerings (STOs)