SYSTEMS CHANGE CASE STUDY

SUSTAINABLE ENERGY IN TANZANIA | DECEMBER 2020

Igniting markets for solar energy in Tanzania

An innovative financial mechanism was used to trigger solar market development in remote, underserved parts of the country. Under the SNV project "Results-based Financing for Off-grid Solar Market Development in Tanzania", a results-based financing (RBF) fund offers temporary financial incentives to selected suppliers and their retailers for verified sales of small-scale solar energy systems to rural and off-grid households. The financial incentive consists of non-reimbursable grants to cover part of the initial investment needed for companies to start engaging in these challenging markets.

The payment of the incentives is based upon results, while the companies pre-finance their activities. As the market develops and economies of scale are achieved, the incentives are gradually terminated. Between 2014 and the end of 2018, the RBF fund has leveraged € 13M of private investments which created 1,256 jobs and access to energy products and services for 390,000 people who did not have such access before. The RBF fund will continue until 2020, but many of the companies participating have already expanded to other parts of Tanzania and beyond. The model is also being replicated for other energy products and services in Tanzania, and in neighbouring countries.

Context: the energy access gap

Worldwide, 840 million people live without access to electricity. Meeting Sustainable Development Goal 7 – access to affordable, reliable, sustainable and modern energy for all – is therefore a long way off in many parts of the world. Tanzania is no exception to this. By 2016, only 33% of Tanzanians were connected to electricity, and in rural areas, this figure was as low as 17%. While national government efforts are ongoing to reach country-wide electrification, large parts of the country will likely remain off-grid for the foreseeable future. Providing a clean energy supply to those in hard-to-reach rural areas

requires innovative solutions. Private sector involvement can play an important role in this, but many companies consider supplying energy to poor rural households as high risk and are reluctant to invest.

SNV engagement

Market research carried out by SNV in the Lake Zone of Tanzania in 2011-12 showed a particularly strong demand for solar systems. While more than 40% of rural households indicated solar is their preferred energy option, only 3.5% of the households had access to solar energy products.[1]

In response to this demand, and lack of supply, SNV worked in collaboration with the Energising Development (EnDev) initiative managed by GIZ and funded by the UK Foreign, Commonwealth and Development Office (FCDO) to stimulate a market for household-level solar technologies in rural areas of Tanzania's Lake Zone and Central Zone. Phase I ran from 2014 until December 2018, followed by Phase II which will end in 2020. Results described in this case study reflect the first phase of the project.

Figure 1: Key energy access data for the Lake Zone and Central Zone of Tanzania (2012)

75%	rural population
18%	electrification rate (Nat'l)
6%	rural electrification
3.5%	solar ownership (Lake Zone)

Table 1: EnDev Tanzania solar RBF overview

Lead	SNV
Partners	Tanzania Investment Development Bank (TIB)
Time frame	2014-2018
Budget	€ 3.4 million
Project area	Lake and Central Zone Tanzania
Funding by	FCDO
Components	Access to energy, innovative finance, value chain development

The programme's objective was to improve market access to and use of quality pico solar devices for rural and off-grid households. Employing the use of efficient LED lighting and compact solar photovoltaic panels, pico-solar products can power a wide range of small and portable applications with just a few watts of electricity. Pico solar systems are much smaller and cheaper than traditional solar systems. Although small, they have the potential to provide electrical power for family lighting needs, provide ample charging to low-power devices such as cell phones and tablets and operate radios, TVs and productive appliances. The project focused on four categories of solar packages. These packages ranged from € 7 to € 800 in price and catered for a variety of household needs, as shown in Figure 2.

Systems change approach and results

Leveraging private sector investment through results-based financing

Central to the programme was a an RBF fund, focused on the application of a temporary financial product in mainstream banking to assist the private sector in developing the market for pico-solar products in isolated rural areas. TIB Development Bank (TIB) was selected to host the RBF fund. Through this, upon verification of valid sales activity, TIB provided quarterly financial incentive payments in the form of non-obligated direct cash

[1] SNV, 2012. Synthesis Report of Renewable Energy Consumer, Enterprise and Enabling Environment Dynamics in Tanzania's Lake Zone.

