

# BIF2: Facilitating Systemic Change in the Malawi Pico Solar Products Market



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# Business Innovation Facility



The DfID funded Business Innovation Facility, known as BIF2, aims to achieve poverty reduction by providing consultancy support to the private sector. BIF2 will work with companies to grow inclusive business models and tackle constraints that affect the whole market. The programme will operate for four to five years, initially in the selected markets of Pico Solar Products (PSP), Pigeon Peas (PP) and Rice in Malawi. The three markets were selected based upon their potential to grow, relevance to the poor, and where BIF2 could have the biggest impact. This document summarises the BIF2 Malawi Pico Solar Product Market Analysis and Strategy. Its aim is to inform interested parties of the activities that BIF2 aims to support, primarily through technical assistance to private sector. The document outlines the current status of the Pico Solar Products market in Malawi, it identifies the fundamental constraints to market development and proposes a series of interventions that will promote change to the market.

## Pico Solar Products Market in Malawi

PSPs are defined as low-cost solar products that provide basic lighting, mobile phone charging and communication services. These products have been selected for BIF2 support because of the potential market (13.6 million people live off-grid in Malawi), and the affordability and accessibility for low-income households. The health, education and economic benefits to users are a primary objective of BIF2 engagement. Other available options – such as solar household systems (SHSs) and mini-grids – were also considered however the PSP market exhibited greater feasibility in terms of private sector activity and alignment with existing government / donor programmes. In the medium to long term SHSs for homes where there is no access to grid provision is a valid aspiration. Manufacturers and distributors cite the concept of the ‘energy ladder’, whereby in the long-term users progress from cheaper products to more expensive and highly functional products. However, until then, PSPs offer improved energy access for non-electrified households in the short to medium term.

The BIF2 focus is therefore on products that are potentially affordable to low income households, starting with the lowest price products with basic functionality (a single lamp and / or phone charging capability) currently selling at \$10 and up to approximately \$30. PSPs are the lowest priced solar goods on the market and there are now more than 30 companies providing quality-assured products to Africa. PSPs come in many forms, but each has three key components:

- A small solar panel (<5Wp);
- A rechargeable battery;
- An LED (light emitting diode) bulb

The batteries and solar panel may be built into the lamp, or components can be separate modules that are easily connected to each other using the ‘do-it-yourself’ plug-and-play technology, for example Barefoot Power’s Powapack Junior model (see Figure 1). During the day, the solar panel is placed directly facing the sun to generate electricity to charge the battery. Once the battery is charged, it can power the PSP at the time the consumer wants to use it.

Additional features of modern solar products that are popular with consumers include mobile phone charging kits that enable consumers to connect and charge their phones directly from the solar panel, or from the lighting product’s battery.

PSPs are also a first step for the poor away from kerosene (fossil fuel), which has suffered from unstable and generally increasing prices and other non-renewable sources, such as candles and batteries. PSPs are important for environmental sustainability and reducing vulnerability of the poor to volatile prices. Technological advances bringing increased quality and lower prices, coupled with business innovation around distribution models, have enabled a boom in the PSP industry, and enabled access to low cost improved quality of lighting and cell-phone charging services for millions of the poor. There was a 300% annual growth in sales of quality-assured solar lighting products across Africa in the period 2009-2012.

Recent and comprehensive sales data for PSPs is not routinely compiled and available for Malawi. Based on company reports and interviews with market actors, it is estimated that around 106,000 products have been sold in Malawi to date at a market value of \$3 million; the vast majority of these sales have been in the last three years. With 49% of the population earning less than MK 10,000 per month (~\$25), it is clear that only the cheaper products have potential for volume sales. Therefore, it is the market for PSPs priced below \$30 (Tier 1 products and a few from Tier 2 of

