USAID DIV Grant: Scaling Up EGG-Energy Franchised Solar Hubs
Grant No. AID-OAA-F-13-00054

Milestone One: Updated Project Implementation Plan
As of 1 November 2013

USAID has awarded a DIV grant to EGG-energy for the period 1 October 2013 – 1 October 2014. This document provides a brief project update, an updated intervention design plan that EGG-energy will follow to achieve the project milestones specified in the grant, and an evaluation strategy with baseline indicators.

1. Project Update

EGG-energy is building a robust electricity distribution network that will be able to deliver the best technologies to our customers as they become available. With the dropping price of solar PV and the steady or rising price of transport and lead-acid batteries, we saw that solar PV had closed the price gap with the battery service since when EGG-energy started in 2009: The cost of a solar system was closer to that of the battery service, and cost of logistics for batteries showed no sign of decreasing. We stopped sales of battery systems in June 2013 and will have fully transitioned to solar by February 2014. Our existing active customers are being upgraded to solar systems. Our solar franchisees will become solar sales agents, and we will continue to grow their numbers.

With this transition, the core focus of our USAID DIV grant has essentially remained the same. The same activities, goals, and milestones will continue to guide this project. Our end users will now all be powered with solar, and our focus will be shifted from battery-charging franchisees to solar agents and business customers. *A complete explanation of this transition can be found in Appendix I.*

EGG-energy is uniquely positioned to sell, distribute, service, and manage the financing of solar PV systems. Furthermore, we will be a key partner for technology providers since we can help pilot, refine, and scale technologies that will allow our customers to receive quality services at affordable prices.

EGG-energy has successfully secured a high-quality pay-as-you-go (PAYG) supplier, Mobisol. Our extensive due diligence process revealed that Mobisol was the only provider that had a mature technology that works for systems requiring installation (~20W and above) and was interested in working with a third party distributor in Tanzania. We are currently distributing 80W, 120W, and 200W solar systems that we source from Mobisol and have started using Mobisol's enterprise management system. We continue to work with them to improve the functionality of this platform and integrate it into our own internal systems. We also continue to develop relationships with other suppliers to source high-quality solar products to meet our customers' needs. We remain technology-agnostic

For the battery business, EGG-energy developed a network of distributors and solar franchises to provide convenient places for our customers to swap used batteries for charged ones. We are now transitioning them to become solar agents. In exchange for improved financing terms (lower upfront cost or discounts) and the ability to earn commissions, they will be required to display EGG-energy marketing material, attend EGG-energy service offering trainings, and act as the representative of EGG-energy in their communities. We have found having a local representative to be valuable both for sales and for helping us evaluate credit risks of community members.

Given our extensive direct customer experience with all the above areas over the past 5 years, we believe financing of solar systems, whether through PAYG technology or otherwise, will require implementers that integrate the operational and financial aspects in house. A large reason why end-user financing of solar products is still uncommon for energy is the lack of quality companies handling distribution, installation and after-sales service. It's a large barrier that EGG has unique skills and experience undertaking, and has recognized as a gap in the East Africa region. On top of the complexities of product development, equipment designers and manufacturers must also figure out how to market, distribute, sell, maintain and finance the PAYG systems, which is not optimal for the manufacturer nor the customer given the scale of the challenge.

EGG-energy's new business model stands out by integrating the following four elements:

1) A technology-agnostic model with a focus on sale of the right product for the right customer: EGG-energy does not focus on product but instead concentrates on sales, distribution and maintenance, the areas of the value chain where energy technology companies are struggling the most and require on the ground operational capacity. Not being tied to a single technological platform uniquely positions us to avoid the risks inherent in product development and allows us to take advantage of the best technologies developed over time. This flexibility is a unique asset that allows us to continuously upgrade our product offering to provide our clients with the best solution available for their market.

2) Consumer financing solution that enables deploying large capital at low default rates: Deploying and managing loans required for solar systems at scale is a significant challenge, akin to managing mortgage products in the developed world. The success of the entire industry depends on the ability to assess the consumers and manage default rates. We have been experimenting with various financing solutions for over 2 years and have seen early evidence of success (0% default rate in our 80-unit, non-PAYG solar leasing pilot). Our innovative solution combines a) a direct proprietary credit assessment tool, b) financing relationships with MFIs and local banks (e.g., our partnership with Ecobank), without relying solely on partners and c) partnerships with local organizations to reduce defaults (e.g., our deal with Tanga Fresh). Further developing this will allow us to address the toughest part of scalability challenge while opening up new opportunities: after establishing a customer base with a credit history, we plan to offer additional life-enhancing services and products on financing through our distribution network and established payment systems.

3) Reliable sales, distribution and after-sales network, underwriting the financing: PAYG or no PAYG, financing won't pass on to end-users if we don't build up robust distribution, installation and after-sales and loan management networks. This is a key reason why banks and MFIs are not willing to finance end-customers – not enough confidence that the products they finance will work for at least the tenure of the financing term. At our core we are a distribution and service company whose strength lies in its execution edge as demonstrated through the battery business. This unique focus on the downstream part of the value chain sets us apart from the great majority of our competitors, who would still have to rely on other partners to overcome unreliable distribution and lack of sales and after-sales support, or attempt to go it alone when they are in their core a product manufacturing company.

4) Unsurpassed efficient customer experience enabled by a tailored IT system: Our service offerings provide a higher quality standard and reliable energy, as they are supported by our network of trained technicians we have already built, and backed by a 2-year warranty. Financing frees the customers from the vicious circle of poor-quality throwaway products. It enables them to

invest in reliable long-term equipment: we are developing the best processes to cost-efficiently provide the quality of service needed to maintain off-grid electrification solutions over time. This is enabled by integration of information technology into every process. Realizing that no existing IT solutions were suitable to address these unique challenges, EGG-energy has invested in developing a unique cloud system accessible from any computer, tablet, and smartphone for every employee. We set up a chain of conditional processes (for e.g., linking individualized commission schemes with deliverables such as GPS-tagged photographs of installations), which made the difference in the efficiency and effectiveness of our employees. This makes operational scalable, allowing a lean management team to enable a broad network of technicians and agents to effectively market, sell and install systems and manage loans, as well as employee KPIs.

2. Intervention Design & Updated Timeline

1) **Enterprise management systems:** EGG employees have started using smart phones to input data, which can operate effectively in areas with inconsistent network access. We continue to develop and implement mobile applications and an SMS service for improved customer service and to work toward a complete centralized database. Having secured Mobisol as a supplier, we were given access to Mobisol's cloud-based operation enterprise management system. We supplement our internal system with data from Mobisol's. With the help of the USAID DIV grant, we are undertaking the following activities:

    a) **Improve station infrastructure** (POS systems, phones, GPS tracking) – *Oct-Dec 2013*
    b) **Complete linkage of customer management database to mobile money system** – *Oct-Dec 2013*
    c) **Conduct CRM trainings for EGG-energy staff** – *Oct 2013 & Apr 2014*
    d) **Mobile apps finalized for logistics, inventory, and customer management**– *Jan-Mar 2014*
    e) **Monitor performance of equipment for better data retention and improved sales performance** –*May-Sep 2014*

2) **Scalable consumer financing capacity:** We are building a fully functional finance model that will allow us to scale the business throughout Tanzania and, later, into neighboring countries. The sales team will be equipped to tailor finance offers to customer needs, and the procedure for consumer credit worthiness will be streamlined. The financing manager and team will be able to oversee 100+ loans per agent. We plan to conduct a pilot with First Access, a social enterprise pioneering a system of credit scoring for the global informal sector, in order to refine our finance offers and credibility checks.

    a) **Gather and analyze data from pilot financing program** –*Nov-Dec 2013*
    b) **Use data from pilot study to refine finance offers and credibility checks** – *Oct-Nov 2013 & Apr-May 2014*
    c) **Hire and train loan agents for expansion of program** – *Nov-Dec 2013 & Apr-May 2014*
    d) **Expand financing program so that all customers have access to financing** - *Jan-Sep 2014*

3) **Incorporation of pay as you go solar into service offerings:** We have obtained a successful PAYG system that is readily scalable and established that PAYG is a trustworthy solution to make solar energy more accessible to poorer customers. Over the next several months, a streamlined procedure for recruitment, managing payments, and policies for delinquent customers and repossession of materials will also be created and finalized.

   a) **Establish agreement with and procure equipment from two PAYG solar companies** – *Oct – Dec 2013, Apr – Jun 2014*
   b) **Sell stock of PAYG systems acquired** – *Dec 2013 – Mar 2014*
   c) **Monitor and analyze use of systems** – *Jan – Sep 2014*
   d) **Refine procedure for late payments and repossession** – *May-Jun 2014*
   e) **Acquire stock of PAYG systems from preferred provider** – *Jul-Sep 2014*

4) **Scalable Operations and Monitoring:** We will ensure that information is consistently distributed to all EGG-energy representatives through regular agent meetings and technician trainings. We will also conduct an impact assessment and increase efficiency in reporting of both business and impact metrics.

   a) **Agent meetings** – *Feb 2014, May 2014, Aug 2014*
   b) **Technician Trainings** – *Nov 2013, Feb 2014, May 2014, Aug 2014*
   c) **Impact Assessment** – *Oct 2013, Sep 2014*

3. Evaluation Strategy & Baseline Indicators

EGG-energy will satisfy the final report requirements regarding social impact, project improvements, and cost effectiveness by rigorously monitoring the following indicators. We will conduct an impact assessment at the end of the grant period to more fully examine the effects of this project.

