



## **Brief:** Solar Pay-As-You-Go Opportunity in Sierra Leone



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## Introduction

Access to energy in Sierra Leone is among the lowest in Africa and the world. The limited electricity that is available is expensive, with electricity tariffs twice as high as the continent's average. A majority of the population does not have access to the national grid and is not likely to gain access in the near term.

Small-scale solar home systems (SHS) offer a low-cost and renewable energy alternative for lighting, mobile charging, television, and other appliances. The cost of these products has also fallen significantly in recent years. Solar energy remains expensive, however. To accelerate uptake, accessibility must be tackled alongside availability.

Fortunately, in addition to improvements in quality and cost-effectiveness of solar technology, new innovations have emerged within finance, payment and credit management – especially integrated pay-as-you-go (PAYG) modalities – helping to accelerate solar product uptake for low income groups.

## Purpose

This document offers PAYG information and learning to inform distributors entering Sierra Leone's solar market in Sierra Leone.

It includes an overview of PAYG best practices informed by aggregated learnings across sub-Saharan Africa, and particularly East Africa, to inform the development of the PAYG opportunity in Sierra Leone. The brief also offers recommendations for targeted investments poised to inform internal business process improvement to support PAYG roll-out and sector-level interventions to support wider PAYG expansion, based on learning in Sierra Leone.

# Solar Energy & PAYG Opportunity

In the last decade, pico-solar, solar home systems and low-cost solar appliances have been introduced to Sub-Saharan Africa, and particularly East Africa. Alongside evolutions in solar technology, solar companies have decreased costs by integrating technologies that allow for real-time monitoring, offer small payments through higher-frequency instalments, and leverage mobile money platforms to decrease the cost of outreach. The combination of all three has come to be termed: Pay-As-You-Go (PAYG).

PAYG for solar has enabled consumers to purchase solar or smaller increments of energy over time rather than making considerably higher, upfront, cash payments. Typically, PAYG customers pay a small, one-time installation fee and then purchase scratch cards or use an integrated mobile money service to top-up their home solar units. Daily, weekly or monthly payments are made within a pre-established timeframe set between the consumer and provider. Instalments are generally made over a period of 12-36 months, although some companies offer payment for up to 10 years. In the interim, ownership of the system is retained by the provider until the system is fully paid. Thereafter, the system is unlocked with ownership transferred to the customer.

## Determinants of Solar PAYG Success

Since its inception, PAYG has accelerated solar home system use and ownership for hundreds of thousands of off-grid households and small businesses. In contexts where PAYG has seen rapid uptake, such as in East Africa, the following factors have been essential to success:

### Ease and incentive for solar and telco money platform integration.

- Solar systems' integrated functionality, particularly remote lockout technology (the type of SHS used

determines the type of PAYG model for financing)

- Strong infrastructure (e.g., M-PESA) to operationalize and to support
- Potent mobile money use and wide application for payments and funds transfer
- Telecommunication company buy-in and willingness to support complementary business opportunities, including solar

### Strong demand and incentive for solar product uptake.

- Wide awareness of PAYG as a means to finance solar systems.
- Costliness of solar alternatives, particularly kerosene. Low-cost LED plug-in or battery-powered alternatives did not exist.

### Primed and well-financed market.

- Wide awareness of benefits of solar uptake, especially when compared to more costly alternatives.
- Well-capitalized solar companies that could afford to offer low installation rates and long-term flexibility with respect to repayment.

## Leveraging Telecommunications Networks to Accelerate Adoption

An essential consideration in the successful operationalization of PAYG is the mobile network ecosystem and the extent to which partnerships with telecommunication providers and mobile money operators (MNOs) can be forged to create shared value. Shared value is created from solar companies being able to leverage MNO assets such as mobile payment platforms or sales outlets while MNOs benefit from increased uptake of mobile services and improved brand perception.

<sup>1</sup> GSMA Mobile Enabled Community Services, Annual Report 2014

Companies are shown to form a range of partnerships from cooperative (lowest risk) to collaborative (medium risk) to co-creative (higher risk). Companies such as Azuri operate a vertically-integrated supply chain where manufacturing/design and last-mile distribution and payments are retained in-house. Through their scratch card model, the company bypasses the dependability on mobile connectivity, albeit it does require management of the agent network.

