Pay-As-You-Go and Mobile Money Services for Off Grid Solar PV in Malawi

Status, Barriers and Opportunities

A Working Paper produced by the University of Strathclyde through the Scottish Government funded SOGERV project

October 2018
Executive Summary

Mobile money and Pay As You Go (PAYG) business models have had a large impact on the off grid solar industry around the world, in particular within East Africa and parts of developing Asia such as India and Bangladesh. PAYG approaches to off grid energy have the potential to benefit both businesses and consumers, but present new and interesting challenges from both a technical and business perspective. New PAYG technology has the potential to enable new and innovative business models, increase customer choice and engagement, reduce cost of energy and ultimate help to provide appropriate energy services to millions of people.

Malawi has a growing off grid energy market, but there are still significant barriers to the uptake of PAYG business models and associated technology. These barriers become more apparent when contrasted with the relatively mature market in other countries, such as Kenya, Rwanda and Bangladesh. Understanding and addressing the differences between these markets and assessing how to best mitigate the barriers is key to the timely, sustainable and cost effective electrification of millions of people in Malawi.

This study has used expert interviews to ascertain the perception of the key barriers to the Malawi off grid PAYG sector. Information was taken from a wide range of relevant stakeholder within the Malawi off grid energy sector and is summarised within this report. Background information on PAYG energy and mobile payment technology is given as a context, and two case studies are highlighted, showing the cutting edge of PAYG off grid solar in Malawi and Rwanda, to provide further context of the experience of consumers and businesses in both locations and demonstrate the relative limitations of the current market in Malawi.

The key findings of the expert interviews are summarised into technical and business barriers.

**Technical Barriers:** mobile signal strength, coverage and reliability; high cost of metering and payment technology and platforms; maturity of mobile money infrastructure in Malawi and mobile money transaction costs.

**Business Barriers:** access to working capital; risk of non-payment from customers and customer ability to pay; unpredictable payback times; previous reputational damage from poor quality products; cost of bill collection; risk of theft by collection agents; lack of experience with relevant business models and lack of technical knowledge and experience within communities.

This is not an exhaustive list, but represents the key concerns and perceptions of a range of stakeholders.

Recommendations given include:

**Business and finance training for off grid energy operators; reduced tax for off grid energy technology; collective action from the Malawi energy industry to lobby for reduced transaction fees for mobile money payments for energy and a greater focus on learning from international best practice.**

This report is intended to assist the sector make better use of PAYG and mobile money services with the intention of helping to address the outlined barriers.
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1 Background

More than 1.1 billion people globally still lack access to electricity [1]. In Sub-Saharan Africa (SSA), there have been significant efforts to address this problem over the last decade, through both centralised and decentralised approaches, but 65% of people in SSA still lack even basic provision for electricity access.

This represents a significant barrier to human development, as electricity is a vital enabling factor a range of interventions and technologies needed to improve human quality of life. These range from access to healthcare, information, communications, lighting, productive income generating activities and many more. The United Nations have identified access to electricity as one of the 17 sustainable Development Goals, a collection of vital goals to improve quality of human life, aimed to be achieved by the Year 2030 [2]. Access to clean sustainable energy is in itself one of the 17 goals: number 7 and it has been shown that this goal has strong links and co-benefits with all of the other sustainable Development Goals [3]. Therefore if we wish to achieve the 17 United Nations Development Goals by the Year 2030 electricity access need to be addressed significantly before then.

![Figure 1: The 17 UN Sustainable Development Goals](image)

1.1 Energy access

Malawi currently has one of the lowest electrification rates in the world, with 11% of the population having electricity access in 2016, the most recent year with available statistics [4]. In 2016, only 4% of the rural population had electricity access. This figure is lower than the figure for 2014, a change that can be accounted for by demographic shift and population growth, but still represents a trend towards reduced rural access as a proportion of the total rural population.