Indicator	Baseline (Oct 2013)	Assessment #1 (Feb 2014)	Assessment #2 (Jun 2014)	Final Assessment (Oct 2014)
Number of active solar franchisees	10			
Geographical distribution of franchisees and customers	3 regions (see map)			
Number of solar installations	65			
Revenue (latest quarter)	$27,326			
Number of customers receiving financing	65			
Repayment rates for franchises and customers receiving financing	97%			
Number of customers managed by each credit officer	65			

Default rate for loans based on PAYG systems and the operations of EGG-energy financing program	0%			
Percentage of customer making payments using mobile money.	30.8%			
Rate of decrease in sales expenses per new customer	$174.48/sale			
Number of service calls/complaints	N/A*			
Franchisee-level metrics on average and by quartile ▪ Revenue ▪ Number of customers	N/A**			
Reduction in Kerosene use, as a result of using EGG-energy technology	84%			
CO2 equivalent mitigated (tons), as a result of using EGG-energy technology instead of traditional/conventional technology	31.2 tons CO2 per year			
Cost savings, obtained from using EGG-energy technology instead of traditional/conventional technology	97,280,000 Tsh			

*To be tracked going forward

**A full assessment of franchisee-level metrics will be covered in the impact assessment.

***From previous impact evaluation when EGG-energy's primary energy product was batteries.

Appendix I: Transition from Battery Service to Pay-as-you-go Solar

EGG-energy is building a robust network that will be able to incorporate new technologies as they become available. With the dropping price of solar PV and the steady or rising price of transport and lead-acid batteries, we saw that solar PV had closed the price gap with the battery service: The cost of a solar system was closer to that of the battery service, and cost of logistics for batteries showed no sign of decreasing. In addition, multiple companies have started working on pay-as-you-go (PAYG) technology in the last few years to enable customers to pay for energy generated by solar systems via mobile phones. We believe that EGG-energy is uniquely positioned to sell, distribute, service, and manage the financing of these systems. Furthermore, we will be a key partner for technology providers since we can help pilot, refine, and scale technologies that will allow our customers to receive quality services at affordable prices.

Reasons for the shift from battery to solar PV distribution

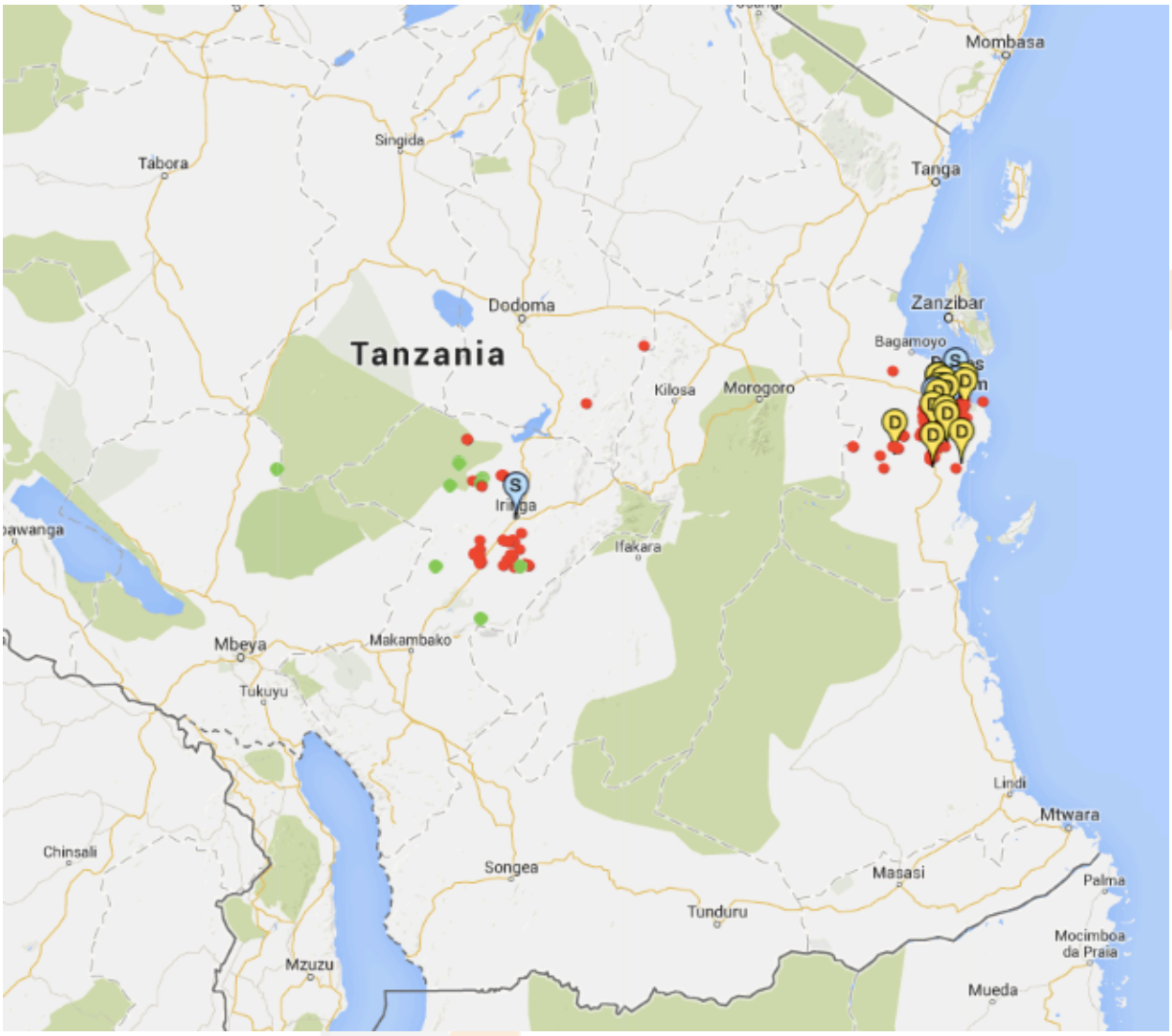
EGG-energy Tanzania management has decided to discontinue the battery distribution service in favor of focusing on solar sales, distribution, installation, service, and financing. This move was made for the following reasons:

- **The decline in solar prices has significantly decreased the price difference between a battery installation and solar system.** The material cost for a small solar lighting system (3 lights and mobile phone charging) at the time of the decision had come down to $124, while the equivalent battery system, after swapping costs, was $84.
- **The operating model proved to provide well below the necessary revenue per customer to be sustainable**. Our projections were based on getting to $5 per active customers in revenue per month, but in 2013, despite our best efforts, we only reached $1.68/month/customer.
- **Sales for the battery system remained weak**. Even with improved sales tactics (demo kits, increased nighttime sales events, better involvement of distributors) and improvements in distribution, we made fewer than 20 sales per month. Our initial projections would require one station to support 500-800 active customers, which proved difficult to achieve.
- **We did not find a viable way to provide our customers with applications beyond lighting, radio, and mobile phone charging – despite our extensive research and trials.** The 38Ah battery system created to power TVs for example was not popular, as it required a motorbike to transfer the batteries over any distance. In addition, it could only power a medium-sized television for a few hours.

We are in the process of transitioning our customers. In-line with our high customer service and values, we have not abandoned our past customers. We offered each and every one of them a path to upgrade to a solar alternative at minimal cost. The existing battery stations will close or transition to the new model only after this exercise has been completed.

We chose solar for several reasons. Solar allows us to reach customers with higher energy needs, and allows our customers to aspire to viable upgrades of their first system. With the offer of financing and the availability of solar pay-as-you-go systems—combined with the dropping price of solar—we are able to reduce the upfront cost of a solar system to be competitive with a battery system. In addition, solar allows us to significantly expand our geographic reach since we only have to reach the customer a few times a year. With the battery business, we needed a distributor within a few kilometers of each customer.

Appendix II. Map of Solar Installations



Note: We will continue to monitor geographic

Appendix III. Updated Gantt Chart: Project Implementation Plan

	2013			2014									
Activity	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Key Project Outcomes**
Enterprise management system													
Improve station infrastructure (POS systems, phones, GPS tracking)													An operational enterprise management system supported by local programmers that is adapted for use in the East African renewable energy market. Perfect the design and implementation of mobile apps and SMS communication for better customer service. Quantify internal efficiency improvements from the management system in areas such as: reduced data corruption, customer acquisition, reduced inventory loss.
Complete linkage of customer management database to mobile money system													
Conduct CRM trainings for EGG-energy staff													
Mobile apps finalized for logistics, inventory, and customer management													
Monitor performance of equipment for better data retention and improved sales performance													
Scalable consumer financing capacity													
Gather and analyze data from pilot financing program													Have a fully functional finance model that will allow us to scale the business throughout Tanzania, and later into neighboring countries. Sales team skilled in tailoring finance offers to customer needs. Streamlined procedure for consumer credit worthiness. The finance manager and team will be able to oversee 100+ loans per agent
Use data from pilot study to refine finance offers and credibility checks													
Hire and train loan agents for expansion of program.													
Financing accessible to entire customer base													
Incorporation of pay as you go solar into service offerings													
Establish agreement with and procure equipment from two PAYG solar companies													Obtain a successful PAYG system that is readily scalable. Establish that PAYG is a trustworthy solution to make solar energy more accessible to poorer customers. Streamlined procedure for recruitment, managing payments, and policies for delinquent customers and repossession of materials
Sell stock of PAYG systems acquired													
Monitor and analyze use of systems													
Refine procedure for late payments and repossession													

	2013			2014									
Activity	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Key Project Outcomes**
Acquire stock of PAYG systems from preferred provider													
Scalable Operations and Monitoring													
Franchisee meetings													Consistent information across all EGG-energy representatives Impact Assessment More efficient reporting of both business and impact metrics
Technician Trainings													
Impact Assessment													

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Milestone Two: Project Update & Impact Assessment 1

As of 1 February 2014

USAID has awarded a DIV grant to EGG-energy for the period 1 October 2013 – 1 October 2014. This document provides a brief project update and the first assessment of indicators.

1. Project Update

EGG-energy has experienced a dramatic increase in sales over the past few months, far surpassing our expectations. In fact, Q4 of 2013 represented EGG's best quarter to date. We are now on track to meet our goal of 700 high-value financed systems sold this year. The success of our PAYG systems, showing strong sales and loan repayment rates, has been particularly encouraging. As we continue to refine our operations, we expect sales to continue growing at a fast pace while maintaining high repayment rates.