Figure 2: Different types of solar power packages supported by the RBF facility

Type	Cost and characteristics	Product examples
Basic task light	Typical cost € 14 (Price range € 7-€ 20) Generally produce less than 2 watts of electricity sufficient for 4-6 hours of light with 25-90 lumen output that generally (on a single full day charge) exceeds a kerosene lantern.	
Light with charging service	Typical cost € 35 (Price range € 20-€ 50) Produce around 5 watts of energy with enough light for 5-7 hours of lighting at 100-200 lumens per day with enough energy remaining to fully charge 1-2 cell phones per day.	
Small/multi-room light kits	Typical cost € 100 (Price range € 50-€ 200) Generally produce less than 10 watts of electricity with light of +200 lumens sufficient for a minimum of 2 rooms for 6-8 hours on a single day's charge along with small electronic and charging.	
Small solar home systems (plug and play)	Typical cost € 500 (Price range € 200-€ 800) In addition to appliances (Fans, radios, TVs) they typically provide 8-16 hours of daily lighting at 300-500 lumens. The use of pay-as-you-go (PAYGO) technology enables consumers to pay for a product in small increments over time via mobile phone has made these systems increasingly affordable.	 

transfers to energy companies for development of the solar supply chain in the targeted markets. The fund avails the financial incentives to private sector suppliers that meet the Lighting Africa quality standards[2] for solar products. The incentives are time bound in value (decreasing annually in value per unit) and performance-based. TIB only pays incentives for products to companies after independent third parties physically verify that the reported sales are valid.

SNV designed the RBF Fund and coordinated its implementation. The fund is operated in a fair and transparent way with all transactions

[2] In order to protect consumers from poor-quality products and to promote consumer confidence, the World Bank's Lighting Africa programme developed a series of Quality Standards and testing methods for stand-alone solar systems, which are commonly accepted in the industry and have been adopted by SNV. See https://www.lightingglobal.org/quality-assurance-program/

easily verifiable. By the end of 2018, 11 solar suppliers and their retailers had received nearly € 1.9 million in financial incentives, funded by FCDO. This was complemented by an additional € 13 million investment by those companies (the project achieved a 1:7 investment leverage ratio). Collaboration between the RBF fund and providers of commercial finance, such as SunFunder, one of the leading players in off-grid solar debt financing, further facilitated access to commercial loans for pico solar suppliers. Backed by RBF contracts, some local solar companies managed to access commercial loans for the first time, ranging from US$ 50,000 to US$ 100,000, initially. As the solar companies managed to grow their business, they got access to larger finance tickets of USD 1-5 million and even above.

Kickstarting the market for pico solar products for hard-to-reach households

Once the RBF fund was established, SNV brokered relations between the TIB as manager of the fund and energy companies. SNV also built the capacities of the companies to access the fund and provided them with market intelligence. This market intelligence was real time as it was based upon regular reporting and verification of the companies' activities. SNV also provided support in the development of business models in view of achieving economies of scale and a long-term engagement in the sector.

The RBF incentives provided to solar companies acted as a guarantee for SunFunder to include local companies in our loan portfolio, helping them expand their activities and, ultimately, the number of people who gained improved energy access. Some of these companies have now emerged as leading players in the solar industry in East Africa.

Audrey Desiderato, Co-founder & COO, SunFunder

The RBF approach reduced market barriers and market entry costs for suppliers of pico solar products and services. This increased their willingness to invest in remote regions of the project area. Their new presence introduced a whole new market dynamic in those regions. It enhanced the quality of solar energy access, led to more product diversity in local markets – especially regarding larger solar home systems – and has improved the market position of quality-certified products[3]. Today, 36 new pico solar products are available on the market. New products include high-powered solar home systems with radio, TV and productive appliances offering income generation opportunities. These systems have gradually been replacing more basic products such as picoPV task light.

The SNV programme has boosted the solar industry in Tanzania, and companies specialising in pico solar and solar home systems in particular. By end 2018, the solar companies installed more than 79,000 small-scale systems in Tanzania's Lake Zone and Central Zone, providing over 390,000 people with access to a clean energy supply. Those consumers invested over € 20 million (product value). Independent impact evaluation and sector stakeholder analysis have indicated that companies have strongly contributed to raising solar energy access rates among rural households in the Lake and Central Zones to some of highest in the country: from

Elizabeth Mukwimba, shows her solar system (Russell Watkins, DFID)

[3] Particip, 2018. Impact Study RBF for Rural Market Development of PicoPV Solar in Tanzania. Evaluation of the Results-Based Financing for Low Carbon Energy Access Facility (RBFF) within Energising Development (EnDev). Final Report.

an estimated 3.5% in 2012 to official national figures indicating 9% small solar home systems (REA-NBS, 2017). After a few years, solar power became the dominant electricity source in rural areas, with 64.8% of the rural households using electricity generated from solar power[4].) Some of the sub-zonal markets indicate upwards of 90% household ownership of at least entry level solar lanterns.

The increased access to solar energy products has resulted in many social and economic benefits. It resulted in cost savings, since electric lighting and charging are cheaper compared to, for example, kerosene or charging at a kiosk. Electric lighting also facilitates children to study after dark and businesses to be open at night. Such benefits create multiplier effects on the economic activity in these rural areas.

The programme also resulted in new employment. The RBF Fund has contributed to the creation of 1,256 new jobs in the solar energy sector of which 938 for retailers and agents selling pico solar products, and 318 for staff directly employed by the solar companies. For the large majority of retailers, solar business has become their main activity and income source.

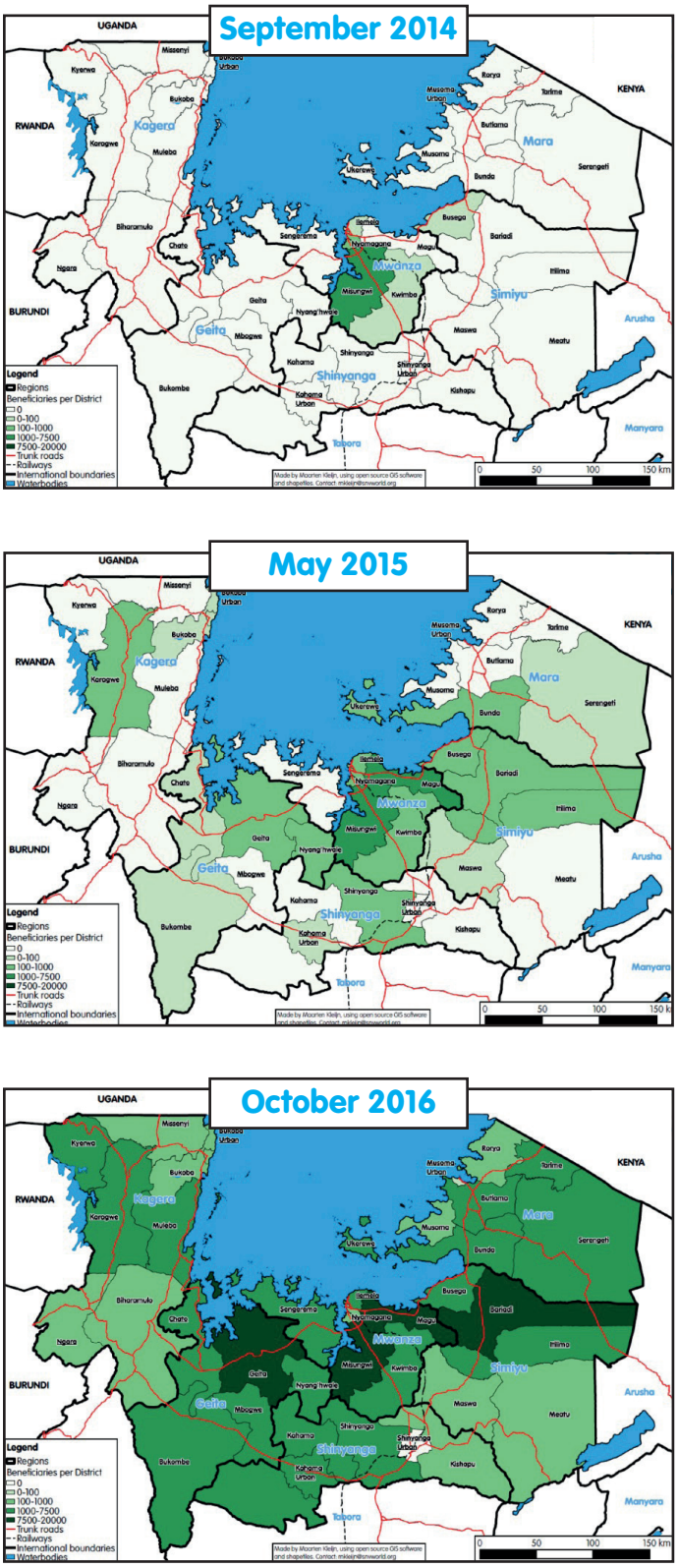
The programme has contributed to a market which continues to expand, even beyond the lifetime of the RFB fund. This is partly by design. The RBF fund is temporary and the financial incentives decrease on an annual basis. This pushes companies to become commercially viable without subsidies. Evidence so far has shown that 3 out of 4 solar companies participating in the fund are able to sustain operations without RBF support and even expand their business within and beyond the Lake Zone and Central Zone.

Scaling up results-based financing

With the success of the solar RBF facility in Tanzania, the project went beyond its original scope: DFID originally allocated € 1 million of RBF incentives in the Lake Zone and decided to scale this up during operation to € 2.2 million in the Lake Zone and the Central Zone. During Phase II (2019-2020), another € 1.5 million is invested to incentivise solar energy markets in the most remote and vulnerable interior markets that have so far remained out of reach. This brings the total

Figure 3: Impact at scale

Maps showing the evolution of verified sales of pico-solar systems as incentivised by the RBF fund in Tanzania. With virtually no presence of solar companies around Lake Victoria when the programme started in May 2014, sales took place within all regions of the Lake Zone within 3 years (covering 57 districts).



[4] REA-NBS, 2017. Energy Access Situation Report. Rural Energy Agency & National Bureau of Statistics.

The RBF incentives assisted to leverage commercial debt finance and contributed to commercial viability of GCS' operations in Tanzania. The RBF programme accelerated GCS' movement across Tanzania. Seeing their success, GreenLight Planet merged with GCS to establish 26 shops across Tanzania, hire over 100 staff, train over 1,000 sales agents, and sell an additional 25,000 solar systems to rural off-grid communities in Tanzania in the past 12 months alone.

Jodie Wu, VP of New Products, GreenLight Planet (quote from June 2018)

Women examine the pico solar systems on display (Russell Watkins, DFID)

RBF fund size to € 3.7 million. The additional investment is estimated to lead to another 50,000 solar systems installed, on top of the achieved 79,000. This will provide an additional 260,000 rural people with access to clean energy while fostering 170 new jobs.

In Phase II (2019-2020) of the programme, FCDO decided to support scaling of the RBF fund with a limited geographical focus to densify the commercial market presence of solar services and products in the most challenging and remote interior areas of the Lake and Central zone regions. To steer companies to those underserved markets that need it most, SNV developed a Vulnerability Access Index (VAI). Based on publicly available data, the VAI ranks and scores regions on socio-economic risk factors and infrastructural conditions. This serves as a basis to establish a geographic differentiation in incentive levels, stimulating business to engage in more challenging markets – and to determine how to phase out RBF incentives over time.

There are multiple examples of scaling and replication. Inspired by the successful collaboration in Tanzania, SunFunder recently worked together with SNV to develop a blended finance instrument, which will provide a combination of debt and RBF financing to assist companies in scaling operations to underserved counties in Kenya. Building on the success of the SNV-managed pico-solar RBF facility in Tanzania, UK Aid and SIDA developed an RBF facility for mini-grids in Tanzania, which was implemented through Tanzania's Rural Energy Agency (REA). SNV was approached to support the design of similar off-grid energy RBF facilities in other countries, particularly in World Bank-supported programmes, and provided inputs and feedback in the design of similar initiatives of different donors and development partners.

Conclusions and lessons learned

This case study described how RBF contributed to kickstarting the off-grid solar sector in Tanzania by levering finance. The key results can be captured by the following four parameters for success (see Figure 4).

The programme enhanced the quality of solar energy access, led to more product diversity in local markets – especially regarding larger solar home systems – and has improved the market position of quality-certified products. Between 2014 and the end of 2018, the RBF fund has leveraged € 13 million of private investments which created 1,256 jobs and facilitated access to energy products and services for 390,000 people who did not have such access before. The RBF fund will continue till 2020, but many of the companies participating have already expanded to other parts of Tanzania and beyond. The model is also being replicated for other energy products and services in Tanzania, and in neighbouring countries.