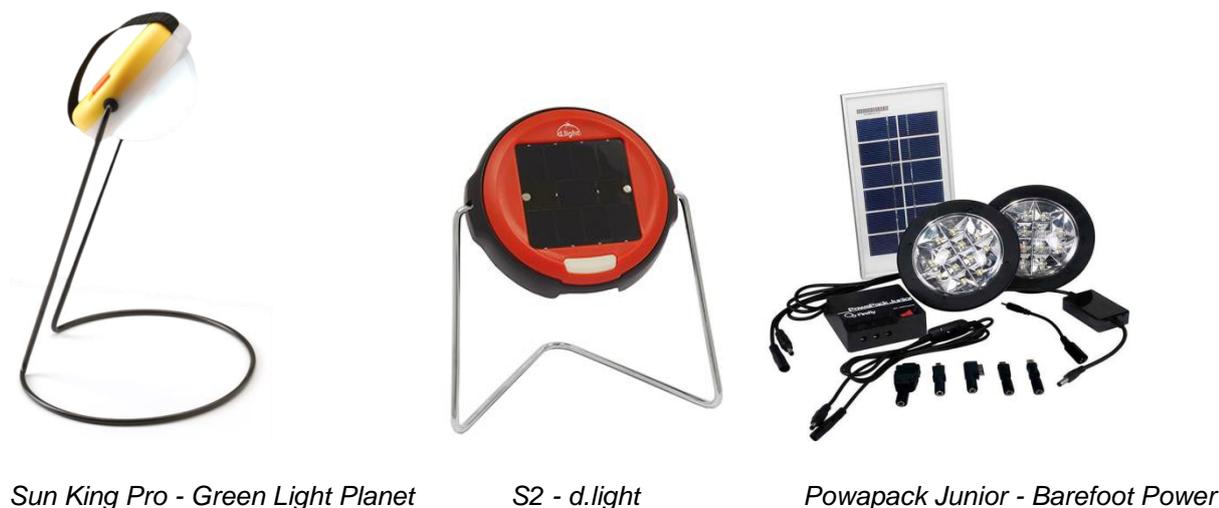
Table 1) that are the focus of BIF2's attention.

**Table 1: PSP Products in Malawi**

Product Manufacturer	Models sold in Malawi	Functionality				Average cost (\$), 2014 prices	Estimated number of products sold*
		Single light	Multiple light	Phone charge	Radio		
<b>Tier 1 (Basic Functionality)</b>							
d.light	S2	X				10	<45,000
Solarway	Sunstom solar charger			X		15	7,111
Nightlight	Solar Candle	X				20	800
Solarway	Everlight	X				24	1,376
Fosera	BOP 50	X				29	<1,000
<b>Tier 2 (Advanced Functionality)</b>							
Solarway	Dual Power Stix Candle		X			36	993
Solarway	Everlight with Phone Charging	X		X		22	7,423
Barefoot Power	Firefly	X		X		29	<5,000
Solarway	Power Stix Candles with Phone Charging		X	X		27	7,296
Voltaics	-	X		X		44	200
Greenlight Planet	Sun King Pro	X		X		50	<3,000
Solarway	G2 lantern		X	X	X	53	18,202
Fosera	Scandle 200		X	X		71	<1,000
Solarway	Multi-charging station		X	X			57
Barefoot Power	Powapack Junior		X	X		86	<3,000
Su-kam	HLS 1210		X	X		100	500
Barefoot Power	Powapack Senior		X	X	X	130	<3,000
Fosera	PSHS 7000		X	X	X	179	<1,000
Azuri	Indigo		X	X		10 (one-off fee)	Small number
Niwa	Multi 300		X	X		Unknown	Not yet being sold
<b>Total</b>	<b>16 products</b>	<b>8</b>	<b>9</b>	<b>13</b>	<b>3</b>	<b>Average</b>	<b>&lt;106,000</b>

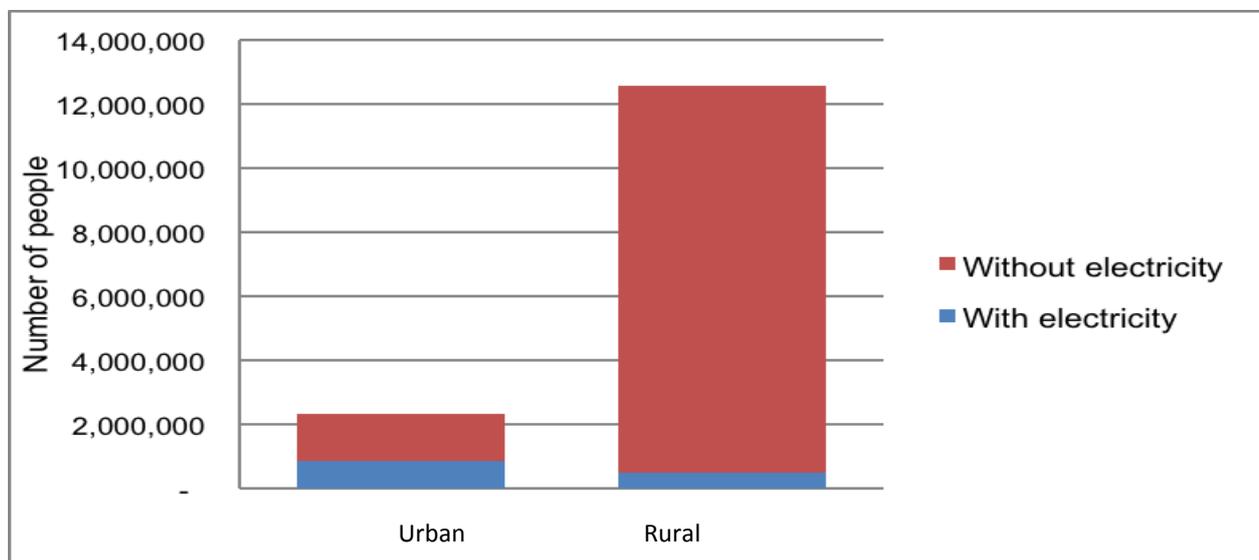
Sources: \*Sales data to March 2014 is estimated based upon company reports, interview data and estimates.

**Figure 1: Three Common Models of PSP Available in Malawi**



Increasing the uptake of PSPs is particularly relevant for Malawi, since current access to grid electricity is extremely low and will remain very low for rural households in the medium term. Approximately 25% of urban households, but only 1% of rural households have access to grid electricity supply. According to OBIN (2014) there are 13.6 million people without access to grid electricity in Malawi, resulting in it being ranked 13<sup>th</sup> out of 42 African countries in terms of off-grid market size. This represents a substantial off-grid market for the private sector, despite Malawi’s relatively small population.

**Figure 2: Access to Electricity Supply in Malawi, Rural / Urban Split by Number of People**



Source: NSO (2012)

The total rate of electrification is estimated at 9% (SE4All, 2013). This is partly a function of a dispersed population, which makes the infrastructure costs prohibitive, but also due to limited power generation that has often fallen short of the demand from already connected users. As a result, the lighting and cooking needs of the vast majority of the population are served by traditional, carbon-based sources of energy, such as charcoal and wood for cooking and kerosene, candles and non-rechargeable batteries for lighting.

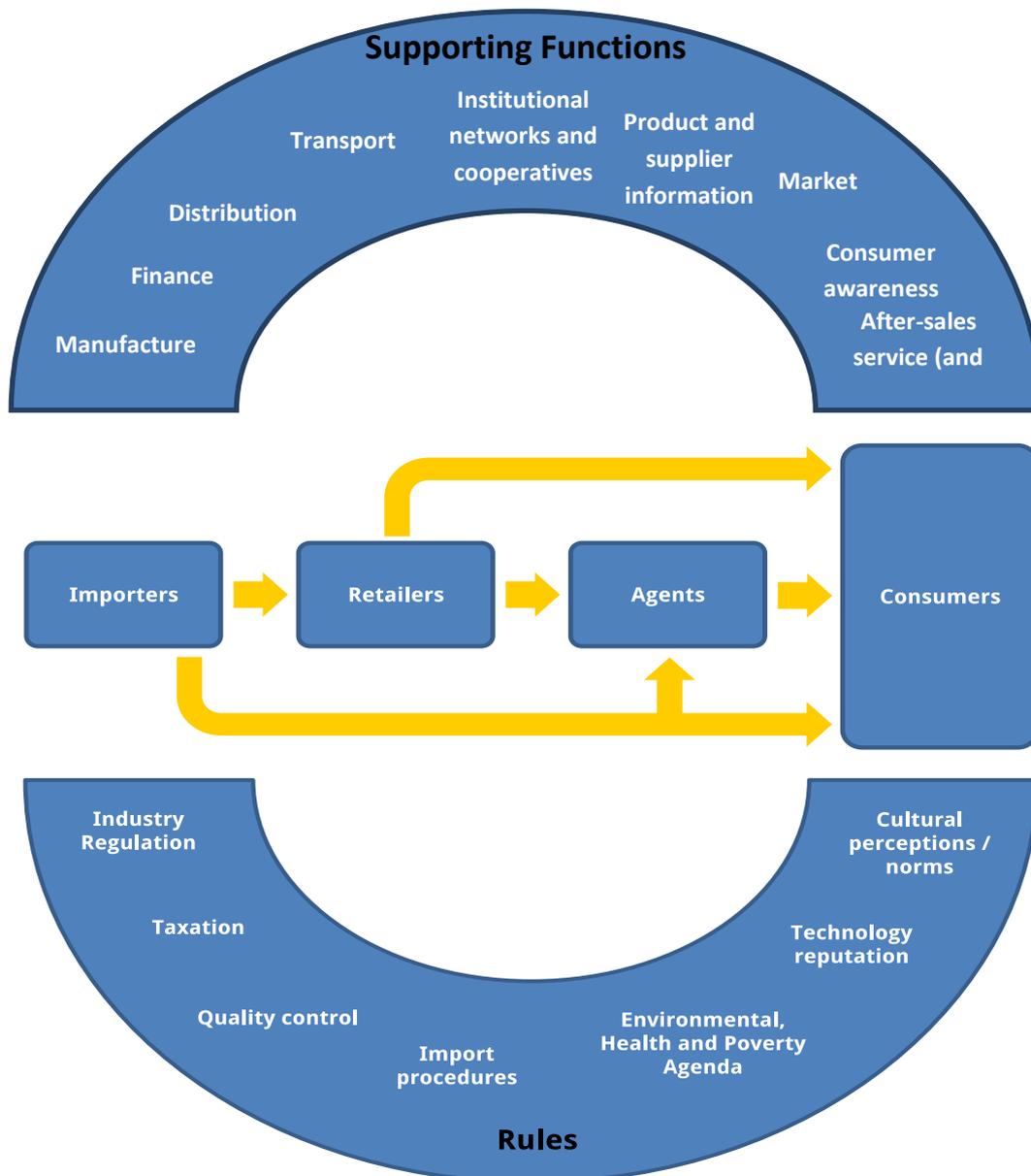
Of the available off grid renewable solutions, including biogas, micro-hydro, and wind turbines, solar technology is the most appropriate for, and developed in, Malawi due to its flexibility, availability of solar energy all year round and its low unit cost compared to other renewable sources.

## Market Structure and Performance

BIF2 embraces 'market systems' theories to identify ways to change markets for the benefit of the poor. Implementing interventions to achieve market system change requires thorough analysis of the market, from the value chain through to the 'functions' and 'rules' that govern it, so as to better identify and select key constraints to tackle. Market systems projects may work with individual organisations to test new ideas, but ultimately these projects are undertaken with the entire market system and all its players in mind. The principle is to replicate successful pilots so that change is embedded throughout the market.

Figure 3 illustrates the pico solar product market system in Malawi; it highlights the core market chain, the supporting functions and the rules. All of these must be present and working to the benefit of an enterprise if it is to develop and be able to form and maintain linkages.

**Figure 3: The Pico Solar Product Market System**



## Core Market Chain

### Importers

Currently there are no players assembling or manufacturing PSPs in Malawi,<sup>1</sup> so importers are responsible for the importation of all PSPs. Whilst solar products do not attract import duty, importers are accountable for the costs associated with freight, clearing agent fees and storage fees. Importers sell direct to consumers, other retailers and through agents.

### Retailers

Retailers reach customers using a number of different retail models, however all must deal with the fact that PSP sales are seasonally linked to harvest periods when cash is available. Models include:

- *Importer Retail Outlets* – Existing importers in Malawi have a limited number of retail outlets located in the main urban centres. These operate as urban flagship stores where technical questions about each solar product can be answered, demonstrations can be made and after-sale support offered. Sales to consumