



Access to Consumer Finance for Vulnerable Groups: One Size Does Not Fit All



AFRICA CLEAN ENERGY (ACE)
TECHNICAL ASSISTANCE FACILITY (TAF)

Access to Consumer Finance for Vulnerable Groups: One Size Does Not Fit All

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Cover page: Power Africa - M-POWER-g62 ; Photo credit Power Africa

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ABBREVIATIONS

Abbreviation	Definition
CGAP	Consultative Group to Assist the Poor
CTEN	Community Technology Empowerment Network
ESMAP	Energy Sector Management Assistance Program
ID card	Identification card
IDPs	Internally Displaced Persons
LED	Light - Emitting Diode
MFIs	Microfinance Institutions
MNOs	Mobile Network Operators
OGS	Off - Grid Solar
PAYGo	Pay-as-you-go
PAYGrow	Pay-as-you-grow
PULSE	Productive Use Leveraging Solar Energy
PV	Photo Voltaic
SIM	Subscriber Identification Module
SMS	Short Message Service
SSA	Sub - Saharan Africa
UNHCR	United Nations High Commission for Refugees
USD	United States Dollar
USSD	Unstructured Supplementary Service Data
VAS	Value Added Service
VSLAs	Village Savings and Loan Associations
Wp	Watt Peak

EXECUTIVE SUMMARY

Consumer finance mechanisms have been instrumental in enabling increased access to off-grid solar (OGS) products. With the total price of a household tier 1 OGS product averaging USD 147 and approximately 40% of Sub-Saharan Africans living on less than USD 1.25 per day, they are prohibitively expensive for many.^{1,2} Consumer financing mechanisms reduce the upfront cost of these products and require relatively small regular repayments until the cost of the system, plus additional fees such as interest, is paid off. The most well-known consumer finance model in the OGS sector is mobile money enabled pay-as-you-go (PAYGo) but traditional asset financing, financing through microfinance institutions (MFIs), and community-based models, among others, all play a role in supporting consumers to overcome affordability constraints through access to consumer finance.

However, the current coverage of consumer finance models is not universal, and some groups, particularly in vulnerable communities, are left un- or underserved. Despite reducing affordability barriers, 46 million people are still unable to afford OGS products through consumer finance mechanisms.³ Additionally, many of the 670 million consumers that are theoretically able to afford OGS products lack the means to access them. Marginalized and vulnerable groups in Sub-Saharan Africa such as women, refugees, and religious minorities often face the greatest challenges in accessing the available consumer finance models due to their social or financial situation. Figure 1 provides an overview of four consumer finance mechanisms and example of their relative advantages and disadvantages for vulnerable groups (a more detailed description can be found in Chapter 3).

SBA Project: Lighting Africa

School girls studying with a solar lamp: IFC's Lighting Africa program has enabled 1.5 million people across the continent to acquire some form of cheap, off-grid, renewably powered light. Photo credit: Jamie Seno



¹ *Lighting Global, Vivid Economics, and Open Capital, 2020 Off-Grid Solar Market Trends Reports (MTR), (Washington DC: International Finance Corporation, 2020), 43,*

² *Off-Grid Utilities Report Bridging the Rural Energy Gap in Emerging Markets, (London, Shell Foundation, 2020), 5,*

³ *Lighting Global, Vivid Economics, and Open Capital, 2020 Off-Grid Solar Market Trends Reports (MTR), (Washington DC: International Finance Corporation, 2020), 15,*

Figure 1: Overview of 4 consumer finance models for OGS products in Sub-Saharan Africa and their relative advantages and disadvantages

	Brief Overview	Regions Prevalent	Examples of Advantages for Vulnerable Communities	Examples of Disadvantages for Vulnerable Communities
PAYGo Models	The OGS company provides the product and financing to the consumer. The consumer makes periodic repayments via mobile money, cash, airtime or scratch cards. If the consumer fails to make a repayment, the device is remotely locked until payment is made.	Particularly strong presence in East Africa, particularly Kenya, due to high mobile money adoption rates	Advantages and disadvantages of PAYGo models are highly dependent on the payment mechanism <ul style="list-style-type: none"> Mobile money – Reduces the need for physical infrastructure which can increase access in rural or hard to reach areas Mobile money – Positively contributes to the financial inclusion of previously underserved low-income earners. Cash - Cash collections do not require access to banking and telecommunication services. 	Mobile money - Poor mobile networks and low mobile money penetration limits the potential uptake of PAYGo via mobile money in some regions and countries <ul style="list-style-type: none"> Cash - Cash collection limits consumer choice on repayment values and is more labor intensive which can increase costs
MFI Models	An OGS company provides the product while an MFI provides consumer financing The consumer makes regular repayments to the MFI that will generally repossess the system if the consumer fails to repay.	Prevalent in many countries with lower mobile money penetration, in particular Ethiopia and Nigeria	<ul style="list-style-type: none"> Lends itself to collective lending mechanisms which are beneficial to vulnerable groups One of an MFI's core competencies is the provision and servicing of consumer finance, which can lead to a more cost-effective process MFI's have received financing support from development partners targeted at vulnerable groups 	<ul style="list-style-type: none"> MFI's often have expensive physical infrastructure and high overheads which can increase the cost of consumer finance Poor MFI coverage in low population density areas limits access to services MFI's often have stringent and complex credit checks
Rental Models	The OGS company rents out charged batteries or OGS products for a fee. The consumer uses the device for a set time or until the battery dies before returning it and renting a new product.	Notable companies in Sierra Leone (Mobile Power), Senegal (Sunny Money) and Tanzania (Wassha & Jaza Energy)	<ul style="list-style-type: none"> Elimination of deposit payments reduces affordability barriers Can increase consumer choice and have additional benefits in consumer education Solar kiosks can offer additional community services e.g. phone charging, ICT services, etc. 	<ul style="list-style-type: none"> Lack of evidence regarding model's viability for large scale implementation \ High breakage, fault or non-return rates on rented products Lack of transfer of ownership of products
Community Based Models	Community savings and credit groups are often formed by common demographics, e.g. farmers. Their goal is to increase financial standing of its members by pooling capital to provide loans or expensive items.	While not often used for OGS products, community lending models are prevalent across SSA (Table 1)	<ul style="list-style-type: none"> Groups are very common among vulnerable communities, well established and trusted. Self-management fosters low administrative costs Social bonds ensure relatively high repayment rates 	<ul style="list-style-type: none"> Loans to purchase an OGS device may require a larger amount or longer repayment period than is generally typical There is currently little-known best practice for how these models can be scaled up economically, particularly in harder to reach areas

Given the highly varying socio-economic situation of vulnerable communities, it is clear there is no “silver bullet” nor one-size-fits-all solution, rather a number of recommendations which together improve access to consumer finance. Expanding coverage of existing models will require stakeholder participation at both the macro and micro levels to improve coverage and reduce costs. New models can be developed or borrowed from other sectors to provide additional coverage, including the increased use of remittances or community lending. It is also vital that any recommendations to improve consumer financing for the end users are cognisant of the fact that OGS companies are generally commercial entities that need to maintain strong consumer repayments and low default rates to meet their own obligations. Given that, this report provides a number of recommendations which OGS stakeholders can come together to implement to improve access for vulnerable groups:

- **Increasing the availability of disaggregated energy access data will make it easier to identify which groups currently lack access and enable the design of targeted consumer finance mechanisms.** There is currently very limited data available on which vulnerable groups are most underserved. This hinders the sectors ability to design consumer finance mechanisms and initiatives specifically to support these groups. Organizations or initiatives such as ACE TAF, ESMAP and 60 Decibels are seeking to fill this gap but could be greatly supported by access to company data.
- **Leveraging and engaging community groups and structures as part of consumer finance mechanisms to reduce OGS companies’ operating costs and increase consumer engagement.** Vulnerable communities often have strong existing social structures and their own credit and savings associations which can both be leveraged to boost repayments and

Peter Mutai, 42, in Lugari, Kakamega County was among the first members of Lugari Boda SACCO to apply for a loan to buy a 4A solar lantern. “The 4A has 4 bulbs and costs 8500 shillings (USD 84) and is enough for my three-roomed house. One bulb is placed outside to provide lighting at night and for security purposes,” Mutai said. Photo credit: Power Africa



provide consumer finance. OGS stakeholders can conduct research into these social structures to enable consumer finance providers to know how to leverage them in lieu of collateral and to improve repayment rates. Additionally, community groups can be engaged and supported to provide consumer financing to members for OGS products with the support of OGS development partners.

- **Building the evidence base for governments, MNOs and financial institutions to increase coverage of enabling infrastructure to many currently excluded vulnerable groups.** Many vulnerable communities are not covered by mobile networks or don't have access to MFIs branches due to the perception of low demand. Development partners and OGS companies can provide evidence for demand for such services and can come together to lobby such organizations to provide the infrastructure required.
- **Support initiatives looking at formalizing remittances as a means of providing energy access to vulnerable communities.** Money sent home by migrants as remittances competes with international aid as one of the largest financial inflows to developing countries yet remains a highly informal process. There has been some work to formalize this process and use remittance funds to pay for OGS products, such as BBOX's partnership with Shell Foundation. However, further support in this area funded by development partners could unlock a whole new customer base and ensure more reliable finances by assessing the wider feasibility and impact of such models, and the role various stakeholders would need to play in scaling it up.
- **Provide support to scale and test rental models to target specific vulnerable communities due to its lower financial barrier to entry.** Rental models, such as solar libraries or solar kiosks, have enabled consumers to regularly gain access to energy without requiring significant upfront costs which act as a barrier in other consumer finance mechanisms. This model is regaining traction in recent years through companies such as SunnyMoney, Mobile Power and Jaza Energy. Additional technical assistance and financial support to expand this model up to scale could provide access to those that currently cannot afford other forms of consumer finance.



*Philips Africa Roadshow
Football event Dar es Salaam
Picture by: Rob Verbeek - Philips*

- **Support companies to run pilot studies on the impact of varying consumer finance terms on consumer access, affordability, repayment and default rates.** While a number of OGS companies are currently experimenting with finance terms, there remains very little consensus in the sector on which approach has the greatest impact on increasing access for vulnerable communities. OGS development partners could support OGS companies to run pilots to determine which financing terms are most effective in engaging vulnerable groups while also ensuring strong repayments.
- **Incorporate consumer insurance into consumer finance mechanisms to support those most at risk of economic shocks.** Insurance against economic shocks, such as the death of the breadwinner, can cover the remaining payments to be made to the OGS company with the household no longer being liable. Such insurance partnerships can be arranged by OGS companies for around 1% of the end consumer product price and could hugely benefit vulnerable groups that are more susceptible to such economic shocks. Development partners could support the scale up of this initiative through research on its impact, the facilitation of market linkages and initial de-risking for insurance companies.
- **Increase sector focus on the provision of consumer finance for smaller OGS products.** The OGS sector has seen a dramatic shift towards selling larger systems over the last few years as companies seek to become profitable. This shift leads to lower income and more vulnerable consumers being unable to afford OGS products. While some companies do offer smaller systems through consumer financing, to further support vulnerable communities to access OGS products, consumers need more options to access less expensive products that meet their energy needs within their spending limit.

This report examines the role of consumer finance in serving vulnerable groups by addressing four key objectives:

- **Identifying vulnerable groups and explaining the affordability and accessibility challenges they face.** This report identifies the social and economic characteristics which typify underserved vulnerable groups and how these present affordability and accessibility barriers to consumer finance for OGS products.
- **Illustrating the advantages and shortcomings of existing consumer finance models in addressing the challenges of vulnerable groups.** While current consumer finance models have made great strides in improving access, this report will dig deeper into their specific advantages and disadvantages for vulnerable groups.
- **Examining the modifications implemented by companies in addressing shortcomings of existing consumer finance models.** This report highlights attempts made to extend consumer finance to a greater number of consumers and providers.
- **Providing recommendations to increase access to consumer finance for vulnerable communities.** Based on these findings, this report highlights steps which OGS stakeholders can take to increase access to consumer finance for vulnerable communities.



Despite global electrification efforts, approximately 840 million people still lack access to electricity in 2020, about 70% of whom live in Sub-Saharan Africa (SSA) and many that are regarded as the most vulnerable in society.⁴ Between 2010 and 2019, electrification efforts helped improve Sub-Saharan Africa's total electricity rates from approximately 30% to 43%.⁵ However, there are discrepancies across social groups and geographies. For example in SSA, 80% of people lacking access to electricity are concentrated in rural areas, while 89% of refugees and internally displaced persons (IDPs) living in camps have tier 0 electricity access.^{6,7} Those individuals located in remote, rural settings face challenges such as inadequate sources of income and poor infrastructure that lead to a constrained ability to afford conventional sources of electricity and which also discourages electricity providers from serving them due to the high cost of doing so. Vulnerable groups are the most likely to face these challenges, which are often compounded by additional barriers due to their socio-economic situation, which prevents them gaining access to electricity.

The definition of vulnerable groups

While there is no single definition of a vulnerable group, this report defines vulnerable groups as communities which are generally living in a state of entrenched energy poverty due to their socio-economic situation and lack of access to enabling infrastructure. They are generally characterized by constrained financial resources or the unavailability of market interactions necessary for the participation in market based off grid energy solutions.⁸

Decreasing component costs have helped push off-grid solar (OGS) as a viable solution for many unelectrified populations, but these cost reductions are slowing, and products are still unaffordable for many. The decrease in the price of lithium-ion batteries, solar PV panels, and LED bulbs has contributed to the improved affordability of off-grid solar products.⁹ However, with the total price of a household tier 1 OGS product still averaging USD 147 and with approximately 40% of Sub-Saharan Africans living on less than USD 1.25 per day, OGS products are still prohibitively expensive for many low-income earners.^{10,11} With costs expected to level off in the coming years, the total price will continue to remain out of reach for most of this population.