Traditionally, energy access globally has been based on a top down model of large power plants, usually burning fossil fuels, and high voltage transmission infrastructure and distribution networks bringing power to consumers. In Malawi, the vast majority of installed generation capacity on the grid is hydro power [5], but still subscribes to the model of large centralised generation. This approach
benefits from economies of scale, but the capital investment and time required make it an unsuitable approach to address the need of many of those without electricity access, particularly in more remote and rural areas, highlighted above as the locations with the lowest levels of electricity access. Grid expansion for rural electrifications is still increasing at a rapid rate in many countries across SSA and has provided a large number of new connections, but this strategy has increasingly exacerbated the mismatch between installed generation and demand, leading to unreliable connections and has resulted in frequent and lasting blackouts across SSA, both planned and unplanned. This has had a significant impact on industry, businesses and consumers.

The use of distributed and off-grid energy resources has allowed an entire new sector of business models and approaches to electricity access. Renewable energy focused off-grid systems can be quickly deployed with significantly less upfront cost than expansion of national grid infrastructure. It is estimated by the IEA that more than half of the people who will be connected by 2030 will gain access via decentralised systems.

These decentralised systems can be divided by size: larger systems are generally known as mini-grids or micro-grids. These comprise of generation, storage and distribution within a community or village. Systems can range from the small kilowatts power range up to multiple megawatts and generally rely on a mixture of optimised storage and generation technologies to provide reliable supply of energy. Many of these grids utilize renewable generation technologies such as solar photo-voltaic (PV), wind and hydro power. Compared to the cost of extending national grid infrastructure to reach remote locations, installing these systems offer a cost-effective way of providing energy access. The downside is that the quality of supply and the level of power that can be drawn is often limited, reducing the ability of the system to support demand growth for income generating activities and higher energy services such as electric cooking and cooling. Challenges and opportunities for mini-grids both in Malawi and wider contexts are explored in detail in a range of literature [6].

Alternative to this approach, although still similar technologically, is the Solar Home System (SHS). A SHS comprises storage, generation and loads at the scale of a single household, business or other building. This reduces the system cost further, removing requirements for distribution networks. Though only basic energy services, such as phone charging and lighting, can be provided SHSs can be deployed quickly and cheaply, by relatively low skilled technicians, even in the most remote locations.
A combination of falling Photo Voltaic (PV) and battery costs, highly efficient DC appliances and communication technologies have reduced the cost of such systems significantly over the last 10 years.

When combined with micro finance, PAYG and rent to own business models, SHSs are within reach of even many of the poorest within society, displacing spending on Kerosene, dry cell batteries, phone charging and other energy services while providing higher quality of service.

2 Methodology

This desk based study has utilised literature review and expert interview as its primary data collection method.

A brief introduction to PAYG and Mobile Money, along with illustrative case studies from the sector, was informed by online research and literature review. Barriers and recommendations for PAYG in Malawi were ascertained through a process of expert knowledge elicitation. Expert interviews with a range of figures from within the Malawi energy sector and the international off grid energy sector contributed their significant experience to provide practical insight into the field. A list of interviewed experts and summaries of their contributions can be found in Appendix A. Thematic coding [7] was applied to the transcripts of the interviews, in order to ascertain key themes and those themes are elaborated on below.

The barriers have been divided roughly into “Business and Policy” informed by the consumer landscape and business environment in Malawi and “Technological” barriers, stemming from the availability and suitability of technology to enable these business models within Malawi. The two are closely interlinked, and the recommendations given in the final section cut across both areas.

3 PAYG Energy and Mobile Money

This report focuses on PAYG energy as a vector for electrification, as outlined in the working definition below. PAYG energy covers a whole range of business models, many enabled by advances in technology.

**Pay As You Go Energy**: Any system or business model where consumers to not pay up front the entire cost of an off grid energy system. This can include models where consumers have no ownership of the system pay only for energy consumed, micro finance loans used to buy systems that are repaid over time or rent to own agreements.