Other companies such as Mobisol are engaged in 'collaborative' partnerships. In its partnership with MTN Rwanda, MTN Rwanda provides the technology and network. MTN does not carry the risks of providing the full energy service. The anticipated benefits to MTN are as follows:

- Increased market penetration from newly acquired customers attracted to the PAYG solar opportunity and/or improve retention of existing customers through new offering
- Additional revenue generation from mobile money payment fees
- Increased phone usage due to improved access to charging
- Increased mobile money subscriptions

Other companies such as Lumos, have developed move involved 'co-creative' collaborations with MTN Nigeria known as a 'telco-grid billing system.' Lumos aligns its services with MTN's airtime billing system, obviating the need for third party applications for their clients. Reported user experience is improved and streamlined. Lumos leverages MTN's network of more than 150 kiosks across Nigeria and the company's strong brand recognition. In their partnership, MTN Nigeria holds the responsibility of distribution, marketing, and sales of the system. Meanwhile, Lumos finances and manufactures the range of products and ships consignments to the TELCO. MTN also receives a proportion of customers' electricity service fees.

## Integration with Mobile Money Payment Platforms

Extension of PAYG services to end users offers significant possibilities towards collection of key data on user experience; customer behaviour analytics on usage and payment discipline; and product performance. The software back-end to support these efforts are SMS or data gateway platforms, often hosted in the cloud, alongside varied levels of integration with a digital payment platform to receive mobile payments from customers.

These varied levels of integration include:

- Manual: the use of a scratch-card or a pre-existing code that is manually entered into the SHS meter.
- Lightweight Integration: Allows multitasking to be done at the user level. Through a smart phone device, a code will be generated for the customer to top-up their SHS.
- Application Programming Interface (API): real-time notification that a payment for the services rendered has been made. In turn, the provider can instantaneously address the notice of payment enabling SHS locking/unlocking and top-up without delay.

API integration, albeit the costliest of the three options, can drastically minimize risk associated with fraud and losses while enabling more advanced functionalities and transactions including deployments at scale. Companies such as Angaza Design, Lumeter Networks, SIMPA Networks, and M-KOPA are but a few of prominent PAYG technology providers with whom solar distributors may seek to partner with to host their PAYG platforms.

# Developing PAYG Opportunity in Sierra Leone

## Mobile Money Ecosystem in Sierra Leone

PAYG is most efficient when linked to mobile money platforms. Mobile money operators (MNOs) play a vital role in making this model cost effective and successful. Presently, there are two telecommunications companies and one focused mobile money operator that offer mobile payment services. Each is a potential channel through which to facilitate payments for consumers to top-up their solar home units in Sierra Leone.

## Airtel (Airtel Money)

First launched in 2009 as ZAP with limited services, which allowed for the transfer of credit through mobile money. Subsequently, this, evolved into Airtel Money. Airtel money is currently the most prominent mobile money payment system, with the widest outreach in Sierra Leone. With 3,584 agents in office and mobile to service an active customer base of 372,419 customers making over 7,500 transactions daily and up to 1.8 million transactions monthly.

Airtel Money offers payment services for money transfers, payment of bills (DSTV, electricity, grocery shopping), and payments for fuel at certain gas stations. Airtel Money also partners with Zenith Bank, Guaranty Trust Bank and Ecobank as mobile banking partners; allowing customers to use the airtel money function to access their bank account and conduct various transactions.

### Issues:

- Consistent payment processing challenges Airtel Money uptake. Periodic system failures result in service access delays or cancellations, loss of payment, and/or repeat transactions (if credited) that collectively dissuade use.
- Connectivity gaps also impinge use and further dissuade uptake. Although Airtel boasts nationwide coverage, network gaps limit activity, including: telephone calls, cash transfers, and

payments.

- Shop and agent coverage is limited and insufficient to attend to customer concerns or to process payments as needed.
- Orange recently acquired Airtel in Sierra Leone; the company is undergoing a shift in management accordingly that is likely to affect operations and investment.

## Africell (Africell Money)

Africell Money launched at the end of 2016 with an uptake of 13,000 active users and 200 agents to service them. Africell Money is still in its infancy, it offers payment services for salaries, electricity, and school fees.

### Issues:

- Untested system and limited integrations. Africell's mobile money platform is new; the company will need time to work our service issues and to grow integrations.
- Connectivity gaps also limit use and uptake. Africell's network is more limited than that of Airtel, constraining use and applicability – particularly for remote customers.
- Shop and agent coverage is still expanding.

## Splash Mobile

Splash Mobile is a third party service provider that leverages telecommunications networks to offer a payment management service. Customers that utilize Airtel and Africell telecommunications networks, can use Splash Mobile to receive funds and to make payments, once registered with an agent. With 450 mobile agents, over 240,000 customers have used Splash to make money transfers and receive payments.

Splash Mobile gained major popularity during the Ebola outbreak, as many frontline workers were paid through this mobile money platform. Since then, the system has been used to pay salaries, transfer cash and make payments to electricity service providers.

**Issues:**

- Connection time-outs and system failures are widespread
- Dependent on the use of telecommunication companies
- Limited services, does not allow for payments of all bills (DSTV, grocery shops)

### Sierra Leone Solar Company PAYG Application & Use

Successful PAYG solar service providers in East Africa, such as M-KOPA, Mobisol, Azuri Technologies, BBOXX and SolarNow, are setting their sights on the next frontier - West Africa.

The PAYG model is in its infancy in Sierra Leone, however. To date, there has been high SHS product uptake, but also high default rates and product recovery costs.

The PAYG model is in its infancy in Sierra Leone, however. The companies below have previously and/or are currently trialing a blend of PAYG approaches and with varied levels of success.

**Table 1: PAYG Distributor in Sierra Leone**

	TELEFICIENT	EASY SOLAR	IGNITE POWER
<b>Background</b>	Teleficient Communications (Ltd.) was initially established as an Internet company, pivoting to sell mobile technology and later solar. In 2013, Teleficient conducted a pilot with Azuri products to test consumer interest and long-term repayment/PAYG models. The pilot revealed notable product uptake, but also high default rates and product recovery costs.	Easy Solar (SL) Ltd is a Sierra Leone based social venture, distributing and financing pico solar products. It is backed by Azimuth, a New York based Benefit Corporation which has the more general goal of “delivering and financing devices that transform the way people live, work and play.- Currently, Easy Solar resells three solar products in Sierra Leone (GreenLight Planet: Eco, Pro and Home System).	Ignite Power is part of the Clean Access Initiative. It is rooted in the work of the Clean Access team and Bloomberg New Energy Finance in 2013 on how African nations can leap-frog to 100% Clean Access. The Clean Access Initiative mission is to create nationwide projects for deployment of Clean Energy solutions and to bring nations across Africa to 100% access to clean power, everywhere and for everyone.
<b>Technology Provider</b>	Azuri / Green Light Planet	Green Light Planet	D.light
<b>Remote control system</b>	Yes	Yes	Yes
<b>Financing System</b>	PAYG: scratch-cards/ mobile money. 20-month repayment plan.	PAYG: cash collection/ mobile money. Angaza platform to track data and interact with customer.	PAYG: mobile money. Atlas platform to track data and interact with customer.

<b>Target Market</b>	Off-grid rural households and Ebola affected homes	Off-grid rural households and small businesses	Off-grid Households
<b>Location</b>	Nationwide	Western Area Rural, Moyamba, Port Loko, Tonkolili	Lungi and Port Loko
<b>Pilot</b>	2013	Early 2016	November 2016
<b>Successes</b>	The use of radio stations as a marketing strategy as it had a wide reach.	High uptake (over 1000 units sold) high repayment rates, customer care (home visits by agents).	High uptake - nearly 500 units sold in two months.
<b>Challenges</b>	Limited access to scratch cards and low penetration into the mobile money market.	Penetration into the mobile money market - approximately 2% of their customers use mobile money. Higher costs associated with in-person cash collection.	Ignite operates on a 100% mobile money platform. Due to connectivity issues and limited mobile money agent presence in the locations in which the company operates, payments have been challenging. For example, there was a 2-week period wherein all weekly collections were halted. Ignite is working with Airtel to improve this.
<b>Next steps</b>	Seeking to understand operational challenges and opportunities for improvement in earlier PAYG approach.	12-month trial period - use of mobile money & moving from manual to lightweight integration system (having a smart phone compute code vs. customer punching in code in SHS).  Endeavour to push mobile money penetration as a result of customer sign up.	Pilot with 500 SHS units with 2 payment options: 1) Repayment period of \$2 a month for 24 months with no down payment; 2) Weekly down payment for 2 months prior to receiving the unit.

## Teleficient: PAYG Sierra Leone – Use Case

In 2013, Azuri launched operations in Sierra Leone in partnership with a local company, Teleficient Communications Ltd. to adopt and replicate the supplier's product offering and pay-as-you-go (PAYG) business model to service last mile consumers marking the entry of PAYG financing in Sierra Leone. Within the span of 24 months, Teleficient brought light to over 3,000 off- and on-grid households providing a safe alternative to traditional energy sources and impacting the lives of low-income communities across Sierra Leone.

In its targeting, Teleficient prioritized off-grid households in urban, peri-urban and rural areas. Acknowledging the inherent risks of servicing customers in an ecosystem with nonexistent credit history, Teleficient built another layer of customer segmentation, focusing on income generating communities while also tapping into trust networks through agents and sub-agents that are embedded deep into the communities in which Teleficient operated. Since starting operations in 2013, Teleficient has brought onboard 30 core agents across the country. Agents are often located in urban and peri-urban areas, but this often limits reach to off-grid rural customers. Agents developed an interesting workaround to this challenge. Teleficient agents further recruited sub-agents, approximately a network of 50 since 2013.

On the wake of Ebola, and as a result of significant fluctuations in foreign exchange rates, Teleficient was faced with high logistics costs in delivering scratch cards to the provinces. This resulted in widespread reduction of scratch card availability and a transition to the use of mobile money. This transition posed a number of challenges including:

- Customers complained of limited awareness of the transition to mobile money due to lack of accompanying advertising and awareness-raising
- Existing mobile money use among Teleficient communities was low as was customer awareness and understanding of mobile money use
- There was high customer resistance toward the newly introduced mobile money technology and mobile money payment

Reported user experience in the initial stages of engagement with Teleficient namely, during the first six months, was noted as high both in customer satisfaction and service delivery from agents, sub-agents, and headquarters. Trends in customer satisfaction show a decline in the later parts of their contract period primarily due to:

- Difficulty locating nearby agents for top-up and/or for support in resolving problems with product
- Challenges with mobile money (i.e. process, codes etc.)
- Difficulty reaching head office for assistance including with product problems

With these insights, Teleficient is making strategic shifts in its PAYG business model and customer engagement experience and repositioning with the below recommendations to maximize sales and return.

## SWOT Analysis: PAYG for Solar in Sierra Leone

Table 2: SWOT Analysis of PAYG in Sierra Leone

STRENGTH	WEAKNESSES
<ol style="list-style-type: none"> <li>1. Convenience of paying at your own pace and on your mobile device</li> <li>2. Weekly payments that align with customers current energy expenditures</li> <li>3. There are existing mobile money systems in Sierra Leone</li> </ol>	<ol style="list-style-type: none"> <li>1. Incentive to ensure regular payments (remote locking technology)</li> <li>2. Penetration into the mobile money market</li> <li>3. Limited access to mobile money/telecom agents (after sales, service and customer support follow up is poor)</li> <li>4. With the existing solar PAYG system - scratch cards are not readily available</li> <li>5. High cost of integration</li> </ol>
OPPORTUNITIES	THREATS
<ol style="list-style-type: none"> <li>1. The solar market in Sierra Leone is still in its infancy</li> <li>2. Clean and affordable electricity</li> <li>3. Can learn from successful PAYG models in other African countries</li> </ol>	<ol style="list-style-type: none"> <li>1. Economic instability (fluctuating dollar prices has resulted in an increase in price of food stuffs and other goods)</li> <li>2. Cheaper energy costs from biofuels</li> <li>3. Limited access to mobile phones (gender disparity)</li> <li>4. Accessing support from telecommunication companies and agents (who distribute SHS) is limited and challenging</li> </ol>

## Conclusions and Recommendations

Based on the initial landscape research and in-depth insights from the Azuri case study, the following targeted business investments are recommended alongside additional opportunities for further research at a sector-level to further the reach of PAYG instruments to finance SHS in Sierra Leone:

### Business-Level Recommendations

**Undertake targeted investments in internal business process improvement to support effective PAYG roll-out at company level:**

**Credit-worthy customer base:** PAYG helps to establish a credit-worthy customer base. The opportunity in the long-term is to leverage these customer and initial credit relationships to provide additional services and products in complement to a customer's initial energy purchases.

Product basket diversification and add-on services such as TVs, radios etc. enables PAYG providers to graduate customers along the energy access continuum with higher-load energy products while enabling providers to gather more in-depth data on customer credit behaviors that can lower portfolio risk and improve portfolio quality. PAYG providers should invest in building a robust credit scoring mechanism.

**Customer service and management of field-based agent networks:** Ensuring that your company is optimally staffed with technical and soft skills service is paramount in servicing PAYG providers' growing and, at times, geographically distant customer base for those reaching last mile customers. As was the case with Azuri and Teleficient, the company's agent network rapidly expanded with agents recruiting sub-agents. This enabled the company to build wide reach, and led to initial high-uptake as agents were able to quickly close on easily obtained gains.

Altogether, the strategy of a large and far-reaching agent

network, without key safeguards and considerations in place, can threaten long-term customer-agent relationships. Customers complained that a few months after their purchase, agents were inactive in their geographical areas, particularly for customers those in more remote, isolated communities.

Companies could trial a mix of approaches, from building in incentives for customer retention to assigning agents to specific geographical areas with market penetration targets that dictate when expansion to a new area may be undertaken. Investing in staff through trainings and a competitive base-level compensation can go a long way to support these efforts as does consistent and reliable headquarter support to field agent network.

**Mobile Money Education:** Teleficient's customers relied heavily on the security of the scratch-card technology. The transition to mobile money proved difficult. Public campaigns that educate customers on the use of mobile money and leverage customer testimonials on use of mobile money platforms, can support in building a case for the use of mobile money.

Importantly, solar providers need not do this alone; mobile money providers are also keen to reach a larger customer base. Often, in contexts such as Sierra Leone where mobile money is still in its infancy, PAYG providers are spearheading mobile money education, driving mobile money sign-ups, and accelerating mobile money penetration. To support these efforts, companies are standing up in-house customer service units or call centers that can offer the following services:

- Troubleshoot agent issues and flag maintenance and unit service checks
- Reinforce customer guidance in plug and play device installations/operation
- Offer remote mobile money education, navigation and customer activity record keeping
- Undertake marketing and sales call as part of wider customer retention strategies such as

courtesy call and deals and promotions. Altogether, the aforementioned recommendations can well-position PAYG providers to balance portfolio growth and scale with portfolio quality that builds in optimal safeguards to reduce risk.

support units/embedded services for mobile money/solar PAYG inquiries and transactions?

## Sector-Level Recommendations

The above findings are a conversation-starter on the ingredients necessary to support the development of a PAYG ecosystem in Sierra Leone and building from learnings in similar contexts. Improvements at PAYG provider level are just the beginning. Wider systemic mobile money infrastructure and ecosystem changes and greater strategic involvement of mobile money and telecommunication providers in the PAYG discourse are necessary to drive growth in the sector. However, more work needs to be done to bring the conversations together – recommendations include:

- **Establish a business case for mobile money operators and solar company collaboration.**
  - What are the current business practices, strategies, motivations and interests of telecommunication companies and service providers (electricity, TV, etc.) to increase the use of mobile money payments?
  - What is the business case in Sierra Leone for fostering strategic partnerships between telecommunication companies/mobile money operators and solar distributors?
- **Delineate pilot opportunities that serve the larger solar community with guidance on PAYG integration and application.**
  - How can bodies such as The Renewable Energy Association of Sierra Leone (REASL) leverage their expertise to forge shared value and create partnerships with telecommunications to drive mobile money penetration? Could they host customer

# Annex 1: Sierra Leone Mobile Coverage – Airtel and SierraTel