Figure 4: Tanzania solar RBF contributions to systems change

Contributions to development goals

Major (financial, quality and business model) contributions to the kick-starting of a solar energy product market in the Lake Zone and Central Zone of Tanzania, which continues to spread to the rest of Tanzania and provide an increasing number of people with the benefits of access to energy, as exemplified by:

- The private sector market serving remote and rural households where previously there was no service
- Multiplier economic and social benefits of having light after dark such as improved business operations, education, health and safety and reduced fossil fuel use
- Crowding in of new companies creating a competitive market and additional employment

Leveraging structural finance

- Local solar companies with first time access to commercial loans
- A 1:7 commercial finance leverage was achieved (1.9 million vs. 13 million euro)
- Consumers invested over EUR 20 million (product value)
- DFID scaled up the RBF Fund two times (EUR 1 million > 2.2million > 3.7million)

Institutional embedding

- Tanzania's Rural Energy Agency (REA) adopted the RBF approach for private sector delivery and operation of mini-grids, co-funded by SIDA and DFID
- The Tanzania solar RBF served as an inspiration with replication in similar initiatives in Kenya, Malawi, Mozambique, Zambia and several West-African countries.

Kickstarting or transforming markets

- 11 solar companies entered the remote and rural markets of the Lake Zone and Central Zone. Companies show commercial viability and growth
- 36 different pico-solar products were introduced in the targeted regions
- 1,256 new were jobs created, of which 866 full-time
- Solar power has become the dominant electricity source, with 64.8% of the rural households using electricity generated from solar power

Shifting values, norms and mind sets

- Private sector players in the solar sector in Tanzania now consider remote and rural markets as a viable business opportunity
- RBF is increasingly the new norm for donors, private and financial sector to promote off grid energy solutions in Tanzania (and elsewhere)

The Tanzania RBF Fund also harvested lessons on pursuing systems change. Evidence shows that RBF can be a useful tool to de-risk private sector engagement and scale into new markets, thereby increasing access to clean energy in off-grid communities. The starting point in any RBF design should be a detailed understanding of the market context. This to define if and how RBF incentives can make a difference by reducing certain market barriers in a manner that sets companies on a path towards commercial viability. RBF funds should be designed with a clear exit strategy in mind, for example, by gradually decreasing incentives over time. As market dynamics vary between regions and change over time, RBF instruments need to be able to respond to this. Their design and operations need to accommodate the private sector needs (e.g. quick payment terms and clear operating procedures) and be accessible to different types of companies (e.g. local and international, new ventures or established operators) to ensure a level playing field.

It has become apparent that successful RBF facilities don't work in isolation and require close collaboration with multiple stakeholders in both the energy and financial services sectors. RBF will only be successful in markets where certain pre-conditions are in place, in terms of the enabling environment conditions (e.g. regulatory frameworks, tax regimes, consumer awareness, mobile money access, etc), as well as private sector capacity and availability of pre-financing mechanisms. In most markets, part of these conditions will be missing or deficient, and hence complementary support –and partnerships are needed to create them.

This incentive is exactly the kind of support we need to rapidly expand energy access to the customers who need it most. We believe it is an ideal model because it accelerates the market without distorting it. The RBF facility played a critical role in scaling up Zola's operations to include remote parts of Tanzania. We have significantly expanded our market access as a result. We now have more than 150,000 customers and operations in Rwanda, Côte d'Ivoire and Ghana.

Xavier Helgesen, CEO, Zola Electric (formerly known as Off Grid Electric)

SNV

SNV "Igniting markets for solar energy in Tanzania", *Systems change case study*, The Hague, SNV, 2020

SNV

SNV Netherlands Development Organisation is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. We focus on three sectors and have a long-term, local presence in over 25 countries in Asia, Africa and Latin America. Our team of more than 1,300 staff is the backbone of SNV.

Systems change

SNV projects directly benefit millions of people. At the same time, our projects also drive systems change – strengthening institutions and kick-starting markets to help many more people work their way out of poverty, well beyond the scope of projects.

In this series, SNV documents and explores lessons on the way it achieves systems change, with special attention to four key parameters of success:

- leveraging finance,
- kick-starting/shifting markets,
- adoption of improved approaches by government and others,
- shifting values, norms and mind sets.

The growing number of case studies will cover a variety of geographic contexts, (sub-) sectors and development challenges.

Cover photo

Solar Entrepreneurs in Tanzania display their solar products (Russell Watkins, DFID)

For more information

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