These approaches can be enabled or enhanced by technology such as Mobile Money and other digital banking technology and remote monitoring and control systems. Below are two case studies of businesses using PAYG in the energy sector with varying levels of sophistication.

Mobile Money is the collective name for mobile phone based banking and payment systems developed in East Africa in the mid noughties. It was noticed that in Kenya a large number of individuals were using the ability of their phones to send and receive credit as a form of de facto currency. Individuals could buy phone credit from mobile network agents present in most communities across Kenya. These agents charge a small transaction fee in order to turn cash into mobile phone credit. This credit could then be sent to other people's handsets and they could in turn transfer this back to cash via another network agent for a small fee. This system was formalised into
M-PESA in Kenya and is now widely utilised for banking, bill paying and day to day spending across the country [8]. 1.7 billion Transactions were processed by M-PESA in from July 2016- July 2017, totalling 48.76% of Kenya’s GDP.

Internationally, almost 700 million people are registered with mobile money accounts, across 276 different services. This accounts for 1.8 billion financial transactions each year with a total value of $31.5 billion. [9]

Globally, it is estimated that 643 million people without access to electricity are covered by mobile networks [10]. This represents more than half of those without electricity access, with a higher proportion of the global population now having access to GSM mobile signal than electricity, as shown in Figure 3.

![Figure 3: Utility access and mobile access growth rates from [10]](image)

Mobile money solutions have become present across the world under a range of different names. The success of the technology is due to its simplicity, any SMS enabled mobile phone can access and use the system, it is agnostic of brand and does not rely ownership of a smart phone.

Malawi has two main mobile operators – AirTel and TNM, both offering a mobile money solution. There is an additional third mobile money service on offer in Malawi, called Zoona [11]. The regulatory framework for mobile money in Malawi ranks highly internationally, due to a strong and well developed network of mobile agents. These agents are responsible for cashing in and out customers credit to the mobile money systems and are widely accessible, with every village and market having at least one available agent [12]. Despite this strong enabling framework, uptake of mobile money in Malawi is less that many countries in East Africa, such as Kenya and Rwanda, where 2/3 of the adult population use mobile money on and active basis. Reasons for this and the impact on the PAGY off grid sector, as well as recommendations to address these barriers are explored further in sections 4, 5 and 6 of this report.
3.1 Case Study: Sunny Money – PAYG and Mobile Money in Malawi

**What does PAYG energy look like for a customer in Malawi?**

Sunny Money are one of the most successful examples of a solar energy business utilising PAYG energy in Malawi, although there is still a great deal of opportunities for them to improve their offering. The organisation is a social enterprise and is owned by SolarAid, a UK based charity. Sunny Money has sold more than 1.7 million solar lights across Africa [13] and is active in Malawi as well as Zambia and Uganda. They sell Pico Solar lights and SHSs, with a focus on ensuring high quality products. In Malawi by 2015 they had sold 142,917 solar lights [13].

Sunny Money’s business model in Malawi is different to their standard approach and involves setting up small community businesses with partner agents. These agents are full owners of their respective businesses, and buy SHSs and Pico solar lamps (Figure 4) direct from Sunny Money at close to cost price, who then deliver them to the entrepreneurs. These individuals then sell the systems within their communities and are responsible for setting the pricing and business model for selling the products on, including dealing with any desired PAYG arrangement.

![Figure 4: The range of products currently offered by Sunny Money in Malawi [14]](image)

Commonly these agents will offer PAYG payment options rather than upfront payment to end consumers, in order to allow a wider range of consumers without the capital to buy a full system upfront to engage. The agents are then responsible for regular bill collection from their customers and become the first point of call for maintenance issues.

The challenge and cost of managing PAYG systems results in many of the agents only selling pico solar lamps – cheap enough that consumers can buy them up front or save up in order to purchase them. A large number of the agents pay Sunny Money via mobile money through the AIRTEL money platform,
but collection from end customers usually takes the form or cash collection in person. The use of a Bluetooth enabled tablet to allow an agent to activate products is also under investigation.

The model is based around empowering individuals to become entrepreneurs and set up solar businesses within their own communities, but there are still significant problems with cash flow for the entrepreneurs, who are required to buy their stock upfront. The growth of the market is severely constrained by this lack of working capital for businesses. There are also issues for consumers, who suffer from limited product choice and are charged a premium by business owners for any system on a PAYG basis, to account for the associated risk. These issues and many more are investigated in greater detail later in the report.

3.2 Case Study: BBOXX – PAYG in Rwanda

What does the cutting edge of PAYG off grid solar look like?

BBOXX are a SHS company, operational across East Africa, with a focus in Rwanda. They are a highly vertically integrated organisation, with their activities covering design, deployment and operation of SHSs, PAYG financing and a range of other activities. They provide electricity access to roughly 250,000 people [15].

Figure 5: A BBOXX SHS displayed at a conference in Rwanda

BBOXX sell a range of products both to consumers and increasingly to business, but this case study focused on their consumer facing operation. The main consumer product they offer is the BBOXX solar home system, shown above in Figure 5. The system contains a 50Wp solar panel, battery, charge controller, communications and monitoring and can be packaged with a range of high efficiency DC appliances. Consumers pay a monthly bill of around $4-8 on a rent to own basis, owning the system after a period of 3 years. Each day they can consume 54Wh of energy, a value selected to ensure
continued service up to the stated value in all reasonable conditions and minimise deep discharge of the battery. This billing process takes place remotely, via mobile money payment and for many consumers in rural parts of Rwanda, this is their first exposure to formalised banking. Through this process, BBOXX can reduce the cost associated with bill collection.

The system not only allows billing to take place remotely, but also utilises the connected GSM sim card to send other aggregated data to a central server and facilitate a range of further functionality. The system can be remotely switched off if the user exceeds their daily energy allocation or fails to pay. New customers can put on a lower tariff with further reduced energy consumption for the first three months of the contract, with greater energy consumption unlocked after proven ability and willingness to pay. Customer usage data and system diagnostic data such as battery and panel voltage and current can be sent back to the server to alert of system failure, theft, tampering or need for preventative maintenance.

Customers also have easy access to a large number of BBOXX shops and agents within most large settlements within Rwanda and a sound and clear value proposition of displacing existing dry cell, kerosene, solid fuel or phone charging costs while receiving improved quality of service.

BBOXX is a trusted company, with a strong brand – many major roads in Rwanda have houses painted in the BBOXX blue acting as adverts, alongside similar properties advertising competitors like MeshPower and MobiSol. Fostering this strong competitive environment drives innovation allowing companies like BBOXX with a proven product and the capital and operational experience to meet the expectations of their consumers effectively to thrive and quickly and effective electrify a large number of consumers.
BBOXX and similar operators such as MobiSol, M-Kopa and others offer sophisticated products tailored to the specific needs of consumers, utilising technology that is in theory also available in Malawi and serving a fairly similar demographic with comparable ability to pay.

The next section of this report will investigate a number of the barriers to the uptake of similar technology that have so far prevented a similar roll out of systems like BBOXX or other mobile money and PAYG enabled technologies in Malawi, derived from expert interviews with a range of stakeholder.

4 PAYG Business and Policy Barriers and Challenges

4.1 Access to Working Capital

Most companies operating in this sector in Malawi must buy products up front from larger retailers and if they choose to operate under a PAYG model will recoup cost outlay over the course of a payback period (1-3 years depending on the size of the system).

Businesses therefore require a large working capital to afford the initial outlay. This creates a large barrier for smaller players to enter the market and limits the speed of expansion. Many companies operate a mix of PAYG and upfront payment to mitigate these challenges. The issues of working capital and cash flow, compounded by risk and fear of non-payment, limit the ability of companies to expand.

The requirement for capital would be less of an issue if companies could easily access capital, through competitive loans or debt or equity investment, but there are a number of barriers in Malawi for energy businesses to gain investment or loans. Bank interest rates are of 40% in Malawi, one of the highest rates for borrowers in the world [16]

A key barrier to accessing finance is a two sided lack of knowledge or expertise. Banks, microfinance institutions and potential investors within Malawi and internationally lack the technical knowhow and experience to assess projects in the fast moving and innovative space of off grid energy. This limits the willingness of institutions to provide capital and support to businesses due to an inability to assess the risk and potential of such investments. In a frustrating chicken and egg situation, investment in the Malawi off grid sector requires a high profile success story to galvanise investment, but such a success story requires significant investment.

Compounding this issue is a lack of robust financial and business acumen among the businesses and organisations seeking funding. In Malawi, a significant proportion of energy businesses have no formal business training or education. Funders want to see robust business plans from potential investments and look at similar success stories from other countries or even within Malawi to increase confidence. Although many good examples exist, the quick moving nature of this young industry means many of those with the means to help address this issue or communicate it are not equipped with the knowledge and skills required.

4.2 Risk of non-payment, ability and willingness to pay

In Malawi the ability and willingness to pay of consumers is low. The average income of a family in rural Malawi is in the region of $690 [17] and most have a large range of competing commitments and pulls on their income. There is a perceived large risk of non-payment from consumers unable or unwilling to meet payments. This compounds the issue of working capital requirement by creating uncertainty in cash flow.

Many businesses mitigate this risk by increasing monthly payments or extending payback time and use this additional income to mitigate the lost income from those unable to pay. This can reduce
business risk, but has the knock-on effect of increasing the cost to the end user. This is bad for consumers, as it means greater bills and a larger strain on already limited budgets and can also reduce the market size of consumers able to afford a system.

If customers with ability and willingness to pay are geographically dispersed (only a few in each village) distribution cost and maintenance costs grow significantly. Reposition of systems after failure to pay is expensive and unpleasant for technicians and customers. It can cause burnout for technicians and significant reputational damage to the company repossessing the system and to the wider solar market.

Willingness to pay for electricity access is closely related to, but distinct from, the issue of ability to pay. A family in Malawi has a huge number of competing interests vying for a limited disposable income. A separate issue is the sense among experts that consumer behaviour in Malawi is often driven by “want” not “need”. Key “wants” are TVs, seen as a symbol of status. This can result in consumers purchasing larger systems than required to meet their basic daily needs, at a larger monthly cost. This can increase risk of non-payment significantly.

All the factors explored above contribute to an uncertainty for investors and businesses regarding the payback time for off grid systems. This is increased in systems such as micro-grids, with predicted demand growth over time built into the forecasts for repayment.

4.3 Reputational damage from experience of poor products and business models

Many consumers have been exposed to cheap and substandard solar systems and/or poorly run solar businesses. In the past in Malawi, many consumers have experience of low cost, low quality solar lamps and associate the experience of these products with all solar products. This reputational damage can be hard for new businesses to overcome.

The reputational damage goes beyond the just consumers, and also affects government officials, banks and funding institutions, compounding the issues of availability of working capital outlined earlier in this report.

4.4 Legislative environment

The tax and legislative environment in Malawi also present a significant barrier to PAYG business models. Although many technologies associated with solar energy such as panels and some batteries are exempt from VAT in Malawi, technologies enabling pay-as-you-go energy systems, such as metering, remote monitoring and other remote payment based technologies are not exempt from VAT or import tax. This represents a lack of clear messaging about the value of attendant technologies is a significant limiting factor for the potential of the pay-as-you-go market within Malawi, increasing the cost of systems.

4.5 Cost of bill collection

A significant cost for many businesses is travel and staff costs to collect bills from PAYG customers. Due to a lack of mature mobile money infrastructure, this collection is manual.

In a PAYG model the collection of bills introduces additional costs. These costs can come in the form of staff that are required to collect bills on a regular basis from consumers and also keep track of payment or non-payment, potentially remotely activating or repossessing systems.

With more sophisticated remote monitoring and the mobile money based systems this increased cost comes in the form of technology costs, transaction fees and subscriptions to technologies or services required for bill collection.
4.6 Risk of theft by account managers or bill collection agents
Most of the PAYG systems currently in use in Malawi rely on manual collection of PAYG payments by agents. This payment could then be delivered in cash or via a Mobile Money account from the agent to the company. This concentration of cash or Mobile Money credit in agents accounts have resulted in isolated cases of theft. This risk is another issue compounding the cash flow issues experienced by these organisations.

This is a particular problem with bespoke solutions created by companies as a cost driven alternative to commercially available billing solutions. The robustness of the security and failsafe’s within these bespoke systems is often significantly less than that of the commercially available off-the-shelf solution, for reasons of both cost and technical competency.

4.7 Lack of technical knowledge and training within communities
A lack of technical training and capacity building within communities is a criticism often levelled broadly to off grid energy systems This could presents even more of a problem as the technological complexity of systems increases with the integration of remote monitoring, billing and other sophisticated technologies. This will require technicians and technical support to be further trained to identify and troubleshoot problems with this more complex technology, increasing training costs.

Additionally, these systems make end customer interaction with systems more complex, often requiring interaction with mobile money systems or complex user interfaces in order to make use of the technology. Community engagement and training is required to ensure that customers understand the functionality of their products.

Often consumer’s tech savviness is overestimated, particularly in the case of older customers and factors such as communication barrier and embarrassment can prevent consumers from seeking the required support.

A significant source of phone ownership in Malawi is gifting of second hand phones from family members, often from urban areas to more rural areas, so phone ownership cannot be used for a proxy for income, technical knowhow or a willingness to pay for technological solutions [18].

4.8 Appropriate business models
The business model used to provide PAYG system is vital to their success. The market is very young and more work is needed to investigate the range of successful models utilised in other markets. There is a danger in assuming that business models successful in other markets will be appropriate for the Malawian market and careful monitoring of projects both within Malawi and international is needed.

For example, the market operates far differently in Bangladesh, with its strong history of community microfinance than other markets such as Rwanda. In Bangladesh, consumers will take out a loan for the value of the system from a third party micro finance institution, becoming full owner of the system immediately and will repay loan with their savings on kerosene, dry cell batteries and other energy products. By contrast, in Rwanda, many consumers first experience of formalised banking is opening a Mobile Money account to sign up for a Solar Home System. They will not become immediate owners, but instead pay regularly on a rent to own basis.

It is perceived by the interviewed experts that the Malawi market is more in favour of energy as a service, rather than an ownership based model, but there is not enough empirical evidence from trials to begin to draw conclusions. With more research, there could be interesting consequences for the most culturally appropriate models of delivery in Malawi.
5 Technical Barriers and Challenges

5.1 Mobile Signal
In order to utilise the full potential of PAYG systems, mobile signal is required for remote payment and monitoring. Opinions vary among experts regarding how much of a barrier is presented by the issue. Some perceive it to be a key issue, limiting the current potential for off grid systems, particularly in more remote or rural areas. Other experts state that in their experience mobile signal is never an issue. This could be due to the majority of the interviewed experts residing in urban locations with more reliable network coverage and underestimating the issues impact on more rural locations and the lack of experience implementing system reliant on mobile signal.

In order to supplement this information, network coverage data for the country was investigated, but we have been unable to find comprehensive data on mobile network coverage for the country. Both mobile networks were contacted, but did not respond.

Another important factor impacting the perception of signal availability is that many individuals in Malawi will have two sim cards, one for each of the mobile networks to ensure reliable coverage from at least one of the networks. Most people will know what locations have good coverage within their communities from one or both of the networks and shift accordingly between the two. People also tend to move physically to locations with better signal strength to make use of mobile phones, the perception being that people will “find signal somewhere”.

This implication should be considered when developing PAYG systems in Malawi. With a stationary SHS, consumers will be unable to physically move the receiver to locations with signal. This could limit the effectiveness or even render completely non-functional systems installed in low signal locations. Additionally, the lack of overlap of signal from AirTel or TNM in many locations could further limit the locations for system deployment if the system is locked into a specific company’s ecosystem.

Stationary systems could mitigate some of these issues by utilising larger antenna than mobile handsets or using local communication technologies such as Low Power Wide Area Networks to send data to a central location with reliable signal, but these issues must be considered when designing systems for Malawi.
5.2 Cost of integrating PAYG technology

In order to operate a PAYG business, both hardware and software for remote billing, monitoring and other functionality is required. Off the shelf solutions, such as Spark Meter are available, but they tend to be expensive to purchase or licence.

Lower cost solutions do exist, for example in-house solutions designed and deployed by the companies, but these can be unreliable, expensive to design and maintain and less secure than commercially available solutions.

Commercial companies also tend to want high volume sales, making them unsuitable for trial projects with only a few systems under test. The inability to run these trials further compounds the difficulty of obtaining funding for companies, as larger investors will want to see demonstrations of working projects before investing.

5.3 Mobile Money maturity

The penetration of Mobile Money technology is far less pervasive than in other counties with successful PAYG off grid sectors, particularly in rural areas. This is partly due to income levels being lower as well as transaction costs and lack of significant effort in advertising and engagement from the mobile networks. The main use of mobile money for many consumers is to send money over large distances to friends or family members, not every day spending as in Kenya and other markets.

5.4 Mobile money transaction costs

Using any form of mobile money or remote payment technology will generally incur a transaction fee or charge. For off grid energy, this is often offset by the savings in staff costs for bill collection and consumer convenience, but still represents a significant outlay for consumers and/or companies.

Transaction costs can be high for mobile money. AirTel Money features tiered transaction cost structure with a fixed transaction cost within each tier [19]. The lowest tier has a cost of 10 MK for transactions from 50MK to 500MK, representing a fee of between 1 and 10% for the smallest transactions of the type common in PAYG systems, but the recommended tariff for Utility Bill Payments (Electricity, water, TV) is 200.00MK. This seems to be intended to encourage larger transactions, but presents a significant barrier to regular, small transactions required for many PAYG business models.

When mobile Money infrastructure was first established in Tanzania, the network operator offered free payments to commercial companies from consumers without charging a transaction fee. The motivation behind this was to ensure a large customer base using the system and to encourage as many companies as possible integrate mobile Money payments into their business model.

From the perspective of the mobile networks mobile money infrastructure can be seen as an enormous long-term potential money-maker and if that they can ensure buy-in to the ecosystem there is significant financial and competitive advantage to the could be derived in the future, as well as large benefits for enabling socially good technologies such as off grid solar energy.
Communicating and working with mobile network operators

Many of the experts interviewed identified working with the mobile network operators as a key opportunity. They represent the most mature mobile payment infrastructure, a recognised brand with an existing network of sales agents. In other markets, co-branding of products with the established brands of mobile operators has helped increase consumer confidence and the logistics and operational experience of the network operators has can be leveraged to help deploy systems.

A number of experts mentioned an attempt to collaborate with one or both of the network operators, ranging from informal discussions to memorandums of understanding being signed, but in every case the project did not advance beyond this point.

Reasons for this breakdown included internal politics and leadership changes within the network, the lack of a strong value proposition of business model for network operator involvement (linked to the lack of business knowledge among many energy businesses) and a perceived lack of professionalism of energy companies.

Recommendations

This section offers a number of recommendations to help address some of the issues outlined above. These recommendations should offer a starting point for encouraging growth in the PAYG off grid energy sector in Malawi. There are a number of wider recommendations for the industry in the literature [20]. The recommendations in this report focus on specific recommendations for PAYG off grid energy.

6.1 Business and finance training

There is a need for business training for off grid energy companies. The ability to produce and present a robust business plan will both help companies run operationally, but also assist in gaining funding.

Additionally, banks and other financial institution within Malawi also require targeted capacity building activities to increase their understanding of this complex and quickly changing market, identify opportunities and facilitate effective investment.

In particular, training is required around new and innovative business models and modes of operation enabled by PAYG technology, with learning taken from successful case studies from the wider international community.

6.2 Tax and government legislation

The removal of VAT/import tax from all attendant technologies needed to operate off grid energy solutions is required to encourage the growth in this sector. A key barrier is the cost of technology, and more clear and targeted taxation could help to mitigate some of these issues.

There is a need of government policy to keep up with the quickly changing technological landscape and ensure that customs and import taxes are aligned with the needs of the market.

6.3 Mobile Money

Wide adoption of Mobile Money represents a huge opportunity for both of Malawi’s mobile operators, but the wider adoption of the technology has been slow when compared to similar countries. One of the causes of this could be the relatively high transaction fee.

Initiatives such as reduced transaction fees for off grid businesses, different fee structures or even removal of fees for all payments to business could help to kick-start the sector and provide great returns in the future.
Other players such as banks and microfinance institutions could also seek to offer competing solutions (Bank of Malawi already has an equivalent remote payment service). The value of any system is limited by how ubiquitous it is, but the potential to become the de-facto payment method within the country should be a strong incentive for investment.

6.4 Collective action from the Malawi off grid sector
A number of problems have arisen associated with the relatively small size of off grid energy companies in Malawi. This limits the willingness of large organisations like mobile operators to do business, as it is not perceived to be worth their time to form partnerships with individual small companies.

This barrier could be overcome or mitigated by a group of companies approaching the networks together, with specific requests of mutual interest across the sector, such as reduction of Mobile Money transaction fees. In addition, this collective approach could help overcome the issue of minimum order size for metering technology and other products.

6.5 Technical innovation
A number of the outlined barriers could be partially addressed through technological approaches. These include: use of mobile base stations as mini-grid base loads; the development of open source technologies to support billing; monitoring and other activities required for PAYG energy; and wide area networks covering a village aggregating data to a single point with a reliable mobile signal, thereby reducing the number of required SIM cards within the system and also ensuring mobile signal is reliably obtained.

6.6 Understanding mobile signal
To help mitigate the issue of unreliable mobile signal within village’s better understanding of mobile network coverage is required. Surveys within Malawi could offer this information and it could be obtained through the government or mobile networks. Knowledge of coverage would assist companies in planning and reduce the risk associated with deploying systems in areas of unknown signal or the cost of undertaking locational surveys prior to insulation.

6.7 Understanding customer needs
This area is a deep and interesting nexus of a range of issues, with the possibility to enable significant social and environmental good. This report only scratches the surface of the issues and range of further work could be undertaken to expand on the work here.

All the interviews conducted for this report focus on experts. By also interviewing consumers and potential customers across a range of locations within Malawi, a wider range of opinions could be included in the dialogue to inform appropriate solutions.

6.8 Learning from international best practice
A comparative investigation of success and failure within the industry across a wider range of locations with both emerging and more mature markets would hold great interest for the wider industry, both within Malawi and globally.

6.9 Stronger marketing and branding
Drawing from international success stories, it can be seen that strong branding and advertising are contributors to successful solar businesses. The reputation damage discussed above can be mitigated by growing consumer trust, but this process takes time.
The government could also contribute to education around solar energy, though educational campaigns in schools, public information initiatives and other activities.

7 Conclusions

From international experience it is clear that decentralised off grid energy, enabled by modern PAYG and remote payment technologies have significant potential to provide reliable and cost effective electricity access in remote and rural locations. This report has highlighted several significant barriers to the uptake of this technology at a large scale in Malawi; however, many of these barrier can be addressed by directed effort from policy makers and industry stakeholders.

8 References

[12] GSMA, "Mobile Money Metrics - Regulatory Index".


