

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 1: July 14, 2013

Summary of progress to date

We are currently partnering with SunnyMoney to distribute our Pay As You Go (PAYG)-enabled solar lamp and phone charger (the SoLite3) to small-scale retailers in peri-urban Nairobi slums. These sales are taking place as part of a randomized controlled trial (RCT), designed and executed in concert with Innovations for Poverty Action (IPA). The RCT is focused on testing different pricing models for PAYG, with the goal of determining a model that encourages the highest PAYG product take-up, quickest repayment, and lowest default rates. Payment data are automatically collated by our backend payment management software, while additional data on the impact of clean energy access on customers’ business indicators will be collected by IPA through detailed in-person follow-up surveys, beginning September, 2013. To date, we have sold approximately 200 SoLite3s for the RCT, with sales (targeting a total volume of 500-1000 units) continuing through the end of August.

Through collaboration with SunnyMoney, we have iterated and improved upon several features of the SoLite3 product, as well as our PAYG marketing and customer education materials. For example, our customers reported difficulty with self-discharge of the SoLite3 battery, so we made improvements to the product firmware to minimize this problem. We are also currently working to simplify the product registration process and add additional symbol-based user instruction to the product pamphlets, based on feedback from the field.

Updated implementation plan

The success of our current collaboration with SunnyMoney has led to interest from both parties (formalized in an MOU between the companies prepared June, 2013) in scaling up PAYG sales in rural, off-grid areas, which comprise our core target market. In particular, we are planning to field test PAYG sales through SunnyMoney’s highly effective schools-based distribution scheme (i.e., “school campaigns”). School campaigns focus on rural schools as a central point for sales and distribution of solar lamps as a clean and safe alternative to kerosene lanterns. Teachers are responsible for marketing and promoting solar lamps, and taking pre-orders for lamps from their community members. Once a threshold level of pre-orders has been reached, SunnyMoney delivers the products and provides on-site sales support. In this way, high distribution costs to rural regions are mitigated by guaranteed sales income, and the teacher serves as a permanent supportive resource for SunnyMoney and the community. The success of the schools campaign distribution model has made SunnyMoney the largest solar lamp distributor in Africa, with a 647% increase in sales in the latest fiscal year. In Tanzania alone – the site of the current project – they are targeting over 600,000 solar lamp sales in 2014.

Although the SunnyMoney school campaigns have been highly effective in increasing the volume of solar lamp sales in rural African communities, the upfront price of these products remains a significant barrier to adoption, capping the take-up of lamps at approximately 15% of the potential customer base. We estimate that the introduction of PAYG pricing into this sales channel could more than double this take-up rate, with significant impacts on health, safety and educational outcomes in rural, off-grid communities.

The implementation plan for this project is divided into five primary activities:

(1) Complete tooling, manufacturing and shipping of PAYG units (months 1-3)

Tooling updates and manufacturing will be completed during the first quarter of the project, coincident with the final planning stages for the small-batch trial (see below). Our contract manufacturer in China has already completed the necessary quality inspections (e.g., IEC and PVoC) for importation into Africa, so we do not anticipate any supply chain delays. The bulk of the units will be stored at the SunnyMoney headquarters in Nairobi, Kenya, and smaller quantities will be shipped from Kenya to the SunnyMoney storage facilities in Dar es Salaam, Tanzania as needed.

(2) Perform a small-batch PAYG trial in a school campaign (months 3-6)

A single school in rural Tanzania will be selected for a small-batch trial of PAYG sales. This trial will consist of 50 PAYG units. The principle goals of the trial will be to determine the best pricing model for PAYG sales through schools (the decision of the pricing model(s) to test will be strongly influenced by preliminary data from the Kenyan RCT), and to test marketing, sales and user-education materials. The exact siting of the school for the small-batch trial will be determined by SunnyMoney's Tanzanian team based on their current schedule, to minimize logistical complexity. One or more Angaza team members will also be on site for the trial. The SunnyMoney team will be trained in the use of the Angaza "Energy Hub" backend software system in order to track payment status on all sold units. In addition, the SunnyMoney and Angaza teams will work closely with the customers to assist them with PAYG, collect their feedback on the product and materials, and streamline the sales process.

(3) Optimize the PAYG pricing, sales process, and design of marketing and user education materials for the rural, off-grid Tanzanian market (months 3-7)

Based on customer data and feedback collected during the small-batch trial, we will finalize the PAYG pricing scheme, and iterate on product features that can be adjusted through software changes in our backend system (e.g., LCD display content, SMS payment reminders, etc.), as well as customer help documentation. The latter will be optimized for the rural Tanzanian market by translating it into Swahili, tribal languages, and/or universal symbols, as appropriate.

(4) Scale up PAYG school campaign sales using best practices determined during the small-batch deployment (months 7-12)

After both parties are satisfied with the refined product offering, we will sell another 450 PAYG units through 2-3 additional Tanzanian schools to get initial experience with scaling sales through this channel. The goal of this deployment will be to stress-test bulk sales to prepare for additional scaling through Tanzanian and Kenyan campaigns.

(5) Disseminate project data and outcomes to the energy access community (months 3-12)

We intend to make all non-personal and non-proprietary data from the project public through various avenues. For example, we will make average energy usage data available to individuals and groups who find it of interest. Any personal information about our customers (e.g., names, telephone numbers) and sensitive business information (e.g., default rates) will not be made openly available. Angaza will be featuring the project on our website, and will be discussing the project outcomes at public events (e.g., conferences, energy access events) and through social media (e.g., Twitter, Facebook, blog posts).

Updated project evaluation plan

Business indicators:

The following metrics are collected automatically from each unit in the field by our Energy Hub payment management system. These data are sent from the unit each time the customer makes a payment.