EGG-energy continues to partner with other organizations in Tanzania to maximize our impact. For our product offerings, we are finalizing a deal with Mobisol to allow us exclusive distribution rights for Mobisol products in our current areas of operation, along with some potential expansion areas. For our finance program, we are launching a partnership with EcoBank to offer our products with EcoBank loans. This product includes an insurance component via EcoBank's partnership with MicroEnsure, offering a small life insurance product for the duration of the loan. And for our sales and distribution, our partnership with Tanga Fresh is generating very good interest and sales. We are planning on pursuing more similar partnerships this year, and these provide strong evidence of their value and our ability to execute.

Table 1. Project Activities Status Update

Activity	Status
Enterprise management systems	EGG employees have started using smart phones to input data, which can operate effectively in areas with inconsistent network access. We continue to develop and implement mobile applications and an SMS service for improved customer service and to work toward a complete centralized database. Having secured Mobisol as a supplier, we were given access to Mobisol's cloud-based operation enterprise management system. We supplement our internal system with data from Mobisol. For more details on the current state of our IT system, please refer to Appendix I.

Improve station infrastructure (POS systems, phones, GPS tracking)	*This activity has been completed. We have decided to simplify this by equipping all of our technicians and sales staff with smart phones with GPS capabilities and reporting applications. POS functions will also be performed using these phones.*
Complete linkage of customer management database to mobile money system	*This activity has been completed. Our customer management database now connects mobile money payments to our individual customers.*
Conduct CRM trainings for EGG-energy staff	*First training has been conducted, and a second is planned for Apr 2014. Many of the CRM functions are now hosted in HQ and managed by our call center, and these will be continuously monitored and improved.*
Mobile apps finalized for logistics, inventory, and customer management	*We are in the process of rolling out new mobile applications for customer acquisition, sales, credit assessment, installations, and after-sales service.*
Monitor performance of equipment for better data retention and improved sales performance	*Planned for May-Sep 2014.*
Scalable consumer financing capacity	We are building a fully functional finance model that will allow us to scale the business throughout Tanzania and, later, into neighboring countries. EGG has been working to streamline its loan processes to most efficiently and effectively serve our customers. We are transitioning all credit assessment processes to digital in order to better link customer information with their accounts. We are also conducting a pilot with First Access, a social enterprise pioneering a system of credit scoring for the global informal sector, in order to refine our finance offers and credibility checks. The financing manager and team are still working toward a goal of overseeing 100+ loans per agent.
Gather and analyze data from pilot financing program	*We have finished collecting data and are have conducted initial analyses. First Access is conducting an additional analysis for further information.*
Use data from pilot study to refine finance offers and credibility checks	*We transitioned to Mobisol to allow for greater data collection and remote monitoring. So far, we are encouraged by a spike in sales. We also collected data for a pilot with First Access to refine our credit scoring program and explore the feasibility of digital scoring (through mobile phones). We will continue to refine our finance offers and credit checks through the spring as we receive more information from First Access.*
Hire and train loan agents for expansion of program	*First stage completed; second stage planned Apr-May 2014.*

Expand financing program so that all customers have access to financing	*This activity has been completed. All of our customers now have access to financing.*
Incorporation of pay as you go solar into service offerings	We have obtained a successful PAYG system that is readily scalable and established that PAYG is a trustworthy solution to make solar energy more accessible to poorer customers. Over the past three months, we have been developing streamlined processes for sales, managing payments, delinquent customers, and repossession of materials. Over the next several months, these processes will be finalized. We are still in the process of identifying and securing a high-quality second PAYG system.
Establish agreement with and procure equipment from two PAYG solar companies	*We have established an agreement and procured equipment from one PAYG solar company, Mobisol. We are in the process of securing a second (planned, Summer 2014).*
Sell stock of PAYG systems acquired	*This activity has been completed. We have sold our initial stock of Mobisol PAYG systems and are waiting for our next batch of inventory to arrive.*
Monitor and analyze use of systems	*We continue to monitor and analyze use of systems as we receive more data points.*
Refine procedure for late payments and repossession	*Planned for May-Jun 2014.*
Acquire stock of PAYG systems from preferred provider	*Planned for Jul-Sep 2014.*
Scalable Operations and Monitoring	We will ensure that information is consistently distributed to all EGG-energy representatives through regular agent meetings and technician trainings. We will also conduct an impact assessment and increase efficiency in reporting of both business and impact metrics.
Agent meetings	*First conducted in Feb 2014 with two more planned for May 2014 and Aug 2014.*
Technician Trainings	*Trainings were conducted in Nov 2013 and Feb 2014. Additional trainings are planned for May 2014 and Aug 2014.*
Impact Assessment	*A baseline was conducted in Oct 2013. A final impact assessment is planned for completion in Sep 2014.*

2. Indicators

Table 2 includes a baseline and our first assessment of project-level indicators.

Table 2. Project Indicators

Indicator	Baseline (Oct 2013)	Assessment #1 (Feb 2014)	Assessment #2 (Jun 2014)	Final Assessment (Oct 2014)
Number of active solar agents	10	10		
Geographical distribution of agents and customers	3 regions	4 regions		
Number of financed solar installations (cumulative)	62	125		
Revenue (latest quarter)	$28,908[1]	$70,800		
Number of customers receiving financing	62	125		
Repayment rates for franchises and customers receiving financing (all systems)[2]	95%[3]	94%		
Repayment rates for franchises and customers receiving financing (PAYG)[2]	N/A[4]	99%		
Number of customers managed by each credit officer	62	125		
Default rate for loans based on PAYG systems and the operations of EGG-energy financing program	0%	0%		
Percentage of customers making payments using mobile money	31%	90%		
Sales expenses per new customer	$195/sale[5]	$156/sale		
Number of service calls/complaints	N/A	N/A[6]		
Agent-level metrics on average and by quartile ▪ Revenue ▪ Number of customers	N/A	N/A[7]		

[1] Updated Q3 2013 figure

[2] Based on PAR>30

[3] Includes Dar es Salaam only (Iringa figures not available) – subsequent calculations include all locations.

[4] First PAYG system loans distributed end of August 2013. It was too early to calculate the repayment rate for these loans as of October 2013.

[5] Updated Q3 2013 figure

[6] To be tracked going forward

[7] As we are in the process of converting all franchisees to agents, we will track this going forward.

Reduction in Kerosene use, as a result of using EGG-energy technology	84%	84%		
CO2 equivalent mitigated (tons), as a result of using EGG-energy technology instead of traditional/conventional technology	10.1 tons CO_2 per year	20.4 tons CO_2 per year		
Cost savings, obtained from using EGG-energy technology instead of traditional/ conventional technology	12,480,000 Tsh or $7,650	25,152,000 Tsh or $15,418		

Appendix I. IT Solutions

Over the past several months, EGG-energy achieved tremendous progress on the implementation of flexible tools capable of distributing any energy product. It is important to note that out of the 21 processes enabled by EGG-energy's IT infrastructure, which was initially developed for the battery business, 15 have been successfully implemented under the solar model, and the remaining processes are either still under development or are only relevant to the battery business model. Please refer to Table 3 below for an overview of the processes and their applications.

We have prioritized the integration of smart phones and related apps into all our business processes. We transitioned from a tough and time-consuming data collection process to a reliable, real-time, fast, valuable and accurate information collection process through our mobile applications. The apps have been designed to work and save data even if there is no cellular network. We are currently working to integrate data collection within our main cloud-based database, which will further assist us in streamlining operations and ensuring a robust credit risk assessment.

The following successes associated with our IT infrastructure are worth noting:

Financial management

- **The large majority of our transactions are currently being made through mobile money**. We have achieved a significant reduction in accounting errors by collecting money via our own EGG M-Pesa account. For example:
  - Weekly budgets and cash requests are processed via mobile money
  - Many of the station employees' salaries are paid via mobile money

- **Our IT systems have enabled the implementation of a per-task remuneration structure**. We now have the capability to control the payment of commission on an installation basis – up to 3 commissions to be paid for 1 installation) (379 transactions generated for a total amount of 7,330, 000 Tsh on 195 installations).

- **We have opened a business account with all three major phone providers** (Tigo, Vodacom, and Airtel). We are now able to generate bulk payments of airtime that take just minutes to execute and to create an automatic report of all the transactio9ns. (814 transactions for a total of 2,700,000 Tsh spent over the last 10 months)

Operations management

- **We now have the ability to track many of our operations in real-time** (e.g., installations, customer credit risk assessment, village identification survey). We have equipped every field employee with a smart phone and have observed notable improvement in employee communications.

- **We are increasingly able to solve problems remotely.** Technicians can now go on site, assess technical issues, and send pictures of the issues to HQ. Our engineer can then solve the problem remotely and save a day that would have otherwise been wasted in transportation. Our PAYG solar systems also allow us to diagnose certain problems remotely since they continuously transmit data on their charge, usage, power output, and temperature.

- **We are building scalable and reliable service operations.** Every installation is geo-tagged, and pictures of every customer and their home are taken and stored on our servers along with their demographic and credit assessment information. This data will become invaluable as we continue to provide after-sales service and sell other products and services at scale. Please see Figures 1 and 2 for a compilation of these pictures from our database.

Table 3. Overview of IT-enabled processes and their previous and current use

Process integrated in the IT system	Used for battery system?	Used for the solar system?	Comments
Administrator Cloud			
Sales prospects	Yes	Yes	Since its installation, we have collected 2,500 qualified prospects. It helped us in assessing the work of the team, understanding the market, analyzing the performance of every sale person, and building a database of prospect which we use to send targeted SMS information about our new offers.
Installations	Yes	Yes	This section concerns the collection of information by the technicians during the installation. It shows the quality of the work from a technician; validates the data collected from the prospect form.
Customers	Yes	Yes	List of all customers. They can be battery, cash solar, solar on credit, solar on PAYG. The process " prospect → installation → customers" can be used for any product available on the market, regardless of technology.
Distributor	Yes	Yes	Our distributors. Most of them are being transformed from battery distributor to ambassador/agent of PAYG technologies.
Employees	Yes	Yes	No relation to technology/product. The phone number and email are collected. This is the base for generating the payment of commissions.
Stations/sites	Yes	Yes	Stations are now equivalent to an area of operation.
Inventory	Yes	Yes	With the integration of PAYG technology, it only takes 3 hours to add the new product to our inventory system.
M-Pesa payments	No	Yes	We started implementing an M-Pesa platform to collect payment for solar systems purchased on credit and to manage cash from the stations.
Analytics	Yes	Yes	A comprehensive list of analytics used to monitor employee and station activity.
Bulk SMS	Yes	Yes	We can send a mass SMS to any filtered list (customers, distributors, employees, prospects). The qualified data we collect from the field enables us to be very targeted on our campaigns.
Employee Cloud			
Battery swap section	Yes	No	This section is not used anymore.
Battery transfer	Yes	No	This section is not used anymore.
Sales prospect	Yes	Yes	Easy way for every employee to enter his/her weekly prospects from the station.

Reconciliation	No	No	A process that we never prioritized. Instead of trying to manage cash, we set an objective of removing cash transactions from the stations and idnstead using mobile money for 100% of transactions.
Receipts	No	No	The implementation required extensive effort. We are looking to integrate an equivalent function on an app, since all the field employees now have a smart phone.
Inventory	Yes	Yes	The whole system has been designed to easily add or remove any product.
Other IT tools			
Mobile app 1: Technician application	Yes	Yes	First collected from email, we expended significant effort in 2013 to develop and implement this app to be able to gather various data sets.
Mobile app 2: Village identification survey	No	Yes	App developed recently to improve the effectiveness of sales by identifying and collecting enough data in target communities/ villages. This functionality was not in place during the battery period, but could have been useful.
Mobile app 3: Credit assessment	No	Yes	Developed recently to assess credit risk for potential customers. We are in the process of linking this form, which was previously only in paper form, to all other customer information on the cloud.
Mobile app 4: Sales	No	Yes	This new app keeps track of our sales information for new customer.
Mobile app 5: System Maintenance	No	Yes	This new app helps us keep track of system technical issues and our response.
Collection of data via email: Sales report	Yes	Yes	Information collected via email – app under development.
GPS tracking platform	Yes	Yes	Platform and device developed to monitor costs of transportation. Ready for scaling up.
Bulk payment of Airtime	Yes	Yes	We now process airtime payments through a platform that generates automatic bulk payments. It drastically reduces the number of issues stemming from lack of airtime on employee phones

Figure 1. Snapshot of the house pictures uploaded from the app on our platform. Photos are accessible from headquarters for further risk assessment, decision making, and trouble shooting.

Figure 2. Snapshot of the customer pictures uploaded from the app on our platform. Every loan customer has a photo on file together with their demographic and credit assessment.

USAID DIV Grant to EGG-energy
Grant No. # AID-OAA-F-13-00054
Milestone 3

As of October 2014, EGG-energy hit the milestone of installing 200 pay-as-you-go solar home systems—all with active repayments. Additionally, we have completed almost 300 non-pay-as-you-go installations, 77 of which were on loan. Hitting Milestone 3 was significantly delayed due to our supplier's tardy delivery of requested stock, which not only resulted in a lack of sales for three months but also made it difficult to develop a healthy pipeline of prospective customers.

Table 1. Pay-as-you-go Solar Home System Installations by Month

Oct 2014	Sep 2014	Aug 2014	Jul 2014	Jun 2014	May 2014	Apr 2014	Mar 2014	Feb 2014	Jan 2014	Dec 2013	Nov 2013	Oct 2013
15	17	30	10	21	44	0*	1*	4*	29	16	14	15

**Represents month where we were out of stock due to delays from our supplier, Mobisol, which had a major effect on our sales for the year.*

Chart 1. Pay-as-you-go Products Sold

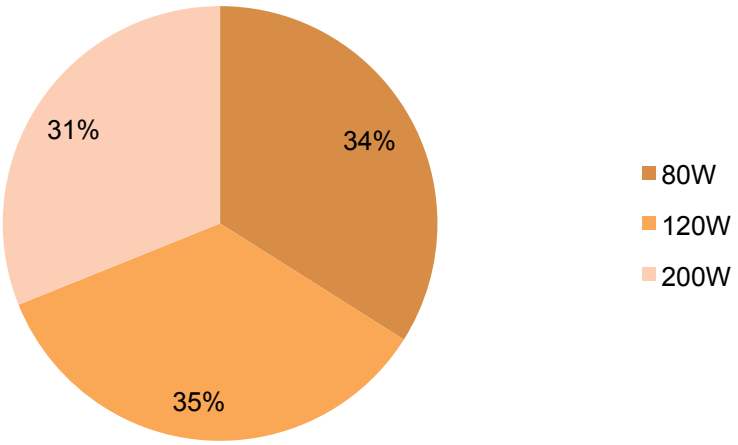


Chart 2. Pay-as-you-go Installations by Region

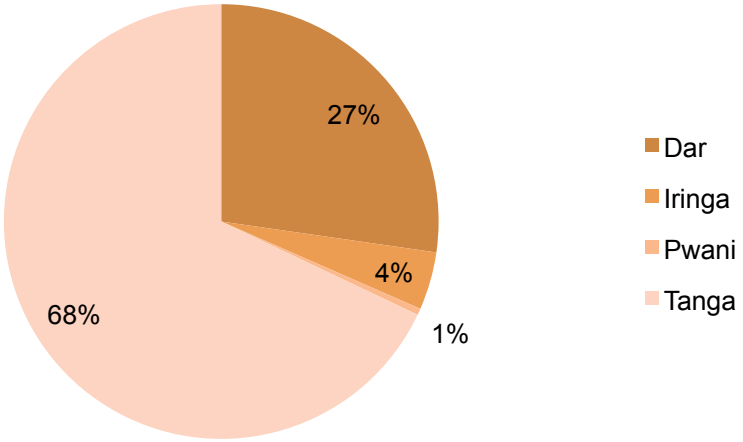
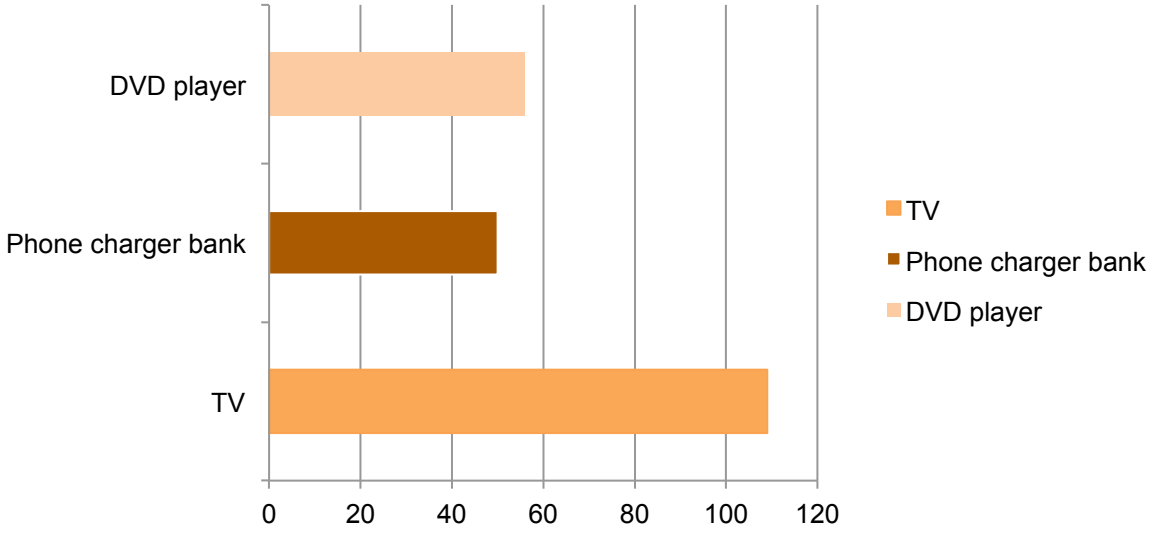


Chart 3. Additional Appliances Bought (loan or in cash) by Pay-as-you-go Customers



USAID DIV Grant: Scaling Up EGG-Energy Franchised Solar Hubs
Grant No. AID-OAA-F-13-00054

Milestone Four: Project Update & Impact Assessment 2

As of 1 June 2014

USAID has awarded a DIV grant to EGG-energy for the period 1 October 2013 – 1 October 2014. This document provides a brief project update and the second assessment of indicators.

1. Project Update

After several delays in receiving new stock from Mobisol, we finally received a new shipment in the beginning of May, which we are rapidly depleting. We continue to source and test products from various solar technology companies.

Our repayment rates on Pay-As-You-Go (PAYG) systems remain very high with a consistent PAR>30 of 0% over the past several months. As we continue to refine our operations, we expect sales to continue growing at a fast pace while maintaining high repayment rates.

EGG-energy continues to partner with other organizations in Tanzania to maximize our impact. We have finalized a deal with Mobisol to allow us exclusive distribution rights for Mobisol products in our current areas of operation. For our finance program, we are still preparing to launch a partnership with EcoBank to offer our products with EcoBank loans. And for our sales and distribution, our partnership with Tanga Fresh is generating record interest and sales. We are actively seeking out further partnerships to support our growth and are currently in talks with several potential partners.

After conducting additional sales agent trainings, we have significantly increased our number of sales agents trained to 50. Of these, 15 are actively and regularly producing prospects and sales. As they start to make sales, we expect the number of active sales agents to increase, as well.

Table 1. Project Activities Status Update

Activity	Status
Enterprise management systems	EGG employees have started using smart phones to input data, which can operate effectively in areas with inconsistent network access. We continue to develop and implement mobile applications and an SMS service for improved customer service and to work toward a complete centralized database. Having secured Mobisol as a supplier, we were given access to Mobisol's cloud-based operation enterprise management system. We supplement our internal system with data from Mobisol.
Improve station infrastructure (POS systems, phones, GPS tracking)	*This activity has been completed.*
Complete linkage of customer management database to mobile money system	*This activity has been completed. Our customer management database now connects mobile money payments to our individual customers.*
Conduct CRM trainings for EGG-energy staff	*First training has been conducted, and a second is planned for summer 2014.*
Mobile apps finalized for logistics, inventory, and customer management	*We are in the process of rolling out new mobile applications for customer acquisition, sales, credit assessment, installations, and after-sales service.*
Monitor performance of equipment for better data retention and improved sales performance	*Ongoing May-Sep 2014.*
Scalable consumer financing capacity	We are building a fully functional finance model that will allow us to scale the business throughout Tanzania and, later, into neighboring countries. EGG has been working to streamline its loan processes to most efficiently and effectively serve our customers. We are transitioning all credit assessment processes to digital in order to better link customer information with their accounts. We are also conducting a pilot with First Access, a social enterprise pioneering a system of credit scoring for the global informal sector, in order to refine our finance offers and credibility checks. The financing manager and team are still working toward a goal of overseeing significantly more than 100 loans per agent.
Gather and analyze data from pilot financing program	*We have finished collecting data and are have conducted initial analyses. First Access is conducting an additional analysis for further information, We are currently awaiting results from First Access.*

Use data from pilot study to refine finance offers and credibility checks	*We transitioned to Mobisol to allow for greater data collection and remote monitoring. So far, we are encouraged by a spike in sales. We also collected data for start of pilot with First Access to refine our credit scoring program and explore the feasibility of digital scoring (through mobile phones). We will continue to refine our finance offers and credit checks through the spring as we receive more information from First Access.*
Hire and train loan agents for expansion of program	*After simplifying our loan program by focusing on the mobile-connected rent-to-own systems, our loan department can handle a significantly larger portfolio, and we do not need to hire a new loan agent for at least 3 more months.*
Expand financing program so that all customers have access to financing	*This activity has been completed. All of our customers now have the ability to apply for financing. Given that we are financing assets that we can repossess, our financing is available to a broader customer base. We see this as a first step towards financing for the unbanked.*
Incorporation of pay as you go solar into service offerings	We have obtained a successful PAYG system that is readily scalable and established that PAYG is a trustworthy solution to make solar energy more accessible to poorer customers. Over the past eight months, we have been developing streamlined processes for sales, managing payments, delinquent customers, and repossession of materials. Over the next several months, these processes will be finalized. We are still in the process of identifying and securing a high-quality second PAYG system.
Establish agreement with and procure equipment from two PAYG solar companies	*We have established an agreement and procured equipment from one PAYG solar company, Mobisol. We are in the process of securing a second (planned, Q3 2014).*
Sell stock of PAYG systems acquired	*This activity has been completed. We have sold our initial stock of Mobisol PAYG systems and are rapidly selling the next shipment of Mobisol systems.*
Monitor and analyze use of systems	*We continue to monitor and analyze use of systems as we receive more data points.*
Refine procedure for late payments and repossession	*This activity has been completed. We will continue to refine late payment and repossession procedures as necessary.*
Acquire stock of PAYG systems from preferred provider	*Planned for Jul-Sep 2014.*
Scalable Operations and Monitoring	We will ensure that information is consistently distributed to all EGG-energy representatives through regular agent meetings and technician trainings. We will also conduct an impact assessment and increase efficiency in reporting of both business and impact metrics.

Agent meetings	*Meetings conducted in Feb 2014 and May 2014 with an additional meeting planned for Aug 2014.*
Technician Trainings	*Trainings were conducted in Nov 2013 and Feb 2014. We are now training new technicians regularly through our technical agent program, during which they apprentice with EGG-energy technicians. Additional training is planned for Aug 2014.*
Impact Assessment	*A baseline was conducted in Oct 2013. A final impact assessment is planned for completion in Sep 2014.*

2. Indicators

Table 2 includes a baseline and our first assessment of project-level indicators.

Table 2. Project Indicators

Indicator	Baseline (Oct 2013)	Assessment #1 (Feb 2014)	Assessment #2 (Jun 2014)	Final Assessment (Oct 2014)
Number of active solar agents	10	10	15	
Geographical distribution of agents and customers	3 regions	4 regions	4 regions	
Number of solar installations (cumulative)	161	288[1]	403	
Number of PAYG systems installed	2	67	118	
Revenue (latest quarter)	$28,908	$70,800	$48,808	
Number of customers receiving financing	62	141	190	
Repayment rates for franchises and customers receiving financing (all systems)[2]	95%[3]	94%	97%	
Repayment rates for franchises and customers receiving financing (PAYG)[2]	N/A[4]	99%	100%	
Number of customers managed by each credit officer	62	125	190	
Default rate for loans based on PAYG systems and the operations of EGG-energy financing program	0%	0%	0%	
Percentage of customers making payments using mobile money	31%	90%	100%	

[1] Updated Baseline and Assessment #1 figures to account for solar upgrades for previous customers under the battery business

[2] Based on PAR>30

[3] Includes Dar es Salaam only (Iringa figures not available) – subsequent calculations include all locations.

[4] First PAYG system loans distributed end of August 2013. It was too early to calculate the repayment rate for these loans as of October 2013.

Sales expenses per new customer	$195/sale	$156/sale	$174/sale[5]	
Number of service calls/complaints per month (percent of total installations)	N/A	N/A	1%	
Agent-level metrics on average and by quartile ▪ Revenue ▪ Number of customers	N/A	N/A	N/A[6]	
Reduction in Kerosene use, as a result of using EGG-energy technology	84%	84%	84%	
CO2 equivalent mitigated (tons), as a result of using EGG-energy technology instead of traditional/conventional technology	25.1 tons CO_2 per year	44.9 tons CO_2 per year	62.9 tons CO_2 per year	
Cost savings, obtained from using EGG-energy technology instead of traditional/conventional technology (per year)	29,402,464 TZS or $17,470[7]	52,595,712 TZS or $31,251	73,597,472 TZS or $43,729	

[5] Figure for Q1. We did not have stock for February and March. Increased sales expenses due to shortage of stock in the face of fixed costs.

[6] As we are in the process of converting all franchisees to agents, we will track this going forward.

[7] Based on current exchange rate of 1683 TZS to 1 USD

USAID DIV Grant to EGG-energy
Grant No. # AID-OAA-F-13-00054
Milestone 5

As of November 2014, EGG-energy hit the milestone of installing 500 solar home systems—all with active repayments. As with Milestone 3, Milestone 5 was delayed due to our supplier's tardy delivery of stock, which not only resulted in a lack of sales for three months but also made it difficult to develop a healthy pipeline of prospective customers. As a result, we hit this milestone two months later than anticipated, which is a significant accomplishment given more than three months of supply delays that were outside of our control.

Table 1. Total Solar Home System Installations by Product Type (as of 30 Nov 2014)

System	Number installed
15W SHS	126
30W SHS	50
50W SHS	48
100W SHS	22
150W SHS	30
200W SHS	6
80W Mobisol SHS	73
120W Mobisol SHS	79
200W Mobisol SHS	68
Total	***502***

Table 2. Total Solar Home System Installations by Region (as of 30 Nov 2014)

Region	Installations
Dar	291
Iringa	66
Tanga	145
Total	***502***

Final Report: Award # AID-OAA-F-13-00054

Executive Summary

USAID's Stage 1 investment helped EGG-energy to build a robust financing program to make solar home systems affordable and making critical improvements to information systems to allow for more efficient and cost-effective operations.

Faced with a dearth of suitable customer management systems, EGG invested significant time and capital to developing an in-house management information system and mobile applications to seamlessly manage field operations in an environment with weak infrastructure and high transport expenses. The team is now able to monitor operations and key business metrics in real time, including the health of its financing portfolio, the condition of its sales pipeline, and the status of customer complaints. EGG also developed and implemented a new low-connectivity, cloud-based CRM system to track customers and better communicate across teams. Ultimately, this information technology will ensure EGG-energy is poised to scale its energy distribution network throughout Tanzania and beyond. Other activities completed as part of this grant include refining our sales model and payment scheme and switching fully to digital payments via M-Pesa.

Over the next few months, EGG-energy is working to secure a new round of funding in order to effectively scale up operations. We also continue to source new pay-as-you-go technologies that fit well with our operations and the needs of our target market, along with refining our sales and marketing efforts.

Background

Around the world, approximately 1.5 billion people lack access to electricity. The problem is most acute in Sub-Saharan Africa, where more than 500 million people do not have access to the electrical grid and must resort to kerosene, dry cell batteries, diesel generators, and car batteries to satisfy their non-heat energy needs. Tanzania epitomizes this trend: About 82% of the country's population of 45 million—7.4 million households—does not have access to grid electricity, and 73% of Tanzanian enterprise owners rank the lack of access to electricity as the greatest constraint on their business.[1]

Over the last few decades, many energy technologies that are well-suited for off-grid Tanzanian homes and businesses have been designed, manufactured, and even imported. However, only pico-solar devices have seen broad deployment in Tanzania. Sales and distribution of more permanent systems remain limited. Solar energy's large upfront costs are a huge barrier to most off-grid Tanzanians, and most banks and MFIs are reluctant to get involved in energy financing.

[1] Lighting Africa Market Assessment Results: Quantitative Assessment – Tanzania. IFC, 2008.

If these gaps in last-mile distribution are not addressed, access to energy will remain elusive for most Tanzanians.

EGG-energy is leapfrogging outdated models of energy distribution in order to offer significant economic, environmental, health, and social benefits for off-grid Tanzanians.

Economic impact

Based on the monthly cost of EGG-energy's PAYG systems and given the distribution of household income in Tanzania, we estimate that approximately 15% of rural households (800,000 homes) can presently afford EGG services. This segment spends more than $200 million per year on energy. Our calculations show that regardless of what source of power they use now (torch, kerosene, generator, other solar), our customers could save a significant amount of money using EGG-energy's systems. Our small business customers increase income with more efficient systems that allow them to stay open for longer hours and generate additional income through charging phones.

EGG-energy's financing program provides the unique benefit of increasing our customers' access to finance. Not only are we able to decrease our costs by providing our own financing program, we will be able to expand our customers' credit history to open up other loan-based purchases, such as new roofs, appliances, and other items to improve their productivity and quality of life.

Furthermore, we believe increasing access to low-cost mobile charging systems is key for East Africa economies that increasingly rely on mobile money. A charged phone is an invaluable payment service (e.g., M-PESA, Airtel Money, Tigo Pesa) and savings tool (e.g., M-Pawa) in a country where only 17% of the adult population has access to formal financial services.[2] In fact, out of Tanzania's adult population of 26 million, 5.5 million have an M-PESA account, and about 14% of all transactions were conducted with M-PESA last year.[3]

These numbers are projected to continue growing at a significant rate. Our target during this project was to get all customers to make payments with mobile money to help connect them to a network of services, known as "digital finance plus," that is already developing quite rapidly. By quickly adopting mobile money, we aim to remain at the forefront of innovation in providing basic services to low-income, rural, and otherwise excluded populations around the world.

Environmental impact

Solar home systems also allow off-grid Tanzanians to light their homes reliably, in a cost-effective manner, without the health, safety, and environmental hazards of kerosene. By replacing relatively dirty sources of energy, over time, EGG-energy has the potential to significantly reduce the carbon footprint of lighting in rural Tanzania. Every 52 kerosene lanterns we replace with electric lights has an impact equal to that of removing an American vehicle from the road (US Department of Energy, US Environmental Protection Agency). Every battery-powered torch we remove saves over 100 batteries from ending up in landfills, where their toxic metals leak into the ground and table water. In 2013 alone, we displaced 70,200 of batteries that would have been thrown away.

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[2] Asli Demirguc-Kunt and Leora Klapper, 2012, "Measuring Financial Inclusion: The Global Findex Database", World Bank Policy Research Paper 6025.
[3] http://www.mobileworldlive.com/vodacom-reports-m-pesa-surge-in-tanzania

Health and safety impact

Of course, burning kerosene is not just terrible for the environment, but also for the health of users. Kerosene lamps are a major contributor to indoor air pollution, which kills 1.6 million people each year and is the leading cause of death in children under five. Many customers have noted improved health since installing EGG-energy systems. We have also found that many of our customers also feel safer with EGG-energy lighting systems, which illuminate outdoor areas at night to deter both human and animal predators.

Social impact

Solar power is particularly beneficial to families with school-age children, who are able to study even after dark, improving their exam results and their future prospects for employment. They are also able to access more information through cell phones, radios, and televisions—including educational programs for children. Access to information through a variety of media is especially crucial for our target customers, who are largely rural and otherwise disconnected from the rest of the world.

Approach

The EGG-energy team is building a last-mile distribution network for solar energy systems by sourcing the highest quality, most efficient products, providing access to consumer financing, ensuring top-notch installation and maintenance.

With the dropping price of solar PV and the steady or rising price of transport and lead-acid batteries, we saw that solar PV had closed the price gap with the battery service since EGG-energy started in 2009: The cost of a solar system was closer to that of the battery service, and cost of logistics for batteries showed no sign of decreasing. We stopped sales of battery systems in June 2013 and have fully transitioned to solar by February 2014. Our existing active customers are being upgraded to solar systems. Our solar franchisees will become solar sales agents, and we will continue to grow their numbers.

EGG-energy takes a technology-agnostic approach and focuses on distribution and service, finding energy solutions that are suitable for customers now and, as technology evolves, connecting the end user to the optimal energy solution. Thus, EGG serves as a key partner for technology providers to help pilot, refine, and scale technologies that will allow customers to receive quality services at affordable prices. Currently, the social enterprise is focused on pay-as-you-go (PAYG) technology, which enables customers to pay for energy generated by solar systems via mobile phones. This $100,000 Stage 1 USAID ran from October 2013 to October 2014 in order to build up our in-house financing program and create an effective information management system.

EGG-energy's innovative, in-house financing program aims to not only make solar energy accessible and to lower the end cost for our customers, but also to expand customers' credit history. Additionally, all EGG-energy products include mobile charging ports, ensuring customers can conveniently and inexpensively charge their mobile phones. A charged mobile phone serves as an invaluable payment service (e.g., M-PESA, Airtel Money, Tigo Pesa) and savings tool in a country where only 17% of the adult population has access to formal financial services (World Bank Global Findex 2012). In fact, out of Tanzania's adult population of 26

million, 5.5 million (and counting) have an M-PESA account, and many others use mobile money services provided by Tigo and Airtel.

This award built on a previous Stage 1 DIV award, which supported the development of franchised solar hubs in rural Tanzania. These franchised solar hubs enable rural entrepreneurs to earn additional sources of revenue. With USAID support, EGG-energy was able to provide financing that lowered the hub-owners' upfront costs, along with sourcing, maintenance, and marketing support. These locally owned and operated solar-powered energy hubs are providing affordable, reliable, and clean electricity to rural neighborhoods. Over the period of this award, EGG-energy was able to decrease customers' kerosene usage by 98%, saving customers money and increasing productivity.

Project implementation

Over the course of this project, EGG-energy has been working to implement robust systems and procedures to lay the groundwork for efficiently scaling our operations across Tanzania.

The market for electricity solutions in Tanzania is large and will likely grow to dwarf our conservative estimates. The opportunity exists now to create a market-based solution that builds a foundation for future growth. To build this foundation, we are focusing on two key segments**:**

- *Off-grid rural homes:* Our largest segment, 5.4 million rural households, will not be connected to the grid in the foreseeable future. These households use small kerosene lanterns or wood fires for light, AA batteries to power low-quality radios, and generators for television. Their total spending on kerosene and AA batteries alone is over $500 million. EGG-energy presents them with a compelling value proposition, allowing them to replace kerosene, expensive cell-phone charging[4], AA batteries, and generators with cleaner and cheaper solar energy.

- *Small businesses:* Electricity can improve small businesses' incomes by enabling new services and increasing productivity. Business owners will be able to work longer hours, make additional revenues by charging their existing customers' electrical devices, and broaden the range and quality of their products by using small electric appliances and tools. According to IFC estimates, 9 out of 10 Tanzanian businesses do not have access to the grid[5]. A vivid example of the key role that electricity plays in development is the fact that 73% of Tanzanian enterprise owners rank the lack of access to electricity as the greatest constraint on their business.

Studies have shown that households spend approximately 12% of monthly income on energy. Based on the monthly cost of EGG-energy's RTO systems and given the distribution of household incomes in Tanzania, we estimate that approximately 15% of rural households (800,000 homes) can presently afford EGG services. This segment spends more than $200 million per year on energy.

We see these market segments as entry points into providing further distribution services in our customers' communities. We expect to soon be able to provide services that are accessible to a

[4] Mobile phone users usually pay about $0.20 to charge their phones, an activity that in some rural areas also involves significant (costly and/or lengthy) travel to a charging location.
[5] Lighting Africa Market Assessment Results: Quantitative Assessment – Tanzania. IFC, 2008.

larger portion of the population as we extend our product offerings. Additionally, as electronics become more available across Tanzania, we will see an increase in demand for more advanced and energy-intensive services. Thus, the market for energy services is constantly expanding and growing.

In order to better reach this off-grid population, EGG-energy embarked on this project with the support of USAID. Below is a summary of the activities conducted as part of the grant.

1) **Enterprise management systems:** In order to improve our enterprise management systems and, ultimately, the overall efficiency of our operations, we undertook the following activities:

    a) Improved station infrastructure (POS systems, phones, GPS tracking)
    b) Complete linkage of customer management database to mobile money system
    c) Conduct CRM trainings for EGG-energy staff
    d) Mobile apps finalized for logistics, inventory, and customer management
    e) Monitor performance of equipment for better data retention and improved sales performance

2) **Scalable consumer financing capacity:** EGG-energy aims to build a fully functional finance model that will allow us to scale the business throughout Tanzania and, later, into neighboring countries. The sales team will be equipped to tailor finance offers to customer needs, and the procedure for consumer credit worthiness will be streamlined. The financing manager and team will be able to oversee 100+ loans per agent.

    a) Gather and analyze data from pilot financing program
    b) Use data from pilot study to refine finance offers and credibility checks
    c) Hire and train loan agents for expansion of program
    d) Expand financing program so that all customers have access to financing

3) **Incorporation of pay as you go solar into service offerings:** We have obtained a successful PAYG system that is readily scalable and established that PAYG is a trustworthy solution to make solar energy more accessible to poorer customers. Over the course of the project, we streamlined our procedures for recruitment, managing payments, dealing with delinquent customers and repossession of materials.
    a) Establish agreement with and procure equipment from two PAYG solar companies
    b) Sell stock of PAYG systems acquired
    c) Monitor and analyze use of systems
    d) Refine procedure for late payments and repossession
    e) Acquire stock of PAYG systems from preferred provider

4) **Scalable Operations and Monitoring:** To ensure that information is consistently distributed to all EGG-energy representatives, we hosted agent meetings and technician trainings. We also conducted an impact assessment and worked to increase our efficiency in reporting of both business and impact metrics.

    a) Agent meetings
    b) Technician Trainings
    c) Impact Assessment

Partnerships

Over the course of this grant, we have developed partnerships with numerous organizations including Tanga Fresh, Tanga Sisal Estates, and Dimagi, and strengthened existing partnerships such as those with Mobisol and BBOXX.

- Dimagi: We have partnered with Dimagi to adapt their healthcare management applications to other sectors, starting with our solar energy distribution. The new application, which be used for prospect identification, sales, credit checks, and installations, was recently rolled out across the company.

- Mobisol: In May 2013 we started a partnership with Mobisol, a high-quality pay-as-you-go (PAYG) supplier. Our extensive due diligence process revealed that Mobisol was the only provider that had a mature technology that works for systems requiring installation (~20W and above) and was interested in working with a third party distributor in Tanzania. We are currently distributing 80W, 120W, and 200W solar systems that we source from Mobisol and have started using Mobisol's enterprise management system.

- BBOXX: We signed an agreement with BBOXX, another pay-as-you-go supplier, in June 2014. After testing their 50W systems, we ordered a first batch, which had just arrived in Tanzania as of the writing of this report.

- Tanga Fresh: Starting in November 2013, we partnered with Tanga Fresh to market and sell solar homes systems through their network of dairy farmers, with loans guaranteed by the company. Tanga Fresh repays the loan out of the farmer's earnings.

- Katani Sisal Estates: Starting in Q3 2014, EGG-energy has partnered with Katani's sisal estates in the Tanga region offer solar home systems to sisal estate farmers and employees.

- YOSEFO: Also in Q3 2014, EGG-energy started working the microfinance institution YOSEFO for lead generation. Currently the MFI does not offer financing to our customers but can help us by sharing their loan histories.

Challenges

Since the initial project conception, EGG-energy shifted its operations to focus solely on pay-as-you-go solar home systems. In order to accommodate this change, EGG had to adapt and refine its business practices.

Working in a country with limited infrastructure poses logistical challenges for any company. Targeting rural populations, geographically isolated with even less infrastructure than in urban areas, is even more challenging. Wireless reception can be weak or non-existent. Transmitting data from a rural area back to staff in Dar or Tanga can be difficult, significantly slowing down our operations. Over the course of this grant, we were able to tackle this challenge by providing all field staff with smart phones and developing and deploying low-connectivity, cloud-based applications to replace paper forms.

The new CommCare application offers significant improvements in customer management and tracking operations. CommCare is designed to work even when our field staff doesn't have data or wireless connection. Every file concerning one customer is grouped so that we can seamlessly follow an individual from prospective customer through installation and system maintenance. This way, every EGG employee can clearly and easily check the stage at which any individual is – from initial prospect to after-sales support. Grouping files also allows us to filter our questions depending on previous answers. Finally, CommCare lets us switch seamlessly between English and Kiswahili, enabling our international working team to use the language that is most convenient for them in any given circumstance and we don't lose important information because of language barriers. This has increased connectivity between field staff and headquarters and improved the efficiency of our work. *See Appendix III for more detail.*

Another challenge we faced during this grant was delays in receiving new stock from our supplier for about four months over the course of the grant. Not only did this cut down dramatically on sales, it also hindered our ability to build a solid pipeline of potential customer to increase future sales. Ultimately, this challenge prevented us from reaching our goal over the course of this project, 500 installations. In order to prevent this problem in the future and mitigate the risk that comes along with depending upon a single supplier, we have procured another pay-as-you-go system from a different supplier, BBOXX.

Evaluation Design and Results

Over the summer of 2014, we conducted an in-person survey of a randomly selected group of customers to better evaluate our social, environmental, and economic impact. Results are summarized below, with a full table of KPIs in Appendix I.

Overall, customers reported increased income from energy savings and improved revenues. Our impact evaluation revealed that customers who previously used kerosene (42%) reduced in spending on non-renewable energy sources by an average of 4,915 TZS per week or 255,580 TZS per year (around $150 USD). Customers who previously used generators (about 20%) reduced spending on non-renewable energy sources by an average of 39,857 TZS per week or 2,072,564 TZS per year (around $1,240 USD). Neither figure includes the additional time gained by eliminating weekly or even daily travel to purchase kerosene or petrol.

Small business customers reported an average of $453 USD in yearly additional income in a country where the average yearly income is $695 USD. Forty percent of our business customers reported increased nighttime hours of operation since installing an EGG-energy solar system. Anecdotally, several reported more consistent nighttime operations thanks to the reliability of EGG-energy systems versus grid electricity.

The impact evaluation also revealed a significant reduction in carbon versus competing alternatives, an average of 373 kg CO_2 saved per household on an annual basis. One hundred percent of customers previously using generators (approximately 1 in 5 customers) have ceased using them altogether. Generators' high fuel consumption (average 39,857 TZS or at least 17 liters of petrol per week amongst our customers who previously used generators) and subsequent air pollution, along with their considerable noise pollution, make them a large source of pollution across on-grid and off-grid populations for the former who use them as back-up power and the latter who rely on them as their primary energy source.

Of the 40% of our customers who previously used kerosene lamps as lighting, only 6% continue to use kerosene lamps. Customers decreased their kerosene consumption by an average of 4,915 Tsh per week or around two or three liters (depending on location). Our customers also significantly decreased the number of battery-powered torches they used after installing an EGG-energy SHS, thus decreasing the number of disposable batteries being thrown away. Many customers reported having to replace the batteries in their torches every week, resulting in over 100 batteries disposed per torch per year. Across the 44% of customers who used battery torches, households ceased using an average of 1.3 battery torches, resulting in the prevention of at least 11,440 batteries from ending up in landfills, where they can leak harmful chemicals into the water table.

At the beginning of this project, we were not able to reliably record the time between prospective customer identification and full payment of solar system and installation. The average for the course of the grant was 13 days. However, this number was significantly affected by delays in stock and the resulting lack of stock to sell over four months of the grant. With consistent stock supplies and systems in place to better follow up with customers, we expect this number to continue to decrease. However, we are also cognizant that some prospective customers will need more lead time before they become customers outright. We will continue to find a balance between efficient sales and installations processes and taking the time necessary to ensure that

The rate of equipment degradation seems quite slow; however, it is too early to accurately assess. We have not lost much that we have not been able to get replaced by Mobisol. To date, we have not had any thefts occur. Over the course of the project, we have averaged seven maintenance calls per month. However, before April, we did not have a call centre in place to regularly accept and track such calls. Going forward, we have set up the processes to better track the calls and the overall cost of maintenance to EGG.

Customer satisfaction has been overwhelming. Ninety-four percent of customers reported that they were satisfied with their experience with EGG-energy, and 100% of customers reported that EGG-energy had positively impacted their daily lives. Numerous customers (31%) reported that they chose EGG because of our loan program and the convenience of M-Pesa payments.

Current trainings for staff, which have included multiple IT trainings and agent trainings, have been sufficient thus far. As we continue to expand, we will need to expand our loan team, which will require further training, both for our manager and for his expanded team.

By implementing a variety of checks into our processes, we have been able to significantly increase the accuracy of data in our enterprise management system and ensure that all necessary and useful information is captured.

Non-quantitative project results

Through a series of customer interviews beyond our quantitative survey, EGG-energy was able to gather a number of qualitative impacts reported by customers. First, our solar home systems have had a significant impact on education. Eighty-two percent of our customers have school-age children. Of these customers, 59% reported that their children can study more each night— as many as three more hours per day— long after the sun sets thanks to their reliable, non-polluting solar home system. Fifty-one percent of customers with school-age children even reported that their children's grades have improved. Second, customers have also increased their usage of mobile money. Sixteen percent of customers previously did not have M-Pesa but now use the mobile money service for other purposes. Other benefits included security and health: 56% of customers also felt safer, and 12% noticed better air quality.

Cost-effectiveness & Competitive Landscape

Compared to other solar energy companies in Tanzania and East Africa, EGG-energy stands out by focusing solely on last-mile distrbution. We do not see pay-as-you-go companies like Mobisol, Off-grid Electric, or Angaza as competitors, but as natural partners. From our count of 20+ such companies, most do not have their own distribution arm. We could thus provide an essential service for them to grow in a region that otherwise lacks reliable partners on this front. Additionally, the areas we operate in, and are likely to enter, are large, unsaturated markets – markets that are largely untapped and will not be saturated within the next few years. The penetration of solar systems in areas in which we operate is less than 5%. Our sales in an area, even after 6 years, are unlikely to saturate the market.

From current estimates, EGG-energy will be a profitable company within 3 years, therefore reducing our cost per development outcome to zero. We expect to be independent from grant funding by that time and to be able to scale with commercial debt. From Q3 to Q4 of 2013, we were able to halve sales expenses from 35% to 17% of revenue, and we expect to cut that in half again in the next year.

Given that we are a for-profit company that collects revenue from our customers at fair prices, we expect that our impact per donor dollar will steadily increase as we need less and less donor money going forward.

If we look instead at the cost of sales, we have seen a steady decrease over the past year (with a temporary spike in Q3 2014 as we have increased our prospect gathering activity). We expect this to settle down to a steady state of about 10% of the revenue of the system. It is difficult to find equivalent numbers for other alternatives, but we believe this to be quite efficient. Additionally, much of these sales costs are from commissions, which benefit our Tanzanian sales staff and other local agents that help bring in sales.

Financial Results and Scaling Plan

Our original goal for the project was to reach 500 customers by the end of the grant period. Due to issues with the supplier and delays in capital from other sources, we were without stock for more than 4 months of the grant period. Our performance is currently lagging our projections by about 5 months, and our operating expenses were about 5% lower than projected. So although the original goals were not met, we believe that our projections were realistic and achievable

had we not had supply issues. Our projections are thus about the same, but shifted back by 5 months.

EGG-energy has a strong, experienced team in place (particularly with the recent hire of Malcolm Wigmore) and is currently raising the $2.5m in capital needed for the company to reach sustainability within 3 years. At this stage, EGG-energy is seeking a mix of commercial and grant capital. Since the start of this grant, EGG-energy has secured a $125,000 grant from National Geographic as a result of winning the Terra Watt prize and a €55,000 grant from Alstom Foundation. Our primary equity investor, GDF-Suez Rassembleurs d'Energies, has already agreed to a follow-on equity investment, and we are in advanced discussions with several other impact investors. USAID DIV stage 2 funding would be crucial for allowing us to conduct a more rigorous evaluation of our operations to prove our impact to more reluctant investors and, ultimately, to close the funding gap. We expect the next round of funding to be in 2016 and to only require commercial debt.

Lessons learned

Throughout the course of the grant, we have made several adjustments based on lessons learned. Most importantly, pay-as-you-go systems, with the ability to turn the system off when the customer doesn't pay, dramatically cut down on late payments and eased the entire loan process for both customers and EGG-energy. Turning a system off due to no payment mimics the on-grid prepaid energy system in Tanzania (Luku) and is a low-investment reminder to customers that their payment is due.

Other than our two current suppliers, Mobisol and BBOXX, few manufacturers are focusing on medium-sized PAYG systems. Diversifying suppliers is very important for distribution-focused companies, as a single supplier can be unreliable. This will continue to be a challenge as few pay-as-you-go suppliers exist, but as more enter the market, diversifying suppliers will alleviate a significant amount of risk from distribution companies. Enterprises also need sufficient capital—certainly a challenge for most social enterprises—to ensure a consistent supply of stock.

Our 25% down payment requirement could be problematic for many customers. Recently, we conducted a pricing study using conjoint analysis that revealed that potential customers would prefer to pay a 10% down payment with payments over three years, as opposed to our current model where most customers pay 25% upfront and pay the remainder over two years. The results from this study were confirmed by the success of our limited-time offer of a 4% down payment for Tanga Fresh farmers and employees. Our limited working capital makes lowering our upfront payment a bit risky, but we are working on securing the necessary capital to ensure that lowering the upfront price, and thus hopefully increasing sales, will not place undue risk on the company.

Another lesson learned is focusing on certain areas to cluster installations when expanding into new areas, as it is very hard to service very dispersed installations, especially in a country such as Tanzania with limited physical infrastructure. We have also found word-of-mouth is often the best means of marketing—making clustering installations a natural sales strategy. Using established networks, like farming cooperatives, to market products has been successful.

Finally, our impact evaluation also showed that customers overwhelmingly want televisions, irons, blenders, and refrigerators. Currently, we are only able to offer televisions but are considering options for offering additional desired appliances, as well.

Appendix III. IT Solutions

Over the past several months, EGG-energy achieved tremendous progress on the implementation of flexible tools capable of distributing any energy product. This project has allowed us to source and adapt the best, most cost-effective cloud-based financial and operations management tools to allow us to scale efficiently.

We have prioritized the integration of smart phones and related apps into all our business processes. We transitioned from a tough and time-consuming data collection process to a reliable, real-time, fast, valuable and accurate information collection process through our mobile applications. The apps have been designed to work and save data even if there is no cellular network. We are currently working to integrate data collection within our main cloud, which will further assist us in streamlining operations and ensuring a robust credit risk assessment.

The following successes associated with our IT infrastructure are worth noting:

Financial management

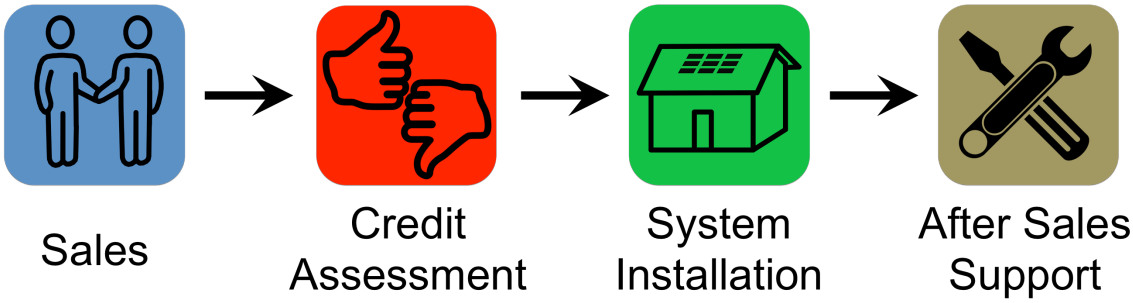
- **A majority of our transactions are currently being made through mobile money**. We have achieved a significant reduction in accounting errors by collecting money via our own EGG M-Pesa account. For example:
    - Weekly budgets and cash requests are processed via mobile money
    - Many employees' salaries are paid via mobile money

- **Our IT systems have enabled the implementation of a per-task remuneration structure**. We now have the capability to control the payment of commission on an installation basis – up to 3 commissions to be paid for 1 installation) (379 transactions generated for a total amount of 7,330,000 Tsh on 195 installations).

- **We have opened a business account with all three major phone providers** (Tigo, Vodacom, and Airtel). We are now able to generate bulk payments of airtime that take just minutes to execute and to create an automatic report of all the transactions. (814 transactions for a total of 2,700,000 Tsh spent over the last 10 months)

Operations management

While EGG-energy has used cloud-based IT systems for most of the past year, the new CommCare application offers significant improvements in customer management and tracking operations. CommCare is designed to work even when our field staff doesn't have data or wireless connection. Every file concerning one customer is grouped so that we can seamlessly follow an individual from prospective customer through installation and system maintenance. This way, every EGG employee can clearly and easily check the stage at which any individual is – from initial prospect to after-sales support. Grouping files also allows us to filter our questions depending on previous answers. Finally, CommCare lets us switch seamlessly between English and Kiswahili, enabling our international working team to use the language that is most convenient for them in any given circumstance and we don't lose important information because of language barriers. This has increased connectivity between field staff and headquarters and improved the efficiency of our work.



- **We now have the ability to track many of our operations in real-time** (e.g., installations, customer credit risk assessment, installations, after-sales service). We have equipped every field employee with a smart phone and have observed notable improvement in employee communications.

- **We are increasingly able to solve problems remotely.** Technicians can now go on site, assess technical issues, and send pictures of the issues to HQ. Our engineer can then solve the problem remotely and save a day that would have otherwise been wasted in transportation. Our PAYG solar systems also allow us to diagnose certain problems remotely since they continuously transmit data on their charge, usage, power output, and temperature.

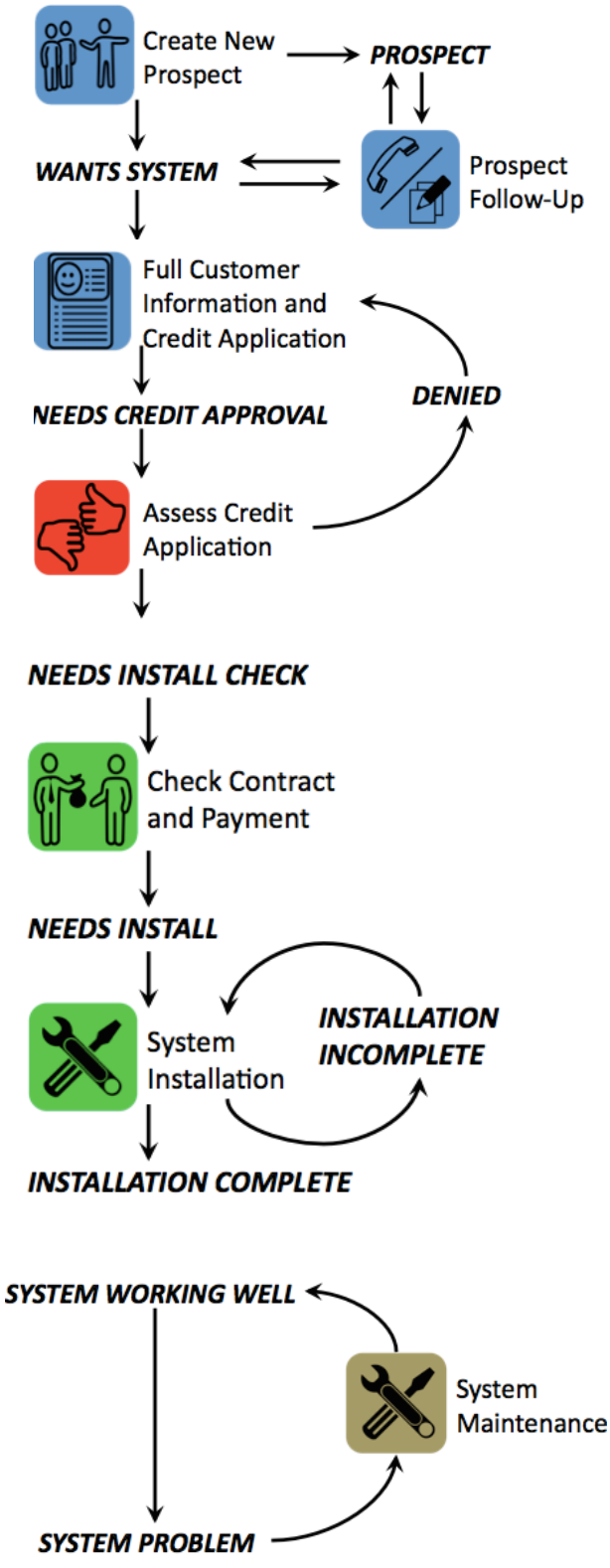
- **We are building scalable and reliable service operations.** Every installation is geo-tagged, and pictures of every customer and their home are taken and stored on our servers along with their demographic and credit assessment information. This data will become invaluable as we continue to provide after-sales service and sell other products and services at scale. Please see Figures 1 and 2 for a compilation of these pictures from our database.

See Figure 1 on the next page for further details on how our cloud-based operations system works.

Figure 1. Summary of EGG operations enabled by CommCare

1. Sales: Demographic information on prospective customers is recorded either on a phone by our field sales team (to be uploaded once they have internet and/or 3G) or on the computer by the call centre. The call centre will then follow up with the customer.

2. Credit Assessment: A field-based staff member fills out a credit assessment form, which includes a photo of the prospective customer's ID. Our credit manager then reviews the application, either approving or denying the customer for a loan-based (PAYG) system.

3. System Installation: A field-based staff member gets the customer's contract in order and ensures the customer sends in a down payment via mobile money. Once that is received, our technicians come to install the solar home system in the customer's home or business. They tag the GPS coordinates and take numerous pictures of the building and system.

4. After Sales Support: All customer complaints (phoned into the call centre) are recorded on CommCare, as well. Our technicians then record all maintenance visits, detailing the problem and solution. Systems are flagged for follow-up until a maintenance report has been filed to indicate that the problem has been solved.