Consumer financing can increase the affordability of OGS products, but access to formal financing options has been limited, particularly for vulnerable groups. Formal financial service providers such as commercial banks have limited presence in rural areas because of the low market

4 *More People Have Access to Electricity Than Ever Before, but World is Falling Short of Sustainable Energy Goals*, World Bank, May 22, 2019,

5 Nirav Patel, *Figure of the Week: Electricity access in Africa*, Brookings, March 29, 2019,

6 *Accelerating SDG 7 Achievement Policy Brief 01 Achieving Universal Access to Electricity*, IEA UNDP & IRENA,

7 Johanna Lehne et. al, *Energy Services for refugees and displaced people*, Energy Strategy Reviews,

8 *Solar Lights and the Extreme Poor in Off-Grid Uganda*, Energypedia,

9 *2020 Off-Grid Solar Market Trends Reports (MTR)*, 2020, 66,

10 *2020 Off-Grid Solar Market Trends Reports (MTR)*, 2020, 43,

11 *Off-Grid Utilities Report Bridging the Rural Energy Gap in Emerging Markets*, 2020, 5,

potential associated with low-income levels and limited economies of scale, creating high costs to serve customers. Additionally, even in areas where financial institutions are present, they have been reluctant to lend for energy products because of their limited understanding of OGS technologies and the potential unknown profitability of lending for OGS products. This is further compounded by the lack of credit history and limited access to collateral that characterizes many without energy access.

Consumer financing models such as pay-as-you-go (PAYGo) have helped increase affordability, driving the rapid growth of the off-grid solar sector, and accelerating future growth. Between 2018 to 2019 alone, the market value of off-grid PAYGo sales grew from USD 164 million to 217 million, indicating a growing market demand for financing options.^{12,13} Consumer financing mechanisms theoretically enable a 670-million-person addressable market, of the 716 million people that lack electricity in Sub-Saharan Africa and Asia-Pacific.^{14,15} The uptake of instalment driven multi-light products has undoubtedly been propelled by the success of mobile money in SSA. Network coverage has spiked with over 700+ million connections in the region, with positive trends also noted regarding the decrease of mobile phone costs which are key factors in improving the accessibility of consumer financing models such as PAYGo.¹⁶

Definition of OGS Consumer Finance

This report defines consumer finance as a loan to a consumer used to finance an OGS product, allowing a consumer to purchase a product over time, which they would otherwise not be able to if they had to pay the full cost upfront. Financing typically involves the breakdown of the total OGS product cost into a down payment and subsequent instalment payments. This makes the product more affordable to end-users by spreading payments across a pre-determined period. At the same time, consumer financing includes additional fees, such as interest payments, which drive up the total OGS product cost the consumer pays over-time compared to buying the system outright in one upfront payment. These extra fees are due to increased costs to service the loan and the increased risk of non-payment.

Despite this significant progress, not all 670 million consumers that can afford OGS products can access consumer financing mechanisms, particularly vulnerable groups that are limited by their specific socio-economic situation. While the availability of consumer finance for OGS products has grown rapidly over the last decade through the rise of mobile phone ownership and mobile money, and the increased engagement of microfinance institutions (MFIs) in the sector, the coverage of these mechanisms is not universal, leaving many consumers unable to afford an OGS product. Consumer finance is often particularly hard to access for people in deep rural areas or vulnerable groups as they are seen as less attractive customers by consumer finance providers due to low incomes or the high cost of serving them. While not documented, it is therefore highly likely that the true figure for the serviceable market is significantly smaller than the 670-million-person addressable market, although by exactly how much is not currently known.

¹² GOGLA, *Global Off- Grid Solar Market Report: Semi-Annual Sales and Impact Data, 2018*,

¹³ GOGLA, *Global Off-Grid Solar Market Report: Semi- Annual Sales and Impact Data, 2019*,

¹⁴ *2020 Off Grid Solar Market Trends Report (MTR), 2020, 15*,

¹⁵ *This assumes access to a multi-light solar product, paid in monthly instalments with the consumer saving for up to three months for the deposit.*

¹⁶ Roxanna Elliott, *Mobile Phone Penetration Throughout Sub-Saharan Africa, July 8 2019*,

A theoretical breakdown of the market can be seen in figure 2.



Figure 2: Theoretical access to OGS products through consumer financing mechanisms (not to scale)

While subsidies are expected to help bridge some of this gap for the most vulnerable, there is an opportunity to increase accessibility and affordability of commercial consumer finance to accelerate energy access. Both demand and supply side subsidies are recognized as viable avenues which policymakers can use to reach universal access of electricity and support vulnerable communities. They achieve this by closing affordability gaps for end users who would otherwise not afford solar products as investigated by the Achieving Dual Goals: Universal Energy Access and Sustainable Markets report.¹⁷ However, we cannot rely on subsidies alone to support vulnerable groups. Further efforts need to be made to move the needle regarding affordability and accessibility by analysing and restructuring consumer finance models. While models such as PAYGo and MFI partnerships have been deployed to the wider general public, refining their intrinsic characteristics to suit the needs of vulnerable communities can further contribute to improved accessibility for individuals who would otherwise remain unserved.

17 Africa Clean Energy, Demand-Side Subsidies in Off-Grid Solar: A Tool for Achieving Universal Energy Access and Sustainable Markets,

2 Affordability and Accessibility Challenges for Vulnerable Groups

While affordability and accessibility challenges exist for all consumers, these are particularly acute to vulnerable groups. Consumer finance models have enabled a greater number of consumers to access OGS products by reducing the upfront costs and enabling smaller repayments to be made over time. However, with PAYGo only contributing to 24% of affiliate sales (affiliate sales are those made by GOGLA members or sales of Lighting Global Quality Verified products) or 5.6% of tier 1 sales consumer financing mechanisms are still not widespread limiting consumer financing access to purchase OGS products.¹⁸ In addition, while consumer finance might be theoretically affordable, for many the deposits and repayments are still prohibitively high when accounting for consumer willingness to pay. Vulnerable groups are particularly at risk from being excluded from consumer finance due to the additional unique challenges they face on top of the common challenges that affect all consumer groups. Unique challenges attributable to a specific vulnerable group, further compound the accessibility and affordability challenges and are discussed in more detail below.

2.1 ACCESSIBILITY CHALLENGES

Accessibility is defined as the availability of a means or opportunity to successfully access consumer financing to acquire OGS products. This is important because while consumers may theoretically have access to OGS products, challenges such as poor supporting infrastructure, an unfavourable enabling environment, stringent credit checks, low literacy levels, and previous negative experiences make it practically challenging and consequently limit the opportunities to successfully access consumer finance. Many of these challenges affect numerous customers, including vulnerable groups, and are explored in more detail below.

Many consumers lack access to the supporting infrastructure required for most consumer finance models. Supporting payment infrastructure, transport and last mile distribution networks are necessary for the effective delivery of consumer financing. For instance, a lack of mobile network coverage and unavailable, or distantly located mobile money agents may mean consumers are unable to make payments or force existing customers to delay or completely miss payments. Even in areas with mobile money agents, the availability or lack thereof, of a ‘float’ (a monetary balance a mobile money agent requires to hold to be able to conduct any mobile money transactions) can limit access and use of mobile money. Additionally, poor quality transport infrastructure can make it difficult and time consuming for customers to access a mobile money agent or a banking branch. This is especially challenging, when MFIs have one branch to cover a vast region. It also makes it challenging for companies to conduct installations and provide maintenance services pushing companies to decide that reaching these customers does not represent a viable economic choice.

The enabling environment is not always favourable for the deployment of consumer finance and can have an outweighed impact on vulnerable groups. Government policies can inhibit access to consumer finance due to poorly defined property rights to assets, such as land or cattle. This can

¹⁸ *Lighting Global, Off-Grid Solar Market Trends Report (Washington, DC: IFC, 2020).*

particularly impact women, where a combination of customs and laws restrict their ability to own and manage land. Additionally, being compliant with government regulations, which vary dramatically by country, can prevent certain consumer finance models from taking off or increase the cost of delivering consumer finance. For example, government regulations in Nigeria have, for many years, prevented mobile money from being widely adopted despite increasing efforts to change this.¹⁹

OGS companies are pushing towards becoming more discerning with the customers they sell to as they seek to shore up their finances, potentially excluding viable customers. Given the OGS industry's recent push towards profitability, in part driven by investor demands, OGS companies' have become and continue to be more selective with whom they sell to. For companies that assess consumer creditworthiness, credit checks are becoming more stringent to protect portfolio quality. This is especially true of MFIs whose rigid credit checks and repayment terms compared to those of PAYGo companies may constrict the ability to onboard new customers.²⁰ Credit history is another major challenge as consumers lack the formal documentation or assets required. This limits access to the few who meet assessment requirements, excluding those that have lower-income and lack assets for collateral.

Low literacy and education levels create a gap in consumer's understanding of their rights and how to access consumer finance models. In Kenya, 10% more women (26%) are illiterate than men (16%), with the gap increasing to 17% between women (38%) and men (21%) in Uganda.²¹ These challenges extend to other vulnerable groups such as refugees. For instance, in Bidi Bidi, the second largest refugee camp in the world located in Northern Uganda, a report by GSMA found that 25% of survey respondents were unable to read or write in any language.²² This trend extends, not surprisingly, to digital literacy where 59% of mobile users indicated they had some struggles using mobile phones with women and the elderly disproportionately affected.²³ Low literacy impacts the ability of potential customers to comfortably engage OGS services as they may not understand the documents they sign and clauses they agree to and may find it difficult to effectively follow through on payment obligations such as those related to mobile money.

Communities whose members suffer from negative experiences in engaging OGS consumer financing can persuade others not to access consumer finance for OGS products. It is widely accepted that OGS financing exposes many individuals to debt obligations that places an additional financial burden on already strained incomes. While some argue that flexible payments are designed to substitute for pre-existing lighting expenditures, the key difference is that the latter is not obligatory and therefore has no additional impact on the individuals if it is not made. In the face of extended periods of non-payment, customers can have their systems repossessed or be faced with additional financial penalties causing significant embarrassment and stress, both financial and mental. In addition, other factors such as unscrupulous and fraudulent agent behaviour and poor-quality products and after sales service can also significantly impact customer experience. If these experiences are shared widely among community members, this can serve to deter other potential customers from engaging OGS consumer financing.

19 Kanika Saigal, "Regulators give mobile money in Nigeria a boost" *Euromoney*, January 10, 2019,

20 Daniel Waldron et al, *A Tale of Two Sisters, Microfinance & PAYGo Institutions* (Washington DC: CGAP- World Bank, 2019),

21 Mark Buttweiler, "The Impact of Equal Education: Solutions to the Gender Disparity in Sub-Saharan African Schools," *Guest Articles, Next Billion*, May 2, 2019,

22 GSMA, *The Digital Lives of Refugees*, (London, UK: GSMA, 2019) ,28,

23 GSMA, *The Digital Lives of Refugees*, (London, UK: GSMA, 2019) ,28,

On top of these common challenges impacting accessibility, vulnerable groups often face specific challenges due to their socio-economic situation.



Refugees and internally displaced people

Refugee camps are a hub of different cultures and languages, raising challenges concerning communication and ease of doing business. Language barriers may limit the effectiveness with which company employees such as sales agents or call centre employees, engage with refugees going as far as inhibiting any potential engagement. This is because both parties may fear that limited communication can lead to transactional difficulties. For those companies and refugees that do engage, the engagement can be a source of frustration as both parties try to meet their obligations.

Refugees may lack appropriate identification necessary to access a variety of services such as financial and telecommunication services. Cross border refugees lack relevant host country identification making it challenging for them to open a bank or mobile money account or even buy a sim card.

Logistical difficulties and bureaucracies can delay and hamper access for OGS companies. The organizational set up of refugee camps may make it difficult, cumbersome, and time consuming for companies to enter these markets, who therefore choose to enter markets that have lower barriers to entry.



Women

Women are traditionally less economically empowered than men due to traditional roles assigned to women and the patriarchal nature of many African societies. As men in rural communities are likely to work outdoors, they may not strongly perceive the household need for an OGS product. On the other hand, women are responsible for household chores such as cooking, cleaning and for looking after the children and therefore, in the absence of access to energy, are disproportionately affected. Gender roles also likely impact mobile phone ownership with women 13% less likely to own a phone with this trend replicated within refugee settings, increasing the barriers and widening the consumer finance access gap.^{24,25}

Asset ownership and income can be a challenge for women in many contexts, either due to a lack of opportunities or due to societal norms limiting women's social standing and creating a gender pay gap. In extreme cases, women can be entirely prevented from asset ownership or receiving an income. An overall trend is seen across Africa, with women much less likely to own assets and wealth compared to men (13% for women vs. 36% for men).²⁶ Additionally, in some countries with significant gender differences, women are at least 11% less likely to own a mobile phone, preventing them from accessing mobile money.²⁷

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24 GSMA, *The Mobile Gender Gap Report*, (London, UK: 2020), 9,

25 GSMA, *The Digital Lives of Refugees*, (London, UK: GSMA, 2019), 38,

26 World Bank, "Gender Gaps in Property Ownership in Sub-Saharan Africa", (World Bank Group, Washington DC, 2018),

27 GSMA, "The Mobile Gender Gap Report 2019", (GSMA, London, 2019),



Religious minorities

Some communities prescribe to faiths that detail the kind of financial transactions members may engage in. Conventional MFIs operate an interest (riba) model, which they charge on the loan they extend to consumers. This is against the Islamic tenets, and as such, many Muslim communities abstain from borrowing from the traditional microfinance services, which is against the Sharī'ah.



Nomadic communities

Nomadic communities often live in very remote locations and they may lack regular access to payment infrastructure. The number of nomadic people in Africa is unclear, but it is estimated that there are 30-40 million nomads globally. The majority are low-income households that rely on pastoral or hunter-gather practices and may lack access to education. This nomadic existence makes access to the infrastructure required for consumer finance mechanisms even more challenging due to the lack of consistent coverage of this across the continent.

2.2 AFFORDABILITY CHALLENGES

Affordability is the ability of customers to pay the upfront deposit and make the regular payments they are obliged to make as per the product's financing terms. While 670 million consumers without access to electricity can afford OGS products, this may not be reflective of reality as affordability needs to include both the ability and willingness to pay. While OGS is considered attractive by many customer groups, if not all, customers can differ in the value they assign to the products and therefore the amount they are willing to pay. While they may vary across and within a customer segment, gaps between what customers are willing to pay and what they can pay are common within the target markets for OGS as potential consumers have competing financial demands. Vulnerable groups in particular may assign less value to an OGS devices as they use limited income on food or education and are also very sensitive to expense and income shocks which may lead to the need to cut back on energy expenditure.

Despite the success of consumer finance models, affordability remains a major challenge that limits the ability of consumers to access OGS products. OGS systems and their associated distribution costs are relatively high, meaning that even with consumer financing models in place, there are still many low-income consumers for which the regular repayments required, let alone the upfront deposit, is unaffordable. This affordability issue is further compounded by the fact that there is a cost associated with providing consumer finance, which is passed onto the consumer. This results in the consumer paying more over time than they would if they were able to purchase the product upfront. In the case of a PAYGo driven model, this can be 25% or more of the total end-consumer price.²⁸ Common affordability challenges affecting all customers, including vulnerable groups are presented below.

High deposits act as the main cost barrier for low-income households as it is generally the single largest payment that they make for their OGS systems. Due to requiring some financial security, most consumer financing models require an upfront deposit to be made. The higher the deposit, the fewer consumers that will be able to afford it, and the longer it will take for others to save up the required

²⁸ Hystra, "Pricing Quality Cost Drivers And Value Add In The Off-Grid Solar Sector, 2020,

amount. The time taken to save up for the deposit will can deter many from doing so, particularly as they are likely to still be spending on kerosene or other traditional fuels while saving, something not accounted for in many affordability calculations. Additionally, the longer they save for the deposit? the higher the chance they will need to use those savings to cover other economic shocks such as an illness in the family, drought or job loss.

Repayment periods are generally no more than 24 months due to the financial burden and risk longer repayments have on finance providers, which pushes up monthly repayment amounts.

The longer the period over which a consumer can pay for an OGS product, the lower their regular repayments will generally be, but the higher the overall cost they pay. Lower regular repayments are beneficial to end-consumers and may allow them to access larger systems that they otherwise might not be able to afford. However, very long repayment periods are generally not offered due to the higher risk of defaults they present and the greater strain on cashflows for the credit provider.

The total cost of a system, and consequently the deposit and repayment amounts, are still relatively high across the OGS sector because of the cost of delivering such mechanisms:

- **The high cost of collecting payments increases the end price of products as companies transfer these costs to the consumer.** In a PAYGo model, global system for mobile communication (GSM) integration costs are about USD 10 on the high end, while there are additional costs associated with SMS reminders, data analytics teams, call centres, etc. In a cash collection model, the costs associated can be even higher due to the labour intensiveness of face to face visits requiring a large workforce.
- **Providers of consumer credit will spread the risk of defaults and slow repayment rates across the consumer base.** Most providers of consumer finance in the OGS sector have a single pass or fail credit assessment for a particular product. This means that lower-income consumers and those that are deemed to be of higher risk of defaulting but still pass the credit assessment access products under the same terms as lower risk consumers. This increases the financial burden on consumers as companies cover their risks from these consumers by increasing the deposit and monthly repayments for all.
- **Investor demands and the foreign currency nature of financing available to OGS companies influences the duration and total cost of OGS products.** Investors that provide non-patient capital are likely to provide financing terms in line with the risk profile of the OGS target market customers. The borrowing rates offered can therefore be high and for durations that are unlikely to exceed 2 to 3 years. Incorporating the time taken to order, receive, and sell products, and collect repayments highlights the limited flexibility that OGS companies can offer customers in terms of total cost and term durations as they need to start repaying their own financiers. To compound the already limited flexibility further, the foreign currency nature of most financing offered to OGS companies exposes their cashflows to significant foreign currency risks forcing them to factor in the risks into their pricing. In addition to the general economic and political dynamics that influence foreign exchange fluctuations, the presence of COVID-19 this year has further worsened the outlook for some currencies. For example, the Zambian Kwacha saw its value depreciate 31.5% between 1st March and 19th September 2020.²⁹

29 Note: Currency rates obtained from Xe.com

On top of these common challenges impacting affordability, vulnerable groups often face specific affordability challenges due to their socio-economic situation.



Small holder and subsistence farmers

Smallholder and subsistence farmers experience seasonal income highly correlated with crop harvesting patterns. Most farmer incomes are tied to their harvest periods, experiencing periods of high cash flows at the time of harvest and low cash flows in the periods between. The fluctuation in cash flows is worse if farmers are growing low value crops with only 1 harvest cycle in the year and have no other supplemental income.

Limited access to market linkages limit the ability to maximize farmer earnings. Smallholder farmers, especially those that stay in remote areas may rely on middlemen or brokers to sell their produce. Brokers aggregate produce in an area and organize the transport for all produce to bigger town centres, providing a convenient option through which smallholder farmers can offload their harvest. The absence of appropriate storage facilities (cold storage or otherwise), the potential costs associated with seeking their own buyers, the threat of produce spoilage and of an increase in supply and therefore a drop in prices, are all reasons why farmers may choose to sell to a broker at a much cheaper price negatively impacting their earnings. The earnings can be further compounded if the harvest for that period was poor limiting the total income earned by farmers and subsequently negatively impacting their ability to spend on goods such as off-grid solar.



Refugees and internally displaced people

Refugees and IDPs have limited income, forcing them to carefully consider their spending. Refugee camps do not provide many employment opportunities. While some refugees may receive remittances and others might engage in small businesses most rely on support from camp managers with some also trading their food handouts for a little more cash. The limited income forces them to make serious choices that leave no room for other expenditures considered unnecessary.



Women

In balancing their household and income generating activities, women-led households may earn lower incomes. As previously mentioned, women are responsible for not only cooking and cleaning the house but also for looking after the children. For single mothers, there is an added burden of the need to earn an income for the household. This requires women to allocate their time between the two sets of activities and thus limiting the income they can earn.



Elderly and disabled

The elderly and disabled lack employment opportunities which can significantly hinder their ability to pay. Elderly and disabled persons are identified as high-risk groups by many governments across SSA. For example, in Kenya, the most vulnerable in these groups are eligible to access government support programmes such as the National Cash Transfer Program. This is due to their limited employment opportunities as well as societal challenges common to these groups, such as a lack of support network and education. This causes significant challenges in their ability to afford OGS products through consumer finance mechanisms.

3 The Current State of Consumer Finance for Vulnerable Groups

Currently available consumer finance mechanisms have already made strides towards better serving and increasing energy access for vulnerable groups. PAYGo and MFI models have expanded rapidly in the last decade and enabled access to consumer finance for millions of consumers. Their rapid expansion has in large part been possible due to the rapid growth of mobile money across the continent and the ever-increasing coverage of MFI networks. Now, in a bid to further increase accessibility and create reliable repayments, OGS companies are developing modifications to these already existing consumer finance models taking advantage of local market nuances and consumer characteristics affecting purchasing power. In addition, other consumer finance mechanisms, including rental models and community models, have the potential to increase access for a larger number of consumers, including vulnerable communities.

However, consumer finance mechanisms are generally driven by OGS companies' need to increase profitability and improve sustainability meaning focus on vulnerable groups is often still limited. While a variety of tools and strategies have been implemented, they understandably all operate within the margins of increasing company profitability and ensuring they are commercially sustainable. As previously discussed, vulnerable groups are to a large extent difficult to serve due to uncertainties surrounding their ability to repay and the higher costs to reach them. It is therefore understandable that OGS companies have to date generally focused on serving “low-hanging-fruit” customers that are more financially attractive or easier to reach. This means that existing consumer finance mechanisms, and the modifications being made to them by OGS companies, are generally not specifically tailored to better serving vulnerable communities, leaving them perpetually underserved. Despite this, many of the improvements being made to consumer finance are beneficial to vulnerable groups and are examined in more detail below.

3.1 PAYGo MODELS

The PAYGo model is one of the most used consumer financing models in Sub-Saharan Africa. While many associate PAYGo with mobile money, numerous variations of the PAYGo consumer finance model exist. Despite this, all the models generally share some common factors. Initially, a customer will go through a credit assessment. This is often very limited and may not require the customer to provide any physical proof of income, expenditure, or assets, nor provide any collateral. If the consumer passes a basic credit / background check which varies by company, they then pay a deposit covering a percentage of the total product price (generally 10-30% of the total cost). The consumer then makes ongoing regular payments to enable them to unlock the device for a set period, potentially as short as on a daily basis, via a pre-determined payment mechanism (mobile money, airtime, cash, etc.). If the consumer does not make a repayment, the product is remotely locked until the next payment is made. Remote locking provides reasonable assurance that OGS consumers will regularly pay as a failure to do so will lead to the shutdown of the system pending further payment. While the PAYGo model does not preclude repossession of systems on non-payment, in reality, the remote locking functionality means OGS companies only do so in extreme cases as consumers can go long periods between repayments during which time they can't use the system.

The key variation between different PAYGo models is how repayments are collected from consumers. Mobile money has been a game-changer in the provision of consumer finance for OGS products due to the ease in which repayments can be collected, but it is not the only payment method through which PAYGo works. While mobile money is extensively available in Kenya, it has not reached anywhere near the same penetration levels in many other countries and is generally more difficult to access for vulnerable communities. Therefore, it is necessary to examine each form of PAYGo and how they serve vulnerable groups. A basic outline of the PAYGo consumer finance model is provided in figure 3.

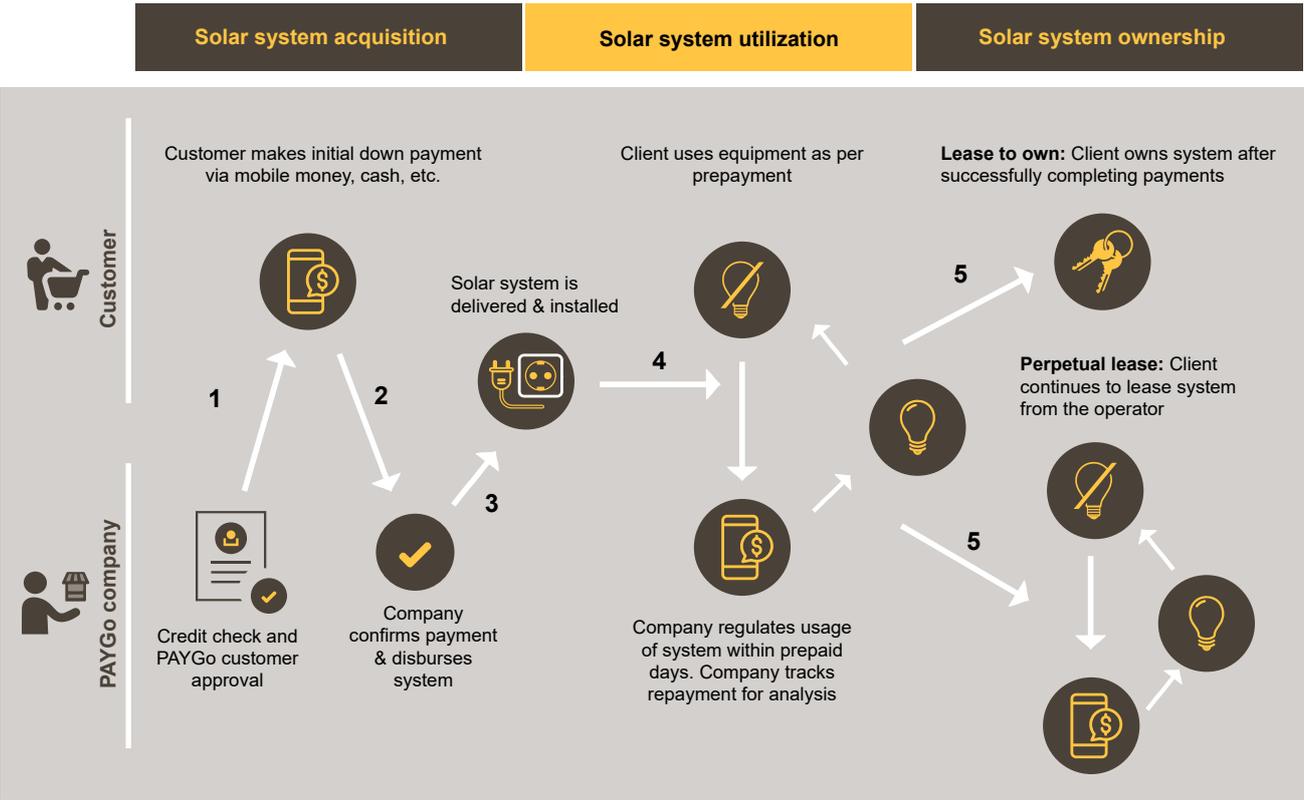


Figure 3: The pay-as-you-go (PAYGo) business model

3.1.1 PAYGo via Mobile Money

One of the most common forms of PAYGo is the collection of repayments through mobile money. The lack of finance partners and the widespread nature of mobile money helped push OGS companies to provide financing directly to end consumers and recover payments via mobile money. Existing MFIs and commercial banks are relatively poorly dispersed across rural populations and therefore have limited last-mile reach. As of December 2018, there were estimated to be 60 mobile money agents per 1,000 sq km compared to 1 bank branch and 2 ATMs within the same coverage in SSA.³⁰ On the back of the widespread availability of mobile money agents and use, PAYGo solar companies set about building

30 Nika Naghavi, "Sub-Saharan Africa: The enduring epicentre of mobile money – Part 1," *Mobile for development*, GSMA, July 17, 2019,

their own networks or partnering with other distributors engaged in last-mile distribution to reach their target customers. Consumers are able to make their regular repayments via mobile money, which will either automatically unlock the OGS system or provide the consumer with a code that they can type into the device to unlock it for the number of days for which they have paid. The ubiquity of this model has led to mobile money becoming one of the most common payment methods and almost synonymous with PAYGo itself.

3.1.1.1 The advantages of PAYGo via mobile money for vulnerable groups

Mobile money reduces the need for physical infrastructure which can increase access in rural or hard to reach areas. The implementation of mobile money payments has led to the increased coverage for OGS consumers in areas where access may have previously been unavailable. Limited physical interaction between both parties is required, with payments made and acknowledged via remote systems. This means OGS companies do not require staff to be near its customers to collect payments, something that is particularly challenging in hard to reach areas and often a characteristic of vulnerable groups. Additionally, the ability to pay remotely can be hugely beneficial to nomadic communities or those that travel for seasonal work that are unlikely to have consistent access to physical infrastructure.

Access to mobile money is increasing on the back of improvements in mobile network coverage, combined with a decrease in mobile phone costs and action to increase access for vulnerable groups. Continued investments into telecommunications infrastructure have helped improve network coverage across SSA. This has in part been driven by the development communities' ambition to provide coverage for vulnerable communities that have to date been underserved. In addition, there has been an influx of cheap handsets from India and China and a larger number of development programmes focused on mobile phone ownership, such as those by UNHCR in refugee settings. These factors have helped boost vulnerable groups access to mobile money across many countries, particularly in those whose governments have also enabled this growth through supportive regulations, and it is expected that its adoption will continue to grow in the future.

Mobile money transactions eliminate cash-based risks such as fraud and high collection costs which may be more prevalent in vulnerable communities. Mobile money reduces the likelihood of fraud as the systems are equipped to perform thousands of transactions safely and securely. Additionally, collection via mobile money reduces the need for field staff to manually collect cash from or distribute vouchers to consumers, which reduce a company's overhead costs, which can ultimately reduce the cost of financing for the consumer. These challenges are likely to be more pronounced in vulnerable communities that may suffer from security challenges or are particularly remote and hard to reach.

PAYGo via mobile money payments positively contributes to the financial inclusion of previously underserved low-income earners. The demand for OGS systems has led to an increase in the adoption of mobile money services. This has driven the use of digital finance services by low-income groups and collectively contributed to improved financial inclusion in emerging markets such as Sub-Saharan Africa.³¹ Additionally, due to the ease in which mobile money data can be collected, some companies are able to pass data onto national credit bureaus to build consumers' credit scores and enable them

31 USAID Global Development Lab, *Pay-As-You Go Solar as a Driver of Financial Inclusion*, (Washington DC: USAID, 2017),

to access additional services in the future. This is particularly beneficial to vulnerable communities that would otherwise have limited ability to build up a credit history due to a lack of viable finance options.

Repayments via mobile money can easily be analysed enabling OGS companies to identify good customers that can build a credit history to access more products or services. OGS companies can use customer payment data to help build a credit history for each customer, thereby helping to identify the best customers. Upgrades offered to these customers may include improving to larger lighting systems or offering appliances. This is not only beneficial to the customer but also increase the customer their lifetime value with the OGS company. In addition, companies like Fenix use repayment data to offer financing products such as school loans to their customers. This ensures that consumers are treated on their own merits based on their individual repayment performance, enabling vulnerable consumers to prove their creditworthiness and increasingly access new products and services which would otherwise be out of reach.

3.1.1.2 The disadvantages of PAYGo via mobile money for vulnerable groups

Poor mobile networks and low mobile money penetration limits the potential uptake of PAYGo via mobile money in some regions and countries. Despite mobile network coverage expanding dramatically over the past two decades across SSA, there are still rural areas in which network coverage is non-existent, making repayment via mobile money impossible. This can particularly impact vulnerable groups that often live in areas where mobile network coverage is low due to relatively low demand or geographical inaccessibility meaning MNOs do not want to provide services in these areas as they do not see it as being financially worthwhile.

Low literacy and education levels negatively impact the adoption of mobile money among vulnerable communities and may limit the ability to understand payment obligations. Many vulnerable groups suffer from low levels of literacy and financial literacy. The lack of face to face contact and need to use a mobile phone may discourage customers from purchasing PAYGo products, and for those that do purchase the products, a lack of understanding may lead to customers finding themselves continuously in arrears and without access, hindering the seamless customer experience initially intended by OGS companies.

Some marginalized groups are unable to access mobile money services due to a lack of documentation. In many countries, consumers require an ID card to access a SIM card or mobile money services. For many refugees, IDPs, undocumented people, or other vulnerable groups, it is not possible to provide this, which hinders their ability to access mobile accounts and hence mobile money.

Poor agent network coverage in some areas may cause payment pain points for consumers due to the need to travel long distances to make payments. Mobile money requires the presence of mobile money agents that collect deposits and enable withdrawals. These are less available in deep rural areas, where vulnerable communities are often located, due to the logistical challenges associated with their management and a lack of demand. This can result in customers needing to travel long distances to make deposits which may deter them from purchasing off-grid solar products. This has been the case in the Energy and Cash Plus project in Kenya, where a lack of mobile money agents has created additional costs for project beneficiaries as they must pay for transport to access the required services.

3.1.2 PAYGo via Airtime Credit

In the PAYGo via airtime model, consumers make their repayments through the purchase of airtime credit. This model closely aligns with the mobile money enabled model; however, it does not require consumers to have a mobile money account but only a mobile phone and a pre-paid SIM. In this model, the customers top-up their mobile airtime, the same balance they use to make phone calls or buy data bundles. Customers then use the USSD menu or send an SMS to request that part of their credit is used to pay for their OGS systems, and the MNO deducts this from their account. The MNO notifies the OGS company that then remotely unlocks the customer's OGS system or sends them a code so that they can unlock their system themselves.

3.1.2.1 The advantages of PAYGo via airtime for vulnerable groups

The PAYGo via airtime model removes barriers specifically associated with the need for a mobile money account and access to an agent network. Consumers only require a mobile phone and not a mobile money account in this model, and hence it is potentially accessible to a far greater number of users where mobile money is unavailable. Additionally, consumers are generally familiar with the concept of purchasing airtime and hence may be more comfortable with the process, particularly as mobile money agents are often not very common in rural areas while airtime retailers are generally available and accessible for consumers. This is particularly advantageous for vulnerable communities that may have a mobile phone and be familiar with top ups but are less likely to have access to mobile money.

3.1.2.2 The disadvantages of PAYGo via airtime for vulnerable groups

In addition to the need to have a mobile phone, the PAYGo via airtime model has additional technical and partnership related challenges not faced in the mobile money enabled model. Vulnerable communities still face access challenges due to their reduced access to mobile phones and poor network coverage. Additionally, to use airtime for repayments, OGS companies require a much closer partnership with an MNO and is far more reliant on their support to enable and process payments. To use airtime, a company needs to be approved by an MNO as a Value Added Service (VAS) vendor. Payments are made to and recorded by the mobile operator, and the OGS company then needs to be instantly notified about the payment to be able to unlock the system in real-time. This level of integration and payment trust requires a deep partnership and support between the MNO and OGS company and can push up costs due to revenue share arrangements between the OGS company and the MNO. While this model was more common prior to the widespread availability of mobile money and its potential benefits, it has not gained significant prominence in recent years, in part due to the technical and operational challenges involved in the OGS company / MNO partnership and the rise of mobile money superseding this payment mechanism. .

3.1.3 PAYGo via Cash Collections

Cash collections from local agents is another means through which payments for PAYGo can be collected. In this model, consumers are visited by a field agent of the OGS company to pay in cash to unlock their system for a set period. Unlike the mobile money or airtime enabled PAYGo in which consumers are often able to make a payment for a period as short as one day, the cash collection model

generally requires that a consumer pays for a minimum of two weeks at a time due to the logistical challenges associated with regularly visiting a customer. Upon receiving the payment, the field officer updates the OGS company's systems via their mobile device/app so that the OGS device can be unlocked remotely or via sending an unlock code to the consumer. This model leans more closely towards the typical MFI model of field collections by rural agents but leverages some of the benefits of PAYGo with remote locking, reducing the need for repossessions.

3.1.3.1 The advantages of PAYGo via cash collections for vulnerable groups

PAYGo via cash collections does not require the consumer to have access to any banking or mobile service. Unlike previously mentioned PAYGo models, cash collection only requires that the consumer has access to cash to enable them to make repayments. Neither does it require a network of mobile money agents within proximity of the consumer. In this way, it is more inclusive than mobile money or airtime enabled models, particularly for marginalized groups that might lack access to such services and in which cash is often the only form of money available.

Early, but limited, evidence indicates that cash collection models in markets with lower levels of mobile money penetration may have a higher repayment and lower default rate.³² Greenlight Planet has piloted a cash collection model in Nigeria due to the low rate of mobile money in the country and the lack of suitable alternative consumer financing models. While these pilots are still ongoing, repayments by consumers taking part in the cash collection model are significantly higher than those that were using mobile money. While the reason for this is not yet fully clear, the fact that consumers are reminded to pay through a physical visit from a collection agent likely plays a part in conditioning them to make repayments. This could be beneficial in increasing repayment rates amongst vulnerable communities that OGS companies might otherwise view as being too risky to serve due to their higher credit risk.

3.1.3.2 The disadvantages of PAYGo via cash collections for vulnerable groups

The cash collection model is more labour-intensive than other PAYGo models, requiring an extensive network of field agents to collect repayments and potentially leading to higher costs. An extensive network of field agents is required to collect payments in cash with a single field agent only able to manage 100-120 customers. These field agents will need to be hired and trained at a rapid rate as new customers are acquired, which will be costly. Additionally, field agents will need to receive financial compensation for travel and making collections, which will add to the overall cost of the model. Finally, the OGS company requires highly sophisticated processes and systems to ensure they can manage the network of field agents and ensure they are visiting the appropriate customers to collect repayments. Development and maintenance costs of such processes and systems are likely to be high. These higher costs will be passed onto consumers, potentially making them unaffordable for vulnerable communities.

The cash collection model limits consumer choice regarding repayment values and can potentially leave them without access to power for extended periods. Due to the labour-intensive nature of the cash collection model, repayment periods generally need to be longer to reduce the need

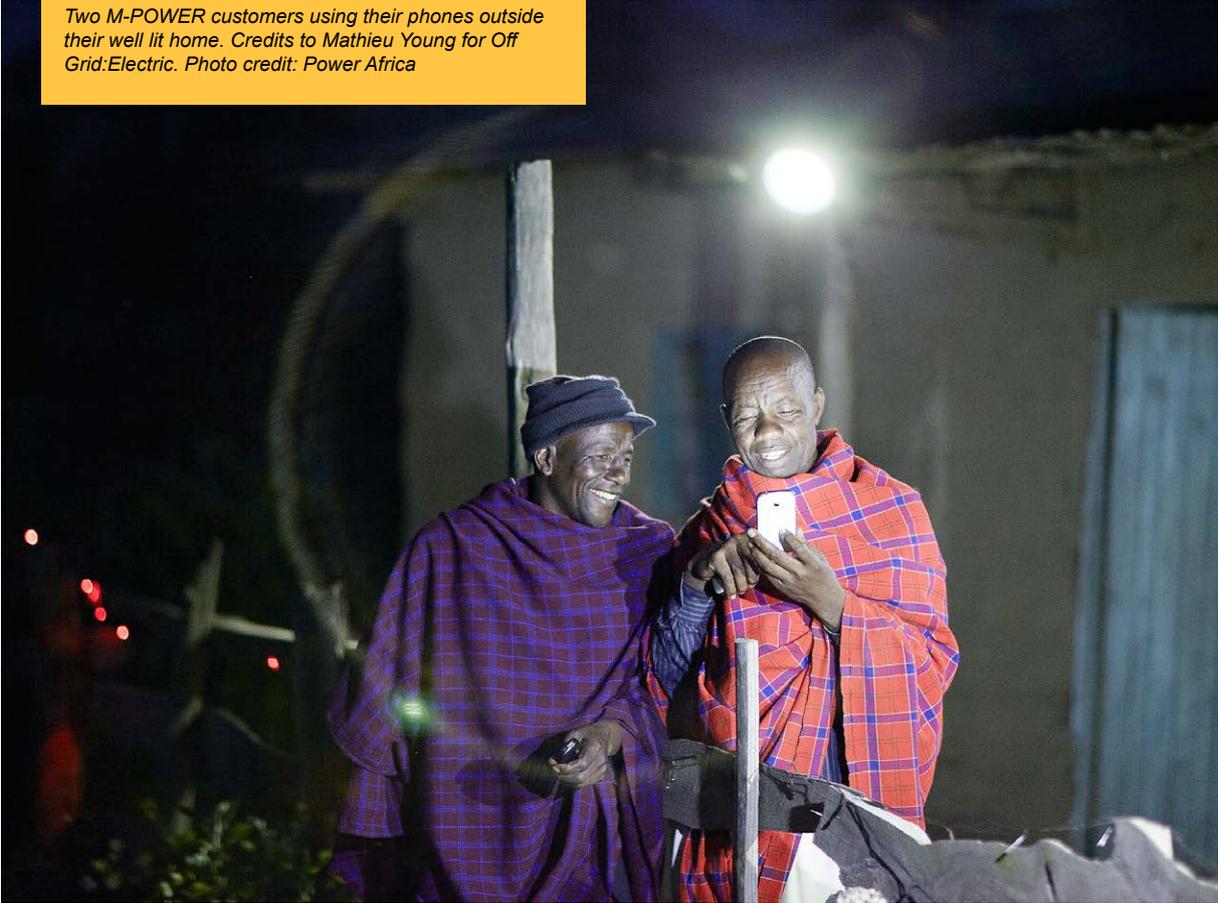
32 Greenlight Planet, *Greenlight Planet Nigeria Pilot learnings: 2017-2019*, (Kenya: Greenlight Planet, 2019),

to conduct regular visits to consumers. This reduces the consumer's choice and ability to pay for a shorter period when funds are constrained. Additionally, it potentially increases the risk of non-payment as consumers need to be relied on to save up funds for a longer period of time, which leaves them open to financial shocks that might require the use of those funds. These challenges are far more likely to impact vulnerable consumers that have lower incomes and are more susceptible to financial shocks limiting their ability to make larger repayments.

Box 1: The use of Scratch Cards or Vouchers

In this model, the consumer purchases a scratch card or voucher via any payment mechanism from a local agent that then allows them to unlock their device. In addition to sharing advantages with the cash collection model, the consumer has more choice over the length of time they unlock the system. An advantage of the PAYGo via scratch cards and vouchers model is that the consumer has more choice over how long they want to unlock the system for by purchasing the corresponding card from an agent in the local community. However, in such a model the OGS company faces significant logistical challenges in printing scratch cards and vouchers and distributing these to vendors in the communities where their products are being used. This will add costs which will ultimately be passed onto the customer.

Two M-POWER customers using their phones outside their well lit home. Credits to Mathieu Young for Off Grid:Electric. Photo credit: Power Africa



3.1.4 Modifications to PAYGo Models

Companies are modifying elements of the PAYGo consumer finance process to further increase access for all consumer groups. With each PAYGo model currently implemented having inherent limitations in serving some groups, many companies have taken steps to implement tweaks to make the model more favourable to consumer segments experiencing affordability or accessibility constraints. However, these modifications are generally not specifically tailored to vulnerable groups but are designed with a focus on increasing overall consumer numbers and financial performance, i.e. improving repayment and default rates. In addition, many of these modifications are still within trial phases, and it remains to be seen whether these will be effective in improving access to consumer finance while still being financially viable for OGS companies.

- **Varying the upfront deposit:** Some OGS companies have experimented with lowering or even removal of upfront deposits to eliminate affordability barriers for consumers. The deposit is generally the largest barrier to affordability of a product as it will often require a consumer to save up for several months to meet the cost. During this time, consumers, particularly those most vulnerable ones, can be subject to financial shocks which causes them to need to use the savings. The lowering or elimination of deposits removes this saving barrier for consumers meaning they only need to make the regular repayment costs. However, while this approach may attract more customers, it comes with significant financial risk to the OGS company as it negatively impacts cash-flow by removing cash received for the deposit. Additionally, a consumer's ability to provide a deposit can be seen as an indication that they can make the regular repayments, so its removal may negatively impact repayment and default rates as companies have less insight into a consumer's finances and the consumer themselves has less skin in the game so may be more likely to default.
- **Extension or alterations of repayment term durations:** Some companies have longer repayment horizons, leading to lower regular repayment amounts, to attract consumers and make payment terms more favourable to vulnerable groups. While the regular repayments are not the main barrier to a consumer's ability to afford a consumer finance mechanism, it does play a factor in their decision making process as lower regular repayments will leave more money available for other necessities. While longer repayment terms may be attractive to the consumer it has some significant challenges. Firstly, it would result in reduced cashflows for the OGS company. Secondly, it increases operational costs as the loan needs to be serviced over a longer time. Finally, it may increase the risk of default due to the length of time over which the consumer is paying which increases the risk of external financial shocks or repayment fatigue. These factors would likely ultimately lead to a higher overall repayment cost for the consumer as the OGS company mitigates its risks by increasing prices.

Box 2: The pay-as-you-grow (PAYGrow) repayment structure

In a PAYGrow model, an OGS supplier aligns the consumer financing model with seasonal income. The PAYGrow model aligns closely with the traditional PAYGo model with the ability to remotely monitor the OGS product and receive payments via mobile money. However, while the PAYGo model requires daily or weekly payments, the PAYGrow model only requires periodic repayments that are aligned to seasonal income. While not yet common in the OGS sector, it has attracted attention in the agricultural PULSE sector, where income is highly seasonal based on harvest cycles. For example, SunCulture – a local supplier of solar irrigation equipment and home lighting – has offered this model to farmers in Kenya.

Box 2: The pay-as-you-grow (PAYGrow) repayment structure (Continued)

Aligning repayments to seasonal income can increase accessibility to consumer financing models. Consumers with seasonal income are often smallholder and subsistence farmers that have a higher perceived level of credit risk due to irregular income, lower levels of education and financial literacy, as well as the risk of crop failure. This can prevent them from accessing more traditional consumer finance mechanisms due to being unable to pass the credit assessment or being unable to keep up with monthly payments, an issue which is at least partially overcome in a PAYGrow model. Additionally, a PAYGrow model provides the possibility of linking repayments to seasonal crop performance through remote monitoring, allowing for variable payment amounts to match consumer income.

PAYGrow models are limited to few sectors and provide higher risk to finance providers, which can drive up overall costs. The PAYGrow model is mostly limited to the agriculture sector due to the specific characteristic of seasonal incomes. While the number of smallholder farmers is significant, with a potential market of 67 million for solar water pumps alone, this limits the PAYGrow model to being a niche mechanism rather than a universal model. Additionally, the PAYGrow model is likely to be more expensive to finance and difficult to manage for OGS companies due to the irregular nature of repayments causing cashflow problems and potentially long repayment periods. These higher risks will push up the costs of the model, which will ultimately be passed onto the consumer.

- **Supporting consumer savings:** Supporting customers to save up to the necessary repayment threshold helps avoid allocation of income to other competing needs. Some OGS companies have developed saving tools and mechanisms such as electronic wallets for consumers so that they can set aside periodic income to make repayments for their SHS. This means customers that may struggle to save for their regular repayments have a means to do so while ringfencing money to repay the SHS system rather than it being spent on other demands. However, this could potentially be considered as deposit mobilisation and attract the attention of Central Bankers or other financial regulators.
- **Income generation support:** Some OGS companies provide localized market opportunities to potential customers for their produce helping to boost their ability to make repayments or purchase products upfront. Despite over 80% of food production activities in Sub-Saharan Africa being generated from subsistence farming, many lack the adequate infrastructure and capacity to locate a ready market for their crops.³³ OGS companies have been observed to provide market linkages to farmers in exchange for a portion of their earnings being earmarked for SHS repayments.
- **Protection against loss of income:** Some OGS companies have partnered with insurance companies to introduce insurance against default in the event of death or illness of a household's primary income earner. Such initiatives are relatively new in the sector, but companies such as Zonful and Zuwa have implemented such systems in Zimbabwe and Malawi, respectively. This is not only beneficial to the consumer that is protected against further economic shock caused by the loss of electricity in the event of the loss of the breadwinner, but also lowers a company's default rate. Due to the relative nascency of this initiative in the sector, more data is required to assess the overall impact on an OGS company's finances and in supporting consumer protection.

33 Steve Wiggins, *Leaping and Learning: Linking Smallholder Farmers to Markets* (London, United Kingdom, 2013),

3.2 THE MICRO-FINANCE INSTITUTION (MFI) MODEL

MFIs provide consumer financing for OGS products in many Sub-Saharan African and Asian countries. This model is very prevalent in markets where mobile money has relatively low levels of penetration, such as Nigeria and Ethiopia. An OGS company may engage an MFI to provide consumer financing on their behalf, or an MFI may engage an off-grid solar company to provide their OGS products to their existing consumers. However, some MFIs, such as the Baobab Group in Senegal, have spun out separate sister OGS companies rather than partnering with an existing OGS provider. An MFI loan approval process usually includes a thorough credit assessment check and the need for collateral or a guarantor. On approval and provision of a deposit, the MFI will provide the product to the consumer directly or transfer funds directly to a retailer to provide the OGS device to the consumer. Post-installation, subsequent payments are collected according to a pre-agreed payment schedule with the MFI managing process.

This model has gained traction within the OGS sector by building upon existing infrastructure and relatively supportive regulations. Initially, the MFI model struggled for traction in the OGS sector leading to companies providing their own consumer financing directly to consumers, generally via the PAYGo model. However, over time, MFIs have seen the success of the PAYGo model and increasingly engaged with the sector. In countries where MFIs have an extensive footprint, they can leverage their local branch networks to provide off-grid financing to existing customers while also attracting new customers. Additionally, some countries have favourable regulatory environments for MFIs, which reduce the cost of doing business. For example, in Ethiopia, each region has an MFI, which is often partly owned by the regional government. While in Nigeria, MFIs are present across the whole country and have been engaged by IFC to increase access to OGS products due to the lack of mobile money penetration and their deep understanding of rural consumers.

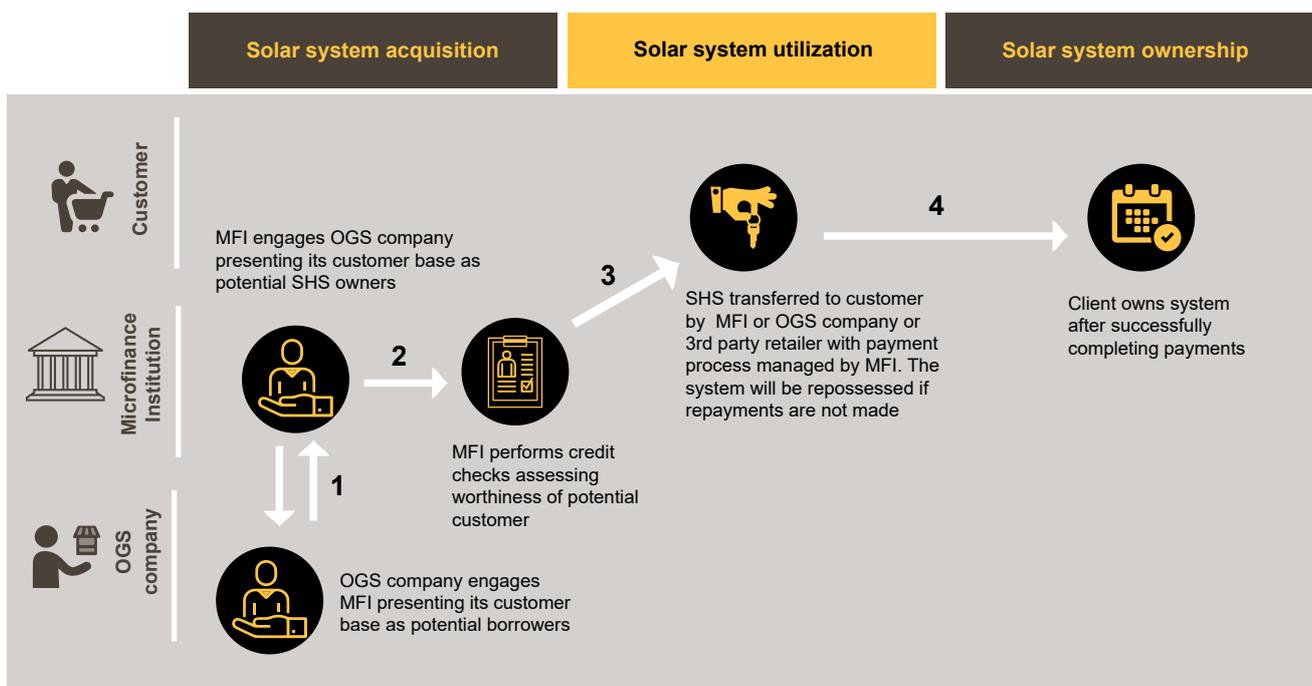


Figure 4: The MFI consumer finance model

3.2.1 The Advantages of The MFI Model for Vulnerable Groups

In some cases, the MFI model has been adapted to include the use of collective lending mechanisms targeted at end-users with little to no asset collateral. Members of vulnerable groups often struggle to provide proof of collateral which precludes them from accessing consumer finance. However, members of a community with mutual interests in acquiring OGS systems are sometimes served by MFIs that have developed products with no requirements on asset collateral. Such debt instruments instead leverage on social collateral, with loans issued to communities to collectively purchase off-grid solar products. On-time repayments are fuelled by reputational risk within communities, with each member wanting to remain in good financial and social standing with the rest of the community.

One of the MFI's core competencies is the provision and servicing of consumer finance, which can lead to a more cost-effective process. MFIs have a track record of collecting repayments from the customers through mechanisms they have spent years perfecting. They have often built an in-depth understanding of the local community to create established systems, processes, and proven track records for recovering funds. This leads to MFIs being well placed to serve vulnerable communities due to a deep understanding of their specific socio-economic situation.

The MFI model has received support from development partners to help reduce the cost of finance for the end consumer. Development partners have provided bespoke financing at low or zero interest rates to MFIs for the sole purpose of encouraging lending to OGS consumers.³⁴ This enhances the MFI's capacity to offer loans to consumers for OGS products at favourable interest rates which can specifically benefit vulnerable groups. Additionally, other collaborations have occurred, including government institutions and MFIs developing a blended approach to MFI consumer financing. Governments offer price subsidies to OGS system providers, while MFIs simultaneously provide loans to end-users mitigating the high pricing of OGS systems.

3.2.2 The Disadvantages of the MFI Model for Vulnerable Groups

MFIs often have expensive physical infrastructure, high overheads, and high costs of collection, which can increase the cost of consumer finance. MFIs often still rely on face to face and cash collection mechanisms which increase the resources they require and hence costs incurred. Additionally, MFIs will generally need to repossess a system in the event of a default, which is an expensive activity, compared to a PAYGo model, which can simply remotely lock the system until repayment is made (in some cases this can be a year or more). These costs are ultimately passed onto the consumer through higher deposits or regular repayments which has an outweighed impact on vulnerable groups.

MFI coverage, particularly in low population density areas, limits the number of potential customers that can access services. MFI coverage is not universal across SSA, particularly in areas with low income or a low population density as these are viewed as economically unviable. Such areas are often where vulnerable communities are based. Due to the face to face nature of collections by MFIs, they rely on high population density areas to limit the number of collection agents required and the distance which they must travel and keep costs down. High population density has been a key factor in their success in countries such as India, compared to their relatively limited prevalence in East Africa.

³⁴ World Bank, "Renewable Energy Fund", World Bank Projects & Operations, World Bank,

By not operating in remote areas, this leaves many potential OGS customers, particularly vulnerable groups, excluded, even if they have the financial means to access consumer finance.

MFIs often have more complex and stringent credit checks limiting access to finance for many and reducing potential OGS sales. Rigid credit checks and repayment terms compared to those of PAYGo companies may constrict the ability to onboard new customers.³⁵ Additionally, credit assessments carried out by MFIs may require proof of identity which some consumers, particularly vulnerable ones, may not have. This limits access to the few who meet assessment requirements, excluding those that have a lower income, lack collateral, or are undocumented.

3.2.3 Modifications to the MFI Model

While the MFI model is limited by the geographical footprint of MFIs, there are still steps some MFIs are taking to increase consumer access for those already covered by the branch network. MFIs generally have stringent membership criteria which often puts them out of reach of many potential consumers that are unable to meet them, particularly those that are most vulnerable. However, having seen the success of the PAYGo model in tapping into a larger number of consumers, some MFIs are innovating to try to attract a larger number of customers without negatively impacting financial performance.

- **Group based guarantees:** While vulnerable groups lack monetary or physical capital, they well often have strong social capital where groups such as women, farmers or refugees have close social ties with one another. These close-knit community systems have offered an avenue of guaranteeing loanable funds disbursed via community groups. Individuals within each group are well versed with each other's economic characteristics and possess clear visibility regarding each member's ability to cover repayments. Such group-based systems of guarantee therefore close the bridge towards accessing funds to purchase SHS which would otherwise remain inaccessible due to the lack of physical collateral.
- **Partnerships with cooperatives:** Given the nature of MFIs being physically located in communities, they often develop strong linkages with local groups. Such groups or cooperatives bring groups of people based on similar characteristics such as their employment, farming activities or demographics. MFIs can use these pre-existing structures to market their services and collect repayments.
- **Altering credit check procedures:** Most MFIs have credit check procedures that are far more stringent and take longer than those conducted by the majority of OGS companies. While this does serve to ensure that only the most credit worth consumers are able to access finance, it excludes many potential customers. Based on the success of OGS companies that have been able to have relatively high repayment rates and low default rates despite their less stringent credit checks, some MFIs are tinkering with their credit assessments to increase the likelihood of those with less physical proof of assets or documentation to purchase OGS products. Additionally, by reducing the time take to approve loans, uptake of MFI financing for OGS products can increase.

35 Daniel Waldron et al, *A Tale of Two Sisters, Microfinance & PAYGo Institutions*, (Washington DC: CGAP- World Bank, 2019),

In Ethiopia, streamlining of screening mechanisms has reduced the processing times for loans to be disbursed to around 24 hours making it more attractive for consumers that are able to access their OGS products sooner rather than having to spend time waiting when they may have travelled large distances to get to the MFI branch.

3.3 THE RENTAL MODEL

In a rental model, a company rents out charged batteries or OGS products to consumers for a fee. In this model, the consumer never takes ownership of the OGS product and instead rents it either from an entrepreneur that has purchased their own set of solar products, an entrepreneur or a community organization that has partnered with an OGS company, or directly from an OGS provider. The elimination of high deposit payments coupled with the reduction in the value of collections provides flexibility to its consumers and reduces affordability barriers by removing the deposit. SELCO, Barefoot, and Schneider have piloted such models in India, while Mobile Power is providing battery rental in Sierra Leone.³⁶ One of the most well-documented cases of a rental model is SunnyMoney's Light Library programme which has been used in countries including Senegal, Malawi, and Zambia to equip schools with solar lanterns which can be rented by students on a daily basis to take home to their families.³⁷

A young man in rural Rwanda watches the news using a Mobisol Solar Home System. Power Africa impacts rural African's lives by enabling access to clean efficient light and information channels through electrification. Photo credit: Ute Klein/Mobisox | Power Africa



³⁶ Lighting Asia, "Solar Off-Grid Lighting: Market analysis of: India, Bangladesh, Nepal, Pakistan, Indonesia, Cambodia and Philippines" (Washington DC: IFC ,2012),

³⁷ Solar Aid, "Light Libraries", Solar Aid, 2020,

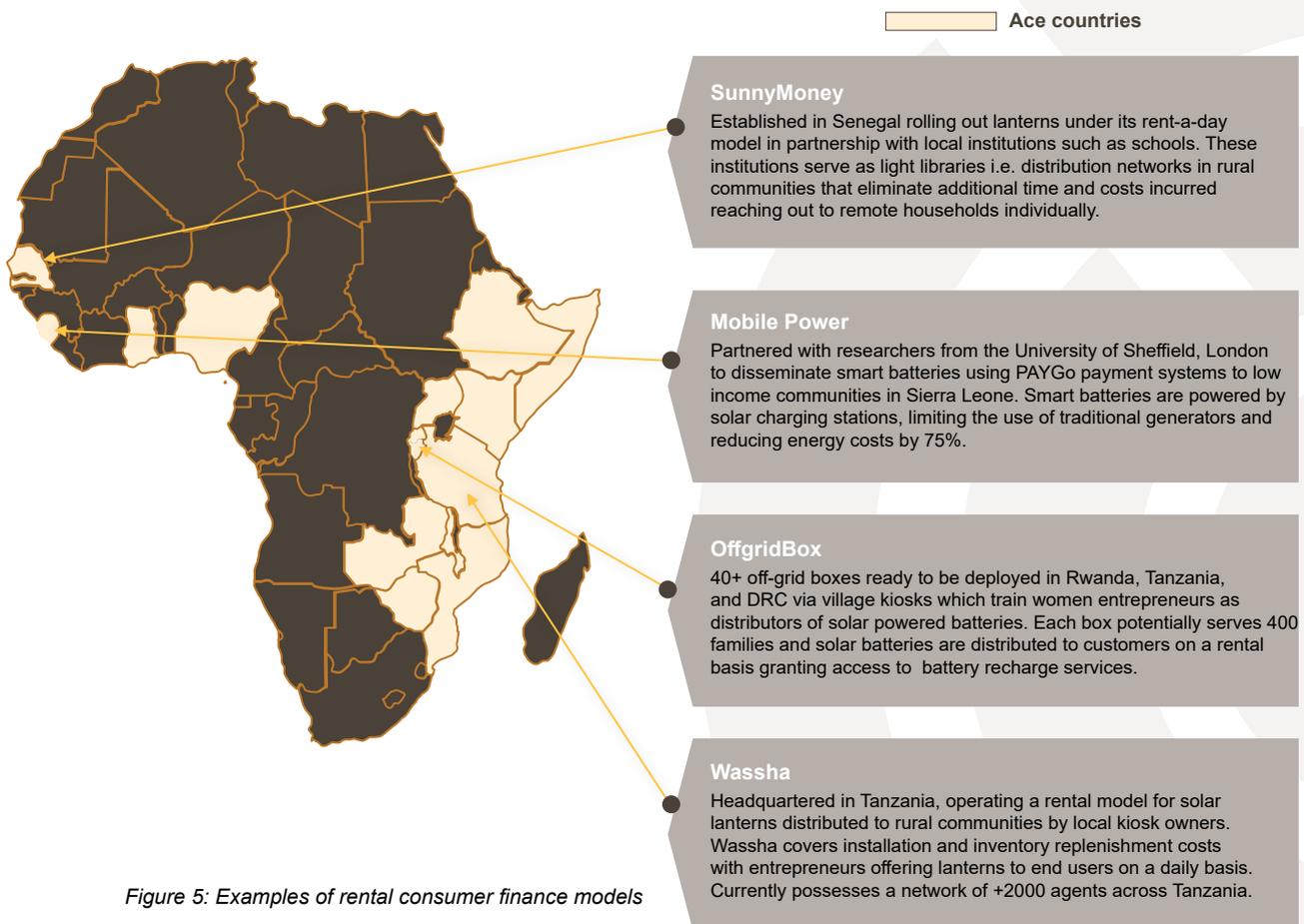


Figure 5: Examples of rental consumer finance models

3.3.1 The Advantages of the Rental Model for Vulnerable Groups

These models lower the economic barrier to access solar products by removing upfront deposits and potential maintenance challenges. Due to this model often not requiring any upfront deposit to access, having very low daily rental costs, and no credit assessment, it is potentially available to a large number of end consumers that would otherwise be unable to access other forms of consumer financing due to affordability constraints. They can also have large coverage with SunnyMoney’s Light Library in Senegal, providing an estimated 55,000 people with direct exposure to the solar lights through 5,000 solar lights in 58 schools. Additionally, end consumers can benefit from not having to bear the responsibility of maintenance and repair should a product require it, a challenge which has an outsized effect on vulnerable households that may not have the means to do so.

Rental models increase consumer choice and have additional benefits in consumer education. The rental model allows consumers to only access OGS products when they want to or can, particularly for those consumers that have volatile or seasonal income, such as smallholder or subsistence farmers, or that move for work, such as nomadic groups or seasonal workers. Additionally, the simple payment structure is highly intuitive and companies currently implementing this model have needed only limited campaigns to create consumer awareness and buy-in. Such a model can also sensitize households to the benefits of OGS products and make them more likely to want to purchase products of their own. The same Light Library in Senegal found a 20% increase in demand for OGS products from those households that had taken part in the programme. This ability for consumers to “try before you buy”

gives prospective customers the choice to fully experience the benefits of OGS without needing to purchase a system outright or put down a large deposit, a risk many vulnerable households would not be willing to take.

Solar kiosks or charging hubs can offer additional services beyond energy to underserved communities. Inherent in the rental model is the need for a centralized location from which the OGS products or batteries are collected and dropped off for charging. These can be existing community focal points, such as schools in the case of SunnyMoney's Light Library, or they can be set up by the OGS company themselves. These hubs can offer additional services to their host communities, many of which would be previously unavailable in particularly vulnerable locations. For example, on top of light leasing, WEIHubs offers phone charging, clean water, internet and an ICT hub to its host communities, while VAC Solar's Community Solar Hubs uses excess capacity to provide power to local businesses and healthcare providers.^{38,39}

3.3.2 The Disadvantages of the Rental Model for Vulnerable Groups

There is currently a lack of evidence that the rental model is economically viable for OGS companies to provide large scale, commercial access to electricity. Despite the recent success of some companies such as Sunny Money, Mobile Power, OffGridBox and Wassha, rental models are yet to come close to the scale of many OGS companies. The filing for insolvency by SolarKisok in early 2019 highlighted to many the potential risks of the business model, and a lack of clear evidence of its efficacy may be putting off many investors leaving these business models still needing to demonstrate commercial viability. SunnyMoney's solar light project in Senegal does provide some insightful data. During the first 9 months of the project in Senegal they experienced a 5% breakage, fault, or non-return rate of solar lanterns. This is significantly higher than the expected breakage rate through manufacturer error (estimated at 2%) and likely due to the lack of ownership present in the model leading to users not valuing products as highly. With the 5% breakage rate and an assumed utilization rate of 85% for the solar products, SunnyMoney estimates that the Solar Library can be self-sustaining, i.e., purchase replacement products as required.⁴⁰ However, this model relies on a school to implement the model, and so has limited to no overhead costs. It currently remains unclear if this model is economically viable at a commercial scale as limited companies have progressed beyond the pilot stage at this point. Additionally, due to the nature of this model requiring households to take products home from a central location, it is limited to smaller systems and so may not be suitable to support the achievement of universal electrification targets.

3.4 COMMUNITY-BASED MODELS

Community-based models leverage existing interests and social relationships to enable communities to save and access finance. While community-based groups were traditionally formed by farmers' need to access agricultural inputs, community-saving and credit models are often formed by other groups such as refugees and internally displaced people, women's groups, etc. The main goal of these groups is to increase the financial standing of individuals by pooling funds that can then be used

^{38,39} *Community Solar Hubs (Helsinki, Finland, EEP Africa, 2020),*

⁴⁰ *Solar Aid, "Light Libraries", Solar Aid, 2020,*

to provide loans to members based on need or buy produce in bulk, enabling members to access goods and services normally far outside of their means. The strong social bonds upon which the groups are formed act as an important lever for ensuring fair practices and that repayments are maintained.

Numerous types of community-based models exist, often based on the economic and social factors that exist locally, but in general, these are either rotating or accumulating.

- **Rotating Savings and Credit Association (ROSCA):** A ROSCA model is a simple model where the members agree to contribute a fixed amount at each meeting for a defined period, such as one year. At each meeting, the funds are collected, and certain members are paid the entirety of the collected money on a rotating schedule. The risk of this arrangement is that members who are early in the pay-out rotation may drop out of the group after they have been paid with the participants at the end of the rotation having the highest risk of receiving reduced or no payment. ROSCAs minimize this risk by giving the most trusted members, the early rotations, and the least trusted members, the latter rotations, something that can be well assessed in a community setting. In this model, no cash is kept by the group, and so governance and security risks are kept to a minimum.
- **Accumulating Savings and Credit Associations (ASCA):** ASCA models are a longer-term form of savings group and organized based on shares that members buy to gain ownership of a percentage of the group's investment or income. This structure is very similar to a unit trust; however, the group leader is not compensated for managing the fund, other than the profit on their own investment into the group. Members must usually make a monthly commitment of a minimum investment and bring their cash to the monthly or weekly meetings. The group leader invests the pooled funds in a pre-agreed-upon manner, commonly loans to members, but groups are also known to invest in local activities and businesses. This requires a strong level of governance and coordination to ensure that the savings are kept safe, and repayments are made.

These models are prevalent globally and are being adopted by solar companies to increase access to OGS products, often for vulnerable groups and in areas where PAYGo and MFI models are unavailable. Some OGS companies have identified that community models could support them to reach more customers, particularly in areas not covered by MFI or PAYGo models, as well as reduce the cost to acquire and service consumers. Generally, companies are identifying groups within the communities they want to serve and hire community members to market solar products, or at least the deposit for such products, within the groups as a worthwhile investment for their pay-out or loan. In many cases, this has been supported by donor initiatives, such as WPOWER implemented by CARE International and funded by USAID, which have focused on introductions to communities and consumer awareness campaigns.⁴¹ Table 1 below, highlights some of the names these community credit and savings associations often go by in ACE countries, however, this list is not exhaustive due the myriad of different cultural groups that exist.

⁴¹ Nozipho Wright, *Village Savings and Loan Associations: Market Potential for Clean Energy Products in Kenya, Rwanda and Tanzania*, (The Hague: Enerjia, 2013),

Country	Examples of Local Savings and Loan Association
Ethiopia	Enyesh, Iqqub, Idir
Kenya	Chamas, VSLA
Ghana	Susus
Somalia	Ayuuto, Hagbad
Nigeria	Esusu
Sierra Leone	Osusu
Tanzania	Upatu, Kuzikana
Rwanda	Ibimina
Zambia	Chilimba
Mozambique	Xitique

Table 1: Names of the community-based savings and credit groups across ACE countries

3.4.1 The Advantages of Community-Based Models for Vulnerable Communities

Community-based models often serve vulnerable groups such as refugees, women, and other members of the society primarily excluded from formal financial systems. Community groups can be formed by any group of people with similar interests regardless of gender, income level, or social class. Additionally, there are generally no stringent economic requirements needed to join the group with the amount contributed by each member based on group and individual circumstances. The flexibility offered by the above factors then enables these groups to serve even the poorest and most vulnerable members of the community that are typically excluded from traditional financial systems and enables access to OGS products. For example, CARE international's network of 317,335 Village Savings and Loans Associations (VSLAs) has a membership of 81% Women.⁴²

They have low administrative costs and high repayment rates since they are managed by the group members and rely on existing social structures. The model leverages group members as fund administrators, credit assessors, and payment collectors. The group's ability to carry out these activities is enabled by the social structures that exist in the community, which encourages trust and produces high repayment rates and low administrative costs. This also enables the group to make more subjective decisions when deciding whether to distribute funds beyond purely assessing a person's financial means. This can enable access for vulnerable persons that may be rejected from other consumer finance mechanisms due to a lack of credit worthiness. Additionally, OGS companies working with these groups can incur lower costs to acquire and serve consumers due to the pre-existing infrastructure, enabling them to focus on sales, distribution, and maintenance activities, and potentially reduce the cost to the end consumer.

Community-based saving and credit groups are well established and very common across SSA, and more globally, with millions of members. While exact figures for the prevalence of community-based lending models are unknown, they are generally accepted to be extremely common across Africa. Kenya has over 1,000,000 such groups (Chamas), with more than 65% of Kenyans participating in at least three such savings groups. Chamas are vital to Kenya's social and economic fabric, with collective savings accounting for 46% of Kenya's GDP.⁴³ The level of coverage across Africa is significantly higher than those that have access to consumer finance through mobile money enabled PAYGo or MFIs which is particularly beneficial to the vulnerable groups which are excluded from access to these services.

⁴² CARE Global VSLA Reach 2017, (Geneva, Switzerland, 2017).

⁴³ Harriet Kariuki, "How Blockchain Technology is revolutionizing 'chamas' - Kenya's informal saving groups, (August, 1, 2018),

3.4.2 The Disadvantages of Community-Based Models for Vulnerable Communities

Loans to purchase an OGS device may require a larger amount or longer repayment period than is generally typical for community loans. An OGS system is an expensive asset for a household, with an 11-20Wp system that would provide full Tier 1 access, costing around USD 147 when bought in cash.⁴⁴ For many VSLAs, particularly those that are not well established or serve vulnerable groups that have a lower income, this would be a large loan and may require a longer payback period than for more typical loans the group provides. However, for smaller OGS products, the VSLA model has proven successful and NGOs such as CARE have engaged these groups intending to provide them with additional liquidity to enable members to access larger loans.⁴⁵

There is currently little-known best practice for how these models can be scaled up economically, particularly in harder to reach areas. Despite there being an abundance of community-based savings groups across SSA, there are currently limited mechanisms through which they can easily be identified or engaged by OGS stakeholders. While some OGS companies and NGOs have engaged these groups to provide OGS products, there is currently limited knowledge of how this can be done in a cost-effective manner. Therefore, OGS companies will often choose to partner with community groups that are more formal, e.g. connected through employment opportunities, or easier to reach, i.e. located in more urban areas. These are less likely to be serving vulnerable communities that generally lack informal employment or are in deep rural areas.

Limited management expertise can promote improper management practices and inhibits long term sustainability. Community-based saving and credit associations are generally informal, unregulated, and are typically managed by the group members themselves. Given the rural nature of these groups and the limited access to services like education that typically characterize such areas, there is a likelihood that the group members lack adequate skills to manage the group fund.

Additionally, significant security challenges can exist as the group lacks a place to securely keep cash or OGS products. This could impede long term sustainability and group member's ability to continue using it as a source of finance unless they receive financial literacy training and support from external stakeholders.

3.5 OTHER CONSUMER FINANCE MODELS

In addition to the consumer financing models laid out above, there are other consumer finance models that have yet to be adopted by the OGS sector to any significant extent. Other consumer financing models are only suitable in niche scenarios but can play a crucial role in filling the gaps. Even for those members of a community that can access the prevalent models, there may be other models that are more suited to their financial or social situation, providing them with greater consumer protection or financial benefits.

3.5.1 Payroll Deductions

Individuals with stable incomes can be provided with OGS products, which are financed via payroll deductions. In this model, people that have a formal and regular source of income receive an

⁴⁴ 2020 Off-Grid Solar Market Trends Reports (MTR), 2020,

⁴⁵ Nozipho Wright, *Village Savings and Loan Associations: Market Potential for Clean Energy Products in Kenya, Rwanda and Tanzania*, (The Hague: Energia, 2013),

OGS product and pay back the cost via a deduction from their regular pay. The OGS product can either be purchased by the employer in bulk to provide to its employees or could be provided by a 3rd party with the employer facilitating repayment. For example, UNEP has proposed a model for a payroll deduction program to finance the sale of OGS systems for palm oil farmers in Indonesia.⁴⁶ While this model has yet to gain any significant traction in the OGS sector, largely due to the informal nature of many of those in need, it has proven highly successful in more developed sectors, particularly when repayments are tax-deductible. For example, the UK's cycle to work scheme has been very successful, allowing employees to receive a voucher for a bicycle from their employer that then takes tax-deductible monthly repayments from their salary over 12 months. However, given the requirement of formal employment, this model is unlikely to be viable for vulnerable groups.

Financing via payroll deductions eliminates liquidity and credit risks associated with debt-based consumer financing and lowers costs for the end consumer. Salaries are a stable source of income that boost credit scores and can fund the acquisition of assets if used efficiently. Low-income earners who take on loans can never fully eliminate the risk of failing to meet their debt obligations, especially when lacking a constant source of income. The use of payroll deductions adequately mitigates this provided the OGS system consumer is employed over the duration of the repayment period. Taking this into account, in addition to the financial benefits of purchasing OGS products in bulk, the overall cost of an OGS product for the end consumer is likely to be lower than when the system is purchased by an individual.

The payroll deductions model is likely to have limited coverage for vulnerable groups due to the informal nature of the economy in many communities that require OGS products and challenges companies face in providing finance. An estimated 76% of people in Africa are in informal employment and hence do not receive a regular salary.⁴⁷ Further, the majority of these informal workers are based in rural communities, which are often the ones that most require OGS products, yet already have the least access to alternative forms of consumer financing. Hence, the success of the payroll model is likely to be limited to very specific scenarios where there is a higher level of formal employment or farmer out grower schemes, such as large commercial agricultural zones. Additionally, many companies may not have the financial means to purchase OGS products upfront for their employees. While this challenge could be mitigated by partnering with OGS companies, the associated administrative costs may be off-putting to many.

3.5.2 Remittance Supported Models

Countries with high levels of remittances have innovatively channelled financial inflows to the OGS sector. A remittance is a transfer of money often by a foreign worker or one working in an urban setting, to an individual in their home country or setting. Money sent home by migrants competes with international aid as one of the largest financial inflows to developing countries. In such a consumer financing model, the international workers send remittances to an OGS provider, rather than sending it directly to the individual they are supporting, with that money going towards repayments for an OGS product.⁴⁸ By partnering with financial institutions or directly with OGS system providers, remitters offer a more creditworthy source of income compared to their home community, which can lower the risk of default and, therefore, the overall cost of delivering consumer finance. BBOXX has experimented with this scheme in Rwanda with the support of the Shell Foundation.⁴⁹

46 Lighting Asia, "Solar Off-Grid Lighting: Market analysis of: India, Bangladesh, Nepal, Pakistan, Indonesia, Cambodia and Philippines" (Washington DC: IFC, 2012),

47 Mariama Sow, "Figures of the week: Informal employment in African cities", Brookings, June 1, 2018,

48 FOMIN, "Financing Sustainable Energy through Remittance" (Washington: Arc Finance, 2009),

49 Shell Foundation, "Sending Energy Home: Bboxx Helping Rwandan Diaspora Fund Energy Access For Friends And Family", News, September 12, 2019,

Remittances provide valuable financial links to the OGS sector, reducing the long-term energy costs incurred by low-income households and risks to finance providers. Remitters to Haiti reported over 25% of finances sent were used to cater for energy bills. In the event of these finances being re-routed to cleaner and more sustainable energy sources, households incur energy savings by purchasing OGS products that have lower costs compared to non-renewable energy sources such as kerosene.⁵⁰ Meanwhile, OGS companies can be more certain that they will receive regular payments due to the higher credit score of remitters compared to local communities.

Remittance based financing faces challenges in environments with poor energy distribution networks. In the event of countries lacking an effective network of retailers and distributors, remitters may not be fully convinced to channel their funds to energy products due to doubts regarding the ability of companies to deliver products to last mile-consumers located in rural areas. Additionally, high distribution costs may also be incurred and passed on to the remitter by OGS companies. Due to the remote nature of the remittance provider, high levels of trust and reassurance is required to ensure funds are used appropriately.

3.5.3 Layby Model

Markets with limited implementation of PAYGo and mobile money have disseminated OGS systems via layby payment schemes. Consumers acquiring OGS products in markets that have low mobile money penetration rates resort to financing purchases via instalment plans with suppliers. Consumers reserve a product, generally with a large retailer, and make instalment payments with plans having varying requirements governing the handover of equipment from suppliers to consumers, with some terms requiring 10%-20% of costs covered before systems are handed over to consumers for use, while other require full payment of the asset before assets are transferred from suppliers to consumers. This model is relatively common in many developing countries outside of the OGS sector among larger retailers that offer layby financing for their products.

Layby models remove the need for consumers to provide large upfront deposits and gives companies the flexibility to offer varying finance terms to consumers. The upfront deposit is often the largest barrier for a consumer to access an OGS product on credit. A typical OGS product deposit might require a consumer to save for several months, which requires them to have relatively sophisticated levels of financial literacy. In a layby model, the consumer can effectively use the provider of the OGS product like a savings institution, making regular payments towards the system as and when they can do so. The OGS provider can then decide at what value of payments made they release the product to the consumer. This lowers the overall credit risk to the company and means that more creditworthy consumers do not have to take on the financial burden of less credit worth consumers.

The layby model has been used in the OGS sector but is yet to take off, likely due to high facilitation costs and limited consumer demand. In Papua New Guinea, only 1% received their OGS systems via the layby model compared to 82% in cash and 17% as gifts. While the literature is unclear as to why the model is so unpopular there are two possibilities. First, companies are not offering the layby model due to the resources required to provide financing, track payments, etc. resulting in a high cost. Second, consumers do not value the model as they make regular payments without seeing the benefit of an OGS product until they have reached a certain threshold of repayment.

⁵⁰ FOMIN, "Financing Sustainable Energy through Remittance" (Washington: Arc Finance, 2009),

4 Recommendations for Improving Access to Consumer Finance for Vulnerable Groups

While OGS companies and stakeholders are already starting to address consumer finance accessibility and affordability challenges, more needs to be done to support vulnerable groups. While OGS companies have started to take strides towards increasing the number of people they serve with consumer finance, these initiatives are generally not specific to vulnerable groups and fail to address their specific barriers. This is understandable given the significant operational challenges when serving last mile consumers and the huge financial burden this puts them under. Therefore, the whole OGS sector needs to pull together to assess how vulnerable groups can better be served by consumer finance mechanisms, and design interventions which better support, or are even specifically tailored to, these groups.

However, given the highly varying socio-economic situation of vulnerable communities, it is clear there is no “silver bullet” nor one-size-fits-all solution. Affordability challenges impacting all consumers can in part be addressed by supporting companies to access more affordable financing, lower their operating expenses, and reduce the manufacturing cost of products. However, while many vulnerable groups share several common challenges impacting their ability to access consumer finance, each group also has its own specific set of challenges dictated by their socio-economic situation, the national enabling environment or local infrastructure. These specific challenges mean that there is no single consumer finance mechanism that will increase access for all groups. Rather, the sector needs to treat groups on their own merits, considering their specific circumstances to better design interventions that will increase their ability to access consumer finance while still being financially viable for OGS companies. The following recommendations are focused on supporting vulnerable groups and have been developed based on result of secondary market research and consultations with OGS sector stakeholders.



Use of data

Increasing the availability of disaggregated energy access data will make it easier to identify which groups currently lack access and enable the design of targeted consumer finance mechanisms. While there is ample data on the total scale of the energy access gap on a global or even national level, there is currently limited data available on which groups have the lowest level of access or are most underserved by standalone solar solutions. This can make it challenging for OGS stakeholders to know which consumer finance models are most effective for vulnerable groups and which vulnerable groups are least served in the market. Availability and analysis of improved disaggregated data at both a company and national level could significantly improve access to consumer finance through the design of improved mechanisms.

- **Company level data:** While OGS companies currently collect varying amounts of data on the demographics, location and socio-economic situation of their consumers, this data is often not detailed enough to distinguish between different vulnerable groups. By increasing the number of data points collected on consumers it would be possible to develop a much-improved picture of which vulnerable groups are or are not served. This could support OGS companies to design and deploy consumer finance mechanisms that are more suited to vulnerable groups. In addition, it could allow OGS companies to sort consumers by socio-economic factors to potentially group

vulnerable communities into specific receivables funds which could attract concessional finance, be eligible for social impact bonds or be subsidized by more affluent customers. Organizations such as 60 decibels are collecting valuable consumer data on behalf of many OGS companies which could be used for this purpose but OGS companies could collect this data themselves without impacting their costs as they already collect some data.

- **National databases:** While initiatives such as ESMAP's Multi-Tier Framework data assesses energy access across a country, many such databases lack the required resolution to hone in on specific vulnerable groups that are most in need. Aggregating datasets from individual OGS companies into a larger database and overlaying this with national demographic data would highlight which groups are underserved. Such data is critical to understanding the scale of the challenge in serving vulnerable groups and is in part being explored by ACE TAF through their Energy Access Explorer maps. It would not only support OGS stakeholders to design specific consumer finance mechanisms targeting vulnerable groups, but would also serve to support the design of wider energy access initiatives such as the deployment of results based financing or other subsidy schemes where consumer finance remains unviable or unavailable.



Community linkages

Leveraging and engaging community groups and structures as part of consumer finance mechanisms to reduce OGS companies' operating costs and increase consumer engagement. Community groups, such as those for women, youths, and farmers, are highly prevalent across vulnerable groups but their potential role in supporting consumer finance models is little understood by many in the sector. Additionally, social structures such as the presence of village or community leaders are often engaged when companies enter new regions but are not leveraged longer term.

OGS consumer finance providers can be supported to leverage social structures in lieu of collateral and to improve repayment rates. Either a lack of collateral or a lack of proof of collateral is a major barrier for many vulnerable persons accessing consumer finance. To overcome this challenge, some financial institutions, such as MFIs, accept social guarantees in lieu of this collateral. In a group loan, each group member is liable for the repayments of the whole group. This improves repayment performance in two ways. First, if any member of the group fails to make their repayment, their payment can be covered by the other members of the group. Second, members are more likely to keep up with their individual repayments as they want to pull their weight for the rest of the group. This has been done by Lippo Microfinance Bank in Nigeria to great success in providing consumer finance loans.

Another approach is to use community leaders to provide social collateral for consumers. These community leaders normally have deep insights into the financial and social standing of community members and can provide guarantees for those wanting and able to make use of consumer finance. In turn, those community members are more likely to keep up with their repayments due to the social pressure of having received such a guarantee from a well-respected member of the community. However, OGS consumer finance providers often lack the resources to know how to tap into such social structures or are unconvinced by their efficacy. OGS stakeholders can provide support to map out these social structures to increase engagement with them and support providers of consumer finance to pilot such initiatives more widely for vulnerable groups.

Engaging and supporting community groups to provide consumer financing to members for OGS products. A more direct route to leveraging community structures to enable vulnerable groups to access consumer finance is the use of community savings and credit associations. As previously discussed, these groups can provide consumer finance on behalf of OGS companies to those who may not be accessible through more formal mechanisms. However, three major barriers exist to scaling these up which need to be overcome.

- **First, loans to purchase an OGS device may require a larger amount or longer repayment period than is generally typical for community loans.** OGS development partners can support this by providing financing to these community groups to enable them to provide onward loans to their members in much the same way credit is offered to MFIs or SACCOs through programs run by the World Bank or other development partners.
- **Second, there is currently little-known best practice for how these models can be scaled up economically.** OGS development partners can support OGS companies to run pilots to formalize engagement with such community groups and test their efficacy in not only improving access for vulnerable groups but also its impact on company financials.
- **Finally, limited management expertise can promote improper management practices and inhibits long term sustainability.** Development partners need to work with community groups to help them formalize and improve the services they offer to members. For example, CARE International has been at the forefront of trying to support and formalize such groups.



Build the
enabling
environment

Build the evidence base for governments, MNOs, and financial institutions to increase coverage of enabling infrastructure to cover many currently excluded vulnerable groups. One of the largest barriers to many vulnerable persons accessing consumer finance is the often deep rural or poor location in which they live. This often means they lack access to the infrastructure needed to access consumer finance such as mobile network coverage, have no access to mobile money agents or banking outlets, or even lack access to formal documentation such as ID cards. This is due to those organizations which offer such services not seeing the financial value in offering them in a location with relatively low demand. For example, MNOs often do not cover refugee camps due to the relatively low ownership of mobile phones, and mobile money agents are often unavailable in deep rural locations due to too few users and challenges collecting cash.

However, the OGS sector can serve as a major driver of demand for such services and it is already well documented that PAYGo companies increase uptake of mobile money among consumers. It is therefore important for OGS companies to work with development partners to build and demonstrate demand for such infrastructure to enable consumers to access OGS consumer finance. Refugee camps are a great example of where demand for such infrastructure is being built by camp managers. In Bidi Bidi Refugee Settlement, UNHCR has worked with MNOs to enable refugees to access SIM cards using their refugee cards in lieu of formal ID and has been rolling out a device ownership program to increase mobile phone usage. This is propelling the deployment of mobile phone infrastructure which in turn will enable access to PAYGo.



Remittances

Support initiatives looking at formalizing remittances as a means of providing energy access to vulnerable communities. As previously mentioned, there has been some traction in channeling the huge value of remittances that flow into developing countries into the OGS sector through pilots such as ePay in Rwanda by BBOX, in partnership with Shell Foundation. Other organizations are also looking to formalize remittance flows in specific scenarios, such as CTEN in refugee settings in Uganda. Such models can provide far more certainty to OGS companies that they will receive regular payments for OGS products from consumers that may otherwise be unable to access or afford consumer financing. BBOX's report from their pilot of their ePay platform provides learnings around the importance of clear communication strategies, building consumer awareness and trust, and ensuring such mechanisms align with current remittance habits. Development partners could seek to learn from such pilots and look for opportunities to further support companies develop remittance-based models through technical assistance and funding.



Rental models

Provide support to scale and test rental models to target specific vulnerable communities due to its lower financial barrier to entry. Rental models, such as solar libraries or solar kiosks, enabled consumers to regularly gain access to energy without requiring significant upfront costs which act as a barrier to many in other consumer finance mechanisms. Such models were relatively prevalent in the early days of the OGS sector but started to fall out of favor with the rapid growth of other consumer finance mechanisms such as PAYGo and MFI models. However, this model has started to gain traction again, through companies such as Wassha, Mobile Power and OffGridBox, as it seeks to fill a gap in the market for those that are not currently adequately served by other OGS consumer finance mechanisms. Despite this, there is still a lack of evidence available on the larger scale commercial viability of such models and the role they can play in the energy access space. To prove the business case that such models can serve more vulnerable groups, they require support from OGS development partners and early stage investors to provide the technical assistance and capital for them to fully scale.



Repayment terms

Support companies to run pilot studies on the impact of varying consumer finance terms on consumer access, affordability, repayment, and default rates. While several OGS companies are currently experimenting with varying the deposit required, repayment amounts and repayment rates, there remains very little consensus in the sector on which approach has the greatest impact on increasing access for vulnerable communities. Throughout the consultations for this report, individual companies were taking several approaches such as linking repayments to seasonal income, having longer repayment terms, or even scrapping deposits. Development partners can work with OGS companies to conduct pilots to see which of these approaches best increases access for vulnerable groups while having a positive impact on repayment and default. For example, CGAP has done some work with smallholder farmers and found that

having intermittent payments when harvesting occurs is not a viable solution, but rather it is important to keep payments consistent to maintain credit discipline.



Insurance

Incorporate consumer insurance into consumer finance mechanisms to support those most at risk of economic shocks. Vulnerable communities are often those that are most at risk of economic shocks disrupting their ability to keep up with repayments on OGS products. Such shocks are unfortunately even more prevalent in the current climate due to the COVID-19 pandemic. Low-income households that derive income from labor intensive, low-skill jobs will be the hardest hit by the crisis.⁵¹ Women-led households will be especially hit, due to high job losses and school closures resulting in more time spent on unpaid work, and no access to school-based nutrition programs.⁵² Households with elderly and sick people may be more exposed to illness and unexpected health bills. Due to COVID-19-related impacts, these vulnerable households will have even less disposable income for essential needs such as food, health, and energy. Some OGS companies, such as Zuwa in Malawi, have sought insurance for their customers against economic shocks. For example, in such a partnership if the main household breadwinner were to die then the insurance would cover the remaining payments to be made to the OGS company and the household would no longer be liable. The range of reasons under which the insurance company pay out would be determined by the agreement with the OGS company but would likely have an outweighed benefit for vulnerable groups. Such insurance partnerships can be arranged by OGS companies for around 1% of the end consumer product price. Development partners could support the scale up of this initiative through research on its impact, the facilitation of market linkages and initial de-risking for insurance companies.



Insurance

Increase sector focus on the provision of consumer finance for smaller OGS products. The OGS sector has seen a dramatic shift over the last few years towards larger systems.⁵³ This trend has in large part been enabled by the increased availability of consumer finance mechanisms, which have made such systems affordable for end consumers. Additionally, larger systems offer higher margins and improved financial performance for OGS companies which has further accelerated this trend. However, this shift leads to lower income communities and vulnerable consumers being unable to afford OGS products. To support vulnerable communities to access OGS products via all forms of consumer finance, this trend needs to be halted and consumers need more options to access cheaper products that are within their affordability range. OGS companies could continue to offer larger systems to more affluent consumers but may require support and technical assistance to help keep their overheads low and conduct better credit risk management procedures to ensure they can be profitable also providing smaller systems.

50 FOMIN, "Financing Sustainable Energy through Remittance" (Washington: Arc Finance, 2009),

51 International Labor Organization (2020) ILO Monitor: COVID-19 and the world of work (2nd edition), page 4-5.

52 World Bank (2020) Poverty and Distributional Impacts of COVID-19: Potential Channels of Impact and Mitigating Policies, page 3.

53 2020 Off-Grid Solar Market Trends Reports (MTR), 2020, 40,



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