- Average hours of light and brightness setting used: these data provide a direct measure of kerosene offset
- Average amount of energy used for mobile phone charging: off-grid consumers in Tanzania typically pay ~\$0.20 per mobile-phone charge when charging at a kiosk, so these data indicate cash savings from use of the PAYG lamp
- Interval between payments: preliminary data from the Kenyan RCT suggest that a regular weekly payment schedule lowers default rates, so we will initially trial a weekly payment scheme. Customers in default will be contacted by a dedicated helpline to collect information about the cause of lack of payment (e.g., problems with the unit, confusion about payment, insufficient money, etc.)
- Number of lost units and repayment rates: our target is to keep default rates under 5% by optimizing customer education and pricing. Repayments will be tracked precisely during the project, and we will trial various incentive structures (e.g., coupons for early payment) to minimize defaults, as agreed upon with SunnyMoney

Additional business indicators will be collected by our team, including:

- Number and cost of goods sold: our goal is to sell the full 500 units during the course of the project, and generate additional demand that can be fulfilled by follow-on sales. We are currently manufacturing at low volumes which makes our cost of goods relatively high, but we are working closely with our manufacturer to source components that will reduce our costs by approximately 30-50% as we reach economies of scale in manufacturing

- Profits or losses: all Angaza profits from the project are obtained through charging a transaction fee on PAYG payments that pass through the Energy Hub. Our principle goal for this project is to cover our costs, while putting business operations in place to realize a profit during full scaling activities
- Change in volume of solar lamp sales in schools campaigns that incorporate PAYG versus SunnyMoney's average sales figures

Impact evaluation

SunnyMoney and Angaza will work together to evaluate the impact of the project. Angaza will facilitate the preparation of appropriate survey instruments based on our experiences during our PAYG pilot in Tanzania and the RCT in Kenya. SunnyMoney's Social Impact team will be primarily responsible for administering the surveys, as well as conducting interviews and focus group discussions with customers to collect feedback on the product and accompanying materials, and track social impact. We will target reaching at least 90% of customers with the surveys, either through in-person visits or phone calls. Interviews and focus groups will be focused on smaller subsets (reaching ~20% of total customers) of the customer base, with the goal of speaking in greater depth with people who are representative of different demographics (e.g., farmers with periodic income versus shop keepers with steadier income, female versus male head-of-households, etc.) to get their feedback on the product and PAYG payment features. We will explore key qualitative questions such as:

- Is there a compelling business case for PAYG sales through school campaigns?
- What is customer payment behavior like, and what are key pain points or areas of confusion with PAYG?
- What modifications to the user education materials would make them better suited to the Tanzanian customer demographic?
- What marketing materials are particularly compelling?
- What transaction costs are incurred for customers, mobile operators, and mobile money providers, per light sold?
- Do customers feel that they are saving money versus kerosene and mobile phone-charging purchases?

The preparation of these surveys and planning of focus groups will occur during the first quarter of the project, and data will be collected at minimum of two times during the project, during the small-batch and scale-up portions. Data will be cleaned and analyzed by Angaza and SunnyMoney, and the parties will work together to determine key action items that are implicated by the outcome.

Cost-effectiveness indicators

1) Cost-effective investment for the public sector:

Currently, the only widely available source of financing for consumer durables in off-grid emerging markets is microfinance. Although microfinance has been incredibly beneficial for increasing financial inclusion, it is hindered by the high servicing costs imposed by in-person collections. As a result,

microfinance loans often are not feasible for products in the price range of a solar lamp (<\$100). In the rare instances that loans of this size are available, interest rates must be prohibitively high to rationalize the servicing expense. As a result, public investment in microfinance institutions is not a scalable or sustainable way to catalyze energy access through small-scale, distributed technologies like solar lamps. In contrast, as a for-profit social venture, Angaza's core business model is built around the scalability and financial feasibility of our PAYG technology. The "loan" that we are extending to consumers is remotely enforced through the independent enabling/disabling of the solar unit based on payment status. All payments are accepted via mobile money and our data transfer technology is automated, ensuring that servicing costs remain low and continually decrease with economies of scale. As a result, public sector investment in Angaza's technology and business model has the potential to sustain long term energy access returns as Angaza grows into a profitable business.

Although providing a technical solution to financing is a relatively recent development in the pico-solar market, there are several other companies innovating in this sector. Among these companies, the two most prominent technological trends are 1) the use of scratchcard payment schemes combined with keypads to lock/unlock the device (e.g., Simpa, Azuri), and 2) the embedding of a GSM module into the unit to mediate lock/unlock (e.g., M-Kopa). Principle distinguishers of Angaza's technology over these other approaches are that it is exceedingly low-cost, while still being completely embedded in the unit and providing two-way data exchange. These features allow superior tamper-proofing and the collection of usage and diagnostic data that can be applied to future product iterations and upgrades, as well as supporting general market intelligence. The low-cost of our product allows us to shorten pay-off times to less than a year, significantly reducing the risk of default and making it feasible to embed PAYG functionality into solar units as small as desk lamps.

2) Cost-effective investment for the customer:

Typical energy expenditures for rural, off-grid Tanzanian families are extremely high relative to their incomes, equaling up to 30% of their household budget. Although current quantitative data are difficult to find, qualitative information from speaking with customers and partners suggests that a typical family spends an average of \$1-2 per week on kerosene for light, and approximately \$0.20 per phone charge. Over a single year, these expenditures equal or exceed \$100 per family, and continue to rise over time with the increasing price of fossil fuels. We have taken these incumbent energy expenditures into account, and are pricing our weekly PAYG payments at ~\$1.5 to be equivalent to typical kerosene purchases. Every PAYG energy payment accrues towards the final purchase price of the device, and when the full price has been reached the unit "unlocks" to provide energy for free. Our payoff period for our 3-watt LED light and mobile phone charging unit is approximately 10 months and the unit lifespan is estimated at 4-5 years, which represents considerable monetary savings for our customers. Additional financial benefits are realized through increased number of hours available for productive trade or studying activities.

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 2: October 4, 2013

Update on activities

We have completed SoLite3 tooling and high-resolution testing, manufactured 2000 units with our contract manufacturer in China, performed full quality screening, and shipped the units to Kenya. They are now being securely stored in the SunnyMoney warehouse in Nairobi. We decided not to ship 500 units to Tanzania until directly preceding sales, in order to minimize risk of damage or theft. We incurred some one-time costs and delays due to the need for IEC standards testing of the factory and units while in China. These tests do not need to be performed again for future SoLite3 batches. Our manufacturing costs were also relatively high per unit due to the low quantity of the build, but these costs are conservatively estimated to decrease by 20% with an increase to 5000 units. We chose to airfreight the SoLite3 stock in order to begin Kenyan sales as quickly as possible, which was considerably more expensive than ocean freight. When our scaling activities reach the point of having a consistent and predictable flow of products running through distribution partners, we will transition to ocean freighting all products.

We have worked closely with SunnyMoney to redesign our sales flow to fit their School Campaign distribution model. The new flow required some technical changes to the firmware loaded on the unit, as well as the backend software infrastructure. These technical modifications have been implemented and thoroughly tested by our US- and Nairobi-based teams. In addition, we have completed the design of marketing materials, stickers, and a warranty card for PAYG sales through the School Campaigns, and these items are currently being translated into Kiswahili. Beginning with existing SunnyMoney materials, we have designed a PAYG-specific training “pack” for the Head Teacher, which describes the SoLite3 product, PAYG technology, Campaign methodology, and Head Teacher incentive structure. SunnyMoney and our Nairobi team are performing mock training sessions to make sure the pack and accompanying presentation are clear and optimally informative.

Our California team is currently working with UX designers from a local university to add functionality to our front-end interface that will allow SunnyMoney to directly “launch” a new School Campaign. This launch feature will streamline the initiation of new campaigns as we scale our sales activities. SunnyMoney will be able to enter all salient data about the school (e.g., location, number of students, Head Teacher name and phone number, etc.), generate account numbers and set pricing, and set a “go live” date for the day of product delivery. Clustering accounts by school will also facilitate data collection and visualization; payment and energy usage data can be analyzed on a school-by-school basis, and then compared across different schools and regions to help optimize operations.

In addition to the payment and energy usage data collected automatically by our backend, our Nairobi team has designed a series of questionnaires to be given to customers upon delivery, customers after the first-week top-up, customers who expressed interest in the product but did not buy, and the Head Teacher. There is the potential for some complications in collecting a sufficient number of surveys to draw general conclusions if we are unable to reach customers. This issue should be mitigated, however, by having each customer's mobile phone number, which will allow us to call them if necessary.

SunnyMoney's Tanzanian team has helped us identify Morogoro as the best area for our initial pilot deployment. They performed a School Campaign focused on the d.light S2 entry-level solar lamp in the area in October, 2012. As a result, they are familiar with the Head Teachers, and the communities have a general understanding of the concept of solar energy. SunnyMoney market research in the region indicated that 87% of the population did not have access to electricity, and 78% of those without electricity used kerosene lamps as their primary source of lighting. The survey respondents in the lowest income group were spending an average minimum of 19% of their monthly income on kerosene. In addition, 89% of the households had a mobile phone and were spending an average of \$0.63 a week charging it. These expenditures provide a compelling incentive to switch to low weekly payments on a multi-function solar lamp, which we believe will be beneficial for take-up of the SoLite3. Among the respondents that did not have a solar light, 88% said they would be interested in purchasing one, again suggesting a ready market for the SoLite3. We have not yet selected the exact school in Morogoro for the pilot deployment, but we intend to make that decision by the end of October. We have been actively training SunnyMoney staff on the use and maintenance of the SoLite3 over the past several months so they will be well equipped for the launch of the initial campaign.

Scaling strategy

Angaza has a dual-pronged strategy for scaling our technology and business model:

1. Sales of SoLite3

We will scale sales of our fully integrated Angaza-branded PAYG SoLite3 through multiple distribution partners. The majority of our initial scaling efforts will be focused on SunnyMoney, since they are currently the largest pico-solar distributor in Africa and we have a strong partnership in place. We are planning to sell SoLite3 units through SunnyMoney School Campaigns throughout rural Tanzania and Kenya, possibly expanding to Zambia over the next year.

In parallel with ramping sales volumes through SunnyMoney School Campaigns, our Nairobi team is actively pursuing new distribution partners for SoLite3 sales. We have spoken with several interested parties, and we are currently evaluating their operations to determine compatibility with PAYG sales. One of the major points we have learned to date is that PAYG distribution requires organized and thoughtful methodology to support customer education at point of sale and provide reliable after-sales support. As a result, we are performing careful due diligence on potential partners to make sure they have the operational capacity to support PAYG.

During the pilot stage of SoLite3 sales, Angaza is providing units to SunnyMoney for distribution through the school campaigns. After we reach 1000 sales, we have agreed to work together to find a risk-sharing strategy to support scaling operations. We are actively pursuing 3rd party resources for working capital, including Kiva and SunFunder. For any units that are not paid for by these sources, our proposal – for both SunnyMoney and other distribution partners – is to sell the SoLite3 units to our partners at cost; Angaza will not make any margin off of the initial sale. Angaza will then revenue share from each payment that is made by end customers. This revenue will be used to cover telephony fees incurred during each payment, thus incentivizing us to continue optimizing our technology. In addition, it will allow us to host and provide a front-end log-in for our distribution partners that allows them to visualize the payment status on their units in real time.

2. Licensing of PAYG technology

The second prong of our proposed scaling strategy is licensing our PAYG technology into the devices of 3rd party manufacturers. We are in conversations with several prominent solar device manufacturers about licensing proposals, including Greenlight Planet, Barefoot Power and One Degree Solar.

The licensing process requires that we perform upfront design R&D to integrate our technology into the existing circuitry and componentry of the 3rd party product. When that work is complete, we hand over the reference design to our partner for incorporation into their existing manufacturing supply chain. As with SoLite3 sales, all Angaza revenue is realized through shares of each payment, which covers telephony fees and hosting. We are also considering offering additional optional services, such as helpline management, to streamline distribution and facilitate customer education.

We are currently in the R&D phase for our first licensed product, the Greenlight Planet Eco desk lamp. We will have a field-ready prototype in February, 2014. This desk lamp will be the first PAYG-enabled entry-level solar product in the market. We are able to introduce PAYG to this extremely popular product tier because our technology adds only a nominal cost (~\$1.5) to the COGS of a solar product. Following the introduction of the PAYG-enabled Eco, we anticipate next licensing into a multi-function lamp and mobile-phone charging product of higher wattage than the SoLite3, giving us a full range of PAYG-enabled product offerings. Customers can transition from kerosene to solar with the Eco, and then move up the product tier through reinvesting kerosene savings. Our digital payment history for each customer will provide an informal credit score to allow us and our partners to evaluate risk of upsells.

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 3: January 1, 2014

Update on activities

During this quarter we completed the R&D and initial prototyping of a new PAYG product, which is an entry-level solar desk lamp. We began developing this product after recognizing a major market opportunity through our partnership with SunnyMoney. SunnyMoney is currently the largest distributor of pico-solar products in Africa, and over 80% of these products are solar desk lamps. Although SunnyMoney is selling impressive volumes of these entry-level products, they estimate that they are only reaching approximately 15% of the potential market because they are not able to offer financing. Even the ~\$10-15 price of these desk lamps is prohibitively high for many rural African families to afford in a single payment, especially when investing in an unfamiliar technology like solar. Since the Angaza PAYG technology adds so little to the COGS of a solar product, we are uniquely well-placed to develop a PAYG entry-level desk lamp. SunnyMoney estimates that offering a product like this can conservatively increase their market reach by 2 – 3x.

Unlike our SoLite3 multi-function lamp, the entry-level PAYG desk lamp is not a fully integrated Angaza product. Instead, we have partnered with the highly respected solar manufacturer GreenLight Planet to embed our technology into their ECO desk lamp. The initial prototypes of the PAYG ECO have been vetted by SunnyMoney, and we are now planning to use that product for our Tanzanian school campaigns. The PAYG ECO will cost a total of \$15, spread over 10 weekly payments of \$1.5. Customers with good repayment behavior on the ECO can then be up sold to the SoLite3, allowing them to quickly move up the energy ladder while minimizing the project partners’ exposure to customer financing risk.

We are in the final stages of adjusting our marketing and user-education materials for this new product and translating them into Swahili. The first Tanzanian school campaign will be rolled out in February through two schools in Morogoro (as described in the previous progress report).

Marketing and user education

The two biggest potential concerns for marketing and user-education in Tanzania are 1) the lack of widespread mobile money familiarity among rural households and 2) the use of Swahili. We are planning to mitigate these issues in the following ways:

1. **Lack of widespread mobile money familiarity:** This was a situation we encountered during our Tanzanian pilot in Musoma in March – May, 2012. Although our customers knew of the service, relatively few had used it before.

- Select a site with good mobile network coverage and high self-reported familiarity with mobile money. These considerations led us to select Morogoro for our February campaigns.
 - Make the mobile money steps very clear in the user-education materials. For the Musoma pilot, we found it helpful to write the steps of the mobile money process on the product insert. We applied this lesson to the upcoming school campaigns by making pictorial representations of the mobile money steps and adding them to the product insert and the “customer card”, which is a wallet-sized hand-out given to each customer.
 - Allow customers to pay in cash if necessary. Although we are strongly encouraging all payments from the customer to go through mobile money, we have designed the technology to allow the head teacher to accept cash and make payments on the customer’s behalf. This is particular important for elderly customers who have difficulty seeing the phone screen.
- 2. Use of Swahili:** Kenyans are generally quite proficient in English, so our customer-facing materials and SMSs have been designed in English.
- We have designed a two-step process whereby our Kenyan staff member performs an initial translation of all text into Swahili, and then a SunnyMoney Tanzania staffer reviews it for accuracy. This process ensures that we do not place too much of a time burden on our Tanzanian colleagues, while still guaranteeing translations in proper Tanzanian dialect.
 - We are hiring a dedicated Angaza staff member to manage our Tanzanian operations. This person will act as translator while we are in country. S/he will also be responsible for translating and relaying customer concerns to our East African office. We have received strong recommendations for this employee from SunnyMoney Tanzania. We will finalize the hire and perform in-person training in early February.

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 4: April 15, 2014

Update on activities

In February, we initiated our first sales of the PAYG-enabled Greenlight Planet ECO solar lamp in Morogoro, Tanzania. In collaboration with SunnyMoney, we selected two schools to run “school campaigns” for the initial sales effort. The schools were selected based on data on the percentage of mobile money access in the families in the region, proximity of the school community to Vodacom M-Pesa agents, and cellular network coverage in the region.

We produced marketing and education materials in Kiswahili that included a flyer for the students, posters for the school, a wallet-sized “customer card”, and a full “head teacher pack” to assist the teacher with sales. A local SunnyMoney staff member was selected to manage the PAYG project full time, including checking in with the head teachers frequently and managing a helpline for calls from customers.

PAYG ECO deliveries to the schools occurred on three separate dates, and a total of 211 sales have been made thus far. Of these sales 22% of customers from one school and 25% from the other have paid off the ECO entirely (i.e., “unlocked” the unit), which is significantly ahead of the payment schedule. The overall sales volumes represent approximately 15% of the school populations. We were previously under the impression that this was the average amount of the school population converted during a regular (cash sales) school campaign, but apparently that number is closer to 3-5% for a primary school, so introducing PAYG increased the effective sales volume of the campaigns by approximately 3x.

Unfortunately, the Tanzanian project manager that we hired had to be let go due to poor performance, which has caused some complications with our field operations. In the first week of April, our Director of East African Operations and our principle SunnyMoney management collaborator traveled to Morogoro to train a new project manager and put improved management systems in place. The new project manager is performing very well to date.

We are planning the next round of PAYG ECO sales through three additional schools in Morogoro, beginning in early May. These sets of sales will be streamlined by applying implementation lessons learned from all of our sales activities to date. Some key implementation lessons are presented below.

Implementation lessons

Angaza Design, Inc.
414 Brannan St.
San Francisco, CA 94107
U.S.A.



-
- The customer's phone number should be inputted to the Angaza software at the point of ECO distribution to ensure that we have the most salient phone number on record. We will send payment reminder SMSs to that phone number.
 - In Tanzania most customers do not come to the school on the day of distribution; most come later in the week or at a convenient time. This is a major contrast to our experiences thus far in Kenya. This behavior means that we cannot rely on the majority of customer education being performed by the SunnyMoney staff when the ECO units are dropped off. As a result, we are reformatting our education materials to make it easier for the head teacher to educate the customer about PAYG when the SunnyMoney staff is not available.
 - It significantly complicates accounting to take variable amounts of money for a downpayment. As a result, we are making it mandatory that a set amount is paid as the downpayment to activate the light. If the customer then wishes to pay additional money, they can do so through a second transaction.
 - Customers prefer to make their downpayment via cash so they can see the product before committing to mobile money. We are now taking all downpayments in cash and all subsequent payments through mobile money.
 - It is very important to post set hours for the helpline and make them obvious in all of the materials to prevent customer frustration.

Unit and customer data

The Angaza Energy Hub, our PAYG software system, automatically collects data on customer payment behavior in real time. To these payment data, we are adding customer information - such as name and phone number – that will allow us to build customer credit scores over time. These credit scores can allow us and others to assess the risk profile of a particular customer or group of customers for follow-on financing. Although we are also collecting data on the aggregate amount of light used by each customer over time, we are not yet storing or displaying these data in our software platform. We are currently working on some additional functionality that will allow us to accrue and analyze these usage data, and we target having it in place within the next two months. Access to these data will allow us to evaluate changes in individual and aggregate light usage behavior over time. We are very confident that we are collecting data from all aspects of our operations that will contribute to the overall success of the field test and subsequent sales efforts.

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 5: August 18, 2014

Angaza has been undertaking the following evaluation activities to assess the first tranche of PAYG Eco sales in Tanzania:

- Daily analyses of repayment activities of customers who purchased PAYG Ecos at the two target Tanzanian schools; the data for these analyses are directly downloaded from our Energy Hub frontend portal;
- Weekly calls with the Tanzania-based employee responsible for overseeing the project; this employee is making daily calls to customers;
- Periodic (approximately monthly) direct calls with the Head Teachers of the Tanzanian schools.

We will discuss some of the key challenges that have been identified as part of these initial sales, and the actions we have taken - or intend to take – to address these challenges.

KEY CHALLENGES

Inconsistent network coverage and M-Pesa outages

In partnership with SunnyMoney, we made the decision to have all customer energy payments other than the downpayment go through the Vodacom M-Pesa mobile money platform. This decision was made in order to see whether mobile money could streamline the collection of payments by SunnyMoney and reduce the work burden on the Head Teacher. Reliability of mobile money as a payment method, however, depends upon the consistency of the network coverage and M-Pesa service. We have experienced some difficulty with both of these technologies during the first tranche of sales. A number of customers have complained of not receiving Vodacom M-Pesa confirmation SMSs after making a payment or not being able to complete payments. According to our interviews, these technical issues have caused some customers to question the reliability of the service.

Angaza actions

Although we still believe that mobile money is an excellent tool for our PAYG technology, we have also streamlined the “cash payment” process through modifications to our Angaza Activator application. We intend to trial a cash-only approach for the next tranche of sales to see whether customers react

positively. This will also provide a nice opportunity to compare the management burden experienced by distributors using mobile money only versus cash only. In the future, we intend to allow our distributors to decide whether they would like to use mobile money, cash, or a combination of the two.

Customer selection

For the first round of sales, the Head Teachers were allowed to market the product freely without any guidance or restrictions. Many of the purchasers ended up being farmers from the surrounding area, without any children at the school or direct ties to the school community. The sales interval corresponded to an agricultural period in which the farmers were spending the majority of their time on the farm and dedicating a significant proportion of their income on agricultural inputs. These farmers found it very difficult to travel the long distance to the school for the Head Teacher to apply payments to their PAYG Ecos. They also found it difficult to make even small payments for the light since their energy expenditures were so limited during this season.

In addition to sales to individuals with little or no ties to the school, a number of customers purchased multiple PAYG Ecos since the downpayment price was so low. Through analyzing the repayment data, it became clear that many of these customers had ceased paying on at least one of the units. It seems these customers may not have been fully calculating the financial obligation entailed by the purchase of multiple units, and are now finding it difficult to continue payments.

Angaza actions

It is our intention to allow our distribution partners to drive decisions on marketing and sales, since they are experts in their particular markets. As a result of this experience, however, we will certainly suggest that our partners put in place measures to determine if a customer has a reasonable ability to consistently access the central touchpoint (the Head Teacher in this case) during the payoff period. We will also suggest that customers be limited to purchasing a single light, and then be permitted to purchase additional lights as they pay down the first.

We have done some preliminary work in Kenya to explore the efficacy of having a customer sign a repayment contract. We intend to continue exploring this idea with our distributors to determine whether contracts enforce more consistent repayment behaviors.

Finally, we are interested in the idea of timing sales around harvest seasons in markets dominated by agricultural activity. Again, we will primarily be delegating these decisions to our distribution partners, but it will be very interesting to observe repayment trends through that lens.

Head Teacher incentive

Head Teachers that participate in the SunnyMoney school campaigns are incentivized for their work by receiving points for every lamp sold. These points accrue towards the purchase of a solar lamp for their personal use. Although this is an attractive reward for the Head Teachers, there is some indication that Head Teachers feel they should receive greater compensation for their work on the campaigns. In the case of PAYG sales, this discontent can be exacerbated since the Head Teachers are expected to continue assisting the customers through the full repayment period. Our interviews with the Head Teachers suggested that they would feel greater commitment to the process if they were receiving cash incentives. Our surveys of customers also indicated that the Head Teachers were not consistently available for assistance with energy payments, which was particularly frustrating for customers that traveled a long way to reach the school.

Angaza actions

The incentivization of agents (or Head Teachers in this case) is another topic that we consider to be the purview of our distribution partners. We intend to recommend, however, that partners offer an incentive for each completed customer payment, or in increments throughout the repayment period. This incentive structure would keep agents engaged and motivated to continue assisting customers throughout the repayment process. Accordingly, we are designing features into our Hub software that makes the calculation and disbursement of agent incentives as straightforward and automated as possible.

Customer education and customer data collection

Perhaps due to some customers living relatively far from the school, many did not travel to the school on distribution day to pick up their units. This is much different than what we have experienced in the other markets in which we have worked. Typically, customers have attended distribution and we (along with our distribution partners) have used that opportunity to educate them on features of the product. In this case, the responsibility to educate the customers who did not attend distribution about the PAYG technology and repayment process fell on the Head Teacher. The Head Teacher was not strongly incentivized to carefully educate the customers (see point above), and our surveys indicated that some aspects of the repayment process were not clear to all customers. The Head Teachers also suggested that our marketing and customer education materials could more clearly demonstrate the financial savings realized by switching from kerosene to solar.

For this set of sales, we were relying on our distribution partner to manage the collection of customer phone numbers. This is a key step in the sales process because it allows our system to send automated reminder SMSs to appropriate phone numbers associated with each account. It also allows field agents to follow up with customers who miss payments or appear to experience difficulty with the technology. If phone numbers are not collected for an account, our system defaults to storing the phone number that sent a mobile money payment for that account. Some customers used the mobile money accounts

of friends, family members, or the Head Teacher, which meant that we did not have the best contact information for them in hand.

Angaza actions

We believe that designing an agent incentive structure that is contingent on customer repayment will greatly benefit the customer education process in Tanzania.

To streamline the collection of customer phone numbers, we have made modifications to our Angaza Activator application so that it prompts for phone number entry when the light is first activated. This new feature ensures that we have the most relevant customer phone number associated with every account.

In addition to the key challenges outlined above, we had an unfortunate loss of the principle lead responsible for overseeing the project in Tanzania. The employee left the project suddenly, apparently because his father passed away. The departure of the employee left the helpline unmanned for a period of several days. We worked with SunnyMoney to remedy the situation as quickly as possible to maintain trust within the community. We sent a blanket SMS to all customers about the temporary helpline outage, spoke directly with the Head Teachers about the situation, and sent additional Angaza and SunnyMoney employees to the field site to identify and train a new project lead.

Finally, as an interesting vignette, we received feedback from our project lead that some customers were suspicious of the products because they bore the USAID logo. Apparently, some customers expressed concern that the products contained listening devices, and some customers said they were being “mocked” by other community member who did not buy the product because of the logo stickers. We did not pursue this further.

CURRENT REPAYMENT STATUS

A snapshot assessment of the repayment data on July 18, 2014 (the current date as the report is being prepared) shows the following:

School 1: 60% of the units sold are completely paid off (“unlocked”); 5% are currently enabled with light (“enabled”) and 35% are currently in the deactivated state (“disabled”).

School 2: 57% unlocked; 4% enabled, 39% disabled.

Angaza Design, Inc.
414 Brannan St.
San Francisco, CA 94107
U.S.A.



There have been some interesting payment patterns in these accounts that suggest these numbers will continue to shift over time. For example, Mr. Dhafarani Sikumbili made four fairly regular weekly payments through April 12, then stopped until over a month later (May 23), then dropped off payments again until July 17. He then made two successive payments on back-to-back days to finish his payments and unlock the unit. Our logs showed that he had purchased two units, and he paid off both in a similar pattern; he made three payments over the past two days to unlock the other unit. Another customer purchased the unit on February 27, made a large payment (20,000 TSH) on March 18, and then just paid for the third time (1600 TSH) on July 18. Yet another customer made a payment of 12,000 TSH on July 18; his previous payment was for 4600 TSH on June 3. We are continuing to contact customers to try to understand the drivers behind their payment behaviors.

We have learned a great deal from the first tranche of sales in Tanzania. We have used what we have learned thus far to make significant improvements to our technology. We are continuing to collect both quantitative and qualitative data from these sales on daily and weekly bases to inform our prioritized list of technical and operational priorities. We are confident that the improvements we are making in our platform will be extremely beneficial as we prepare for our next Tanzanian sales.

“Electrifying the Base of the Pyramid through Innovative Micropayment Technology”

Angaza Design

Milestone 6: Final Report

Executive Summary

The key objectives of the project were to (1) trial sales of an entry-level PAYG-enabled lamp (the SunKing Eco) in Tanzania through the SunnyMoney school campaigns; (2) optimize the design of PAYG marketing methods and user education materials for rural, off-grid Tanzanian families; and (3) scale up PAYG school campaign sales using best practices determined through the trial deployment. Key results and lessons included recognizing (1) strong demand for PAYG-enabled entry-level solar products in Tanzania; (2) the need for intensive local distributor oversight of PAYG sales and after-sales support; (3) the importance of careful and thorough end-user training on mobile money (if being used for PAYG payments); (4) the necessity of some degree of customer screening/selection for a centralized PAYG sales model.

We have temporarily halted PAYG Eco sales through SunnyMoney in Tanzania because our project was being managed by their innovation department (“SunnyMoney Brains”) which is headquartered in Nairobi. The lack of robust local distributor oversight led to sub-optimal after-sales support for PAYG customers, which was unacceptable to Angaza. We have continued PAYG Eco sales through a different Tanzanian distributor called Global Cycle Solutions.

The PAYG Eco was largely born through discussions and collaboration with SunnyMoney since it is perfectly suited for their school campaign distribution model. Therefore, we plan to reinstate sales of the Eco in collaboration with SunnyMoney in Tanzania when SunnyMoney’s senior management has restabilized, and we are able to work directly with their Tanzanian country team.

Background

The project was initially intended to be a field test of the Angaza’s branded SoLite3 PAYG lamp and mobile-phone charger through SunnyMoney school campaigns in Tanzania. However, the scope of the project shifted a bit during the implementation period due to a fairly rapid pivot in Angaza’s business priorities. Angaza had always intended to transition over time to an exclusive licensing model, in which we worked directly with manufacturers to make their existing product lines PAYG-ready. Before making this transition, however, we felt that we first needed to demonstrate the field viability of our technology through selling a 2000-unit batch of the SoLite3, which we manufactured in Shenzhen. Instead, our early work with SunnyMoney revealed a market opportunity for an entry-level PAYG lamp so we shifted our

Angaza Design, Inc.
414 Brannan St.
San Francisco, CA 94107
U.S.A.



focus to creating this product. To do so, we formed a partnership with Greenlight Planet to make their Sunking Eco study lamp PAYG-ready. By our third Milestone, on January 1, 2014, we had completed R&D and initial prototyping of this product. In February, we initiated the first sales of the PAYG-enabled Eco through school campaigns in two schools in Morogoro, Tanzania. Morogoro was selected because SunnyMoney survey data showed that it had a relatively high percentage of mobile money familiarity, it had mobile money agents who were accessible to the community, and there was good cellular network coverage. Following these initial sales, our intention was to complete a second round of school campaigns through three additional Morogoro schools beginning in early May. This second round of sales was first delayed, and then cancelled, because we determined there was insufficient local distribution oversight through SunnyMoney's innovation department. We transitioned Tanzanian sales to a different distributor, Global Cycle Solutions, who has sold approximately 270 PAYG Ecos to date.

Although the focal product changed during implementation of the project, the key goals did not. We were seeking to test the viability of PAYG solar lamp sales through SunnyMoney school campaigns in Tanzania. The results, overall, were very positive and we gained a great deal of knowledge about how to optimize PAYG implementation in the Tanzanian context.

The funding for the project was as follows:

USAID: \$99,940

OTHER: \$256,959

The project

Angaza has been focused on PAYG technology development since late 2011. Before beginning this project, we had developed a proprietary PAYG data-transfer technology that worked through audible tones sent via the cellular voice network. We built this technology into our flagship product, the SoLite3, and performed pilot sales in Kenya as part of a Randomized Controlled Trial with Innovations for Poverty Action and SunnyMoney. As mentioned above, our intention was always to slowly phase out of manufacturing to an exclusively licensing-focused business model. This transition accelerated during the project period due to the opportunity to create the PAYG Eco, and we have completely halted SoLite3 manufacturing and sales. In addition, we have now developed several other PAYG data-transfer technologies that are optimized for different solar product categories (e.g., portable lamps, semi-installed solar home systems, etc.).

The principle theory of change that drives our social mission is that access to financing for solar devices underpins a permanent transition away from kerosene. By creating PAYG devices that cover the full spectrum of solar product tiers – from entry-level study lamps through full solar home systems – we can target the true base of the pyramid and help people up the first rung of the “energy ladder”. Customers

can then progress further up the ladder as they save money from diverted kerosene expenditures. Since multiple types and tiers of solar products are managed within our software platform, we can derisk distributors' targeted upsales to "good payers". Similarly, customers who fall behind in payments can be easily identified and supported through call center outreach and targeted promotions.

Program Design & Implementation

The goals of the project were to (1) trial sales of an entry-level PAYG-enabled lamp (the SunKing Eco) in Tanzania through the SunnyMoney school campaigns; (2) optimize the design of PAYG marketing methods and user education materials for rural, off-grid Tanzanian families; and (3) scale up PAYG school campaign sales using best practices determined through the trial deployment. A total of 500 PAYG lamps were targeted for sale by the end of the project period.

The project was implemented through close collaboration with SunnyMoney Brains, SunnyMoney's innovation department. Prior to the beginning of the project, we had been working with Brains for several months in Kenya to execute a Randomized Controlled Trial of SoLite3 sales in partnership with Innovations for Poverty Action. The USAID-funded project was our first experience working with SunnyMoney outside of Kenya.

Our initial project plan involved selling the SoLite3 through school campaigns in Tanzania. During the early implementation phases, however, we recognized a strong market opportunity to focus on an entry-level PAYG solar lamp instead. We completed R&D and initial production of these lamps (a PAYG version of the Greenlight Planet SunKing Eco) in January, 2014; we then developed full marketing and user-education materials, and initiated the first round of sales through two schools in Morogoro, Tanzania in February 2014. We targeted kerosene-dependent families in the community surrounding the school. Per SunnyMoney's typical school campaign protocol, the school head teacher acted as a "solar ambassador" and took ownership of the majority of marketing.

The preliminary plan was to launch a second round of sales through two additional schools in Morogoro beginning in May, 2014. Instead, we chose to pause and evaluate our overall results before moving to the next phase. The Brains team is based in Nairobi and the SunnyMoney Tanzania office was not involved in the project. As a result, there was difficulty with oversight of a local Tanzanian project lead. We were concerned that the after-sales support and servicing was insufficient. Ultimately, we decided not to move forward in the near-term with SunnyMoney in Tanzania, and shifted to a locally based distributor (Global Cycle Solutions) instead.

There is a detailed discussion of the challenges of the project in the Milestone 5 report, including information about how Angaza is learning from, and addressing, those challenges.

Evaluation Design

One of the key features of our entry-level PAYG technology is that it includes bi-directional data transfer. This feature allows us real-time visibility into every product sale and PAYG payment made in the field. As a result, we can very easily evaluate the quantitative results of our sales efforts.

In our sales with SunnyMoney, we sold a total of 104 PAYG Ecos at Morogoro School 1, and 109 PAYG Ecos at Morogoro School 2, for total sales of 213 lights. As of the time of writing this report, 25% and 29% of the customers had not paid off in School 1 and School 2, respectively. Since that time, we have sold an additional 267 PAYG Ecos in Tanzania in partnership with Global Cycle Solutions with average repayment to date of ~90%.

We performed phone interviews with all of the customers that fell behind on payments in the Morogoro schools (phone numbers are collected at the point of product registration), and requested information about why they were finding it difficult to pay. The most common answers were that they did not have any money at that time, or that it was too difficult to get to the school to add payment to their lamp. These answers led us to put “risk minimization strategies” in place to employ during future sales as a mode of lightweight customer screening. For all current sales, customers must own or have immediate access to a mobile phone, must live within 5 km of the centralized payment point (e.g., school), and may only purchase a single PAYG light at one time. These relatively simple rules have significantly increased payback overall.

In addition to receiving payment information from lights deployed in the field, our system also automatically collects information about light usage. We are in the initial stages of analyzing and displaying those data on our frontend software system (the Energy Hub). It will be very interesting to look for interactions/correlations between usage and repayment data, and we foresee using these analyses to more accurately assess sales risk.

Findings

A thorough breakdown of lessons learned during this project was provided in the Milestone 5 report. In brief:

Inconsistent network coverage and mobile money outages can lead to customer frustration. We feel that mobile money is an incredibly powerful tool for PAYG payments, but the platforms are unlikely to ever reach 100% reliability. As a result, it is critical that the distributor have a call center in place that can address customer concerns over lost payments. In areas with poor mobile money penetration

Angaza Design, Inc.
414 Brannan St.
San Francisco, CA 94107
U.S.A.



among rural populations, cash payments should be accepted. We have streamlined both our cash and mobile money payment flows to make them as straightforward as possible for distributors and end customers.

There must be some degree of lightweight customer screening or selection to maximize repayment. During our initial sales in Morogoro with SunnyMoney, the head teachers were allowed to market the product freely, without any guidance or restrictions. Many of the purchasers ended up being farmers from the surrounding area, without any children at the school or direct ties to the school community. The sales interval corresponded to an agricultural period in which the farmers were spending the majority of their time on the farm and dedicating a significant proportion of their income on agricultural inputs. These farmers found it very difficult to travel the long distance to the school for the Head Teacher to apply payments to their PAYG Ecos. They also found it difficult to make even small payments for the light since their energy expenditures were so limited during this season.

In addition to sales to individuals with little or no ties to the school, a number of customers purchased multiple PAYG Ecos since the downpayment price was so low. Through analyzing the repayment data, it became clear that many of these customers had ceased paying on at least one of the units. It seems these customers may not have been fully calculating the financial obligation entailed by the purchase of multiple units, and are now finding it difficult to continue payments.

We now implement risk minimization strategies at the point of sale to perform a lightweight evaluation of customers before allowing them to purchase a PAYG light.

The sales agent (or head teacher) should be incentivized to follow-up with PAYG customers. The easiest way to provide this incentive is to give the agents/teachers cash rewards for getting customers to full payoff.

I believe all of these lessons fall into the category of “Product or service delivery modifications”. I feel that all of the results are generalizable to other PAYG companies, as well as relatively generalizable to any entity providing credit in emerging markets.

Cost-effectiveness & Competitive Landscape

There are a number of other companies entering the PAYG solar market. Angaza’s biggest differentiator is our licensing-focused business model. The vast majority of the other PAYG companies are vertically integrated, with operations that span product design and manufacturing through distribution and sales. These vertically integrated models are very expensive, and do not capitalize on the expertise that already exists in the market. As a result, we feel that the customers are often less well-served because

Angaza Design, Inc.
414 Brannan St.
San Francisco, CA 94107
U.S.A.



companies are stretched thin and unable to focus. By contrast, our company is focused exclusively on the optimization of PAYG. We work closely with manufacturers (such as Greenlight Planet) to make their existing product line PAYG-ready. In this way, we capitalize on their extensive expertise in product design, component sourcing, QA/QC and logistics. Similarly, we work directly with solar device distributors to provide them with software and training tools to manage PAYG sales. We defer to their expert knowledge of the local context to guide customer-focused decisions such as pricing, communication content (e.g., SMSs), marketing tools (e.g., radio advertisements, fliers), etc. By taking an approach that leverages each partners' core capabilities rather than trying to do everything ourselves, we feel that end-customers benefit and overall costs are reduced.

Financial Results

The principle financial goal for this project was to hit the proposed sales volume of 500 units. We are now at approximately 480 products sold in Tanzania, so we are very near to hitting our target despite halting sales with SunnyMoney Brains. We also wished to reach a point of stability in our pricing to distributors, which we have achieved. All current sales are administered under a consistent pricing regime which we feel was critical to move out of piloting into full commercial operations.

We are still actively applying for public funds to accelerate our entrance into new markets, facilitate our R&D into new product categories (e.g., clean cookstoves, water pumps), and launch efforts with new partners. In addition, our company is currently raising a \$3 M Series A equity round, after which we will be financially self-sustaining. There is considerable investor interest in our round, but we have not yet secured a lead investor. USAID has been very helpful in drawing positive attention to our company through the DIV press release and support on Twitter (thank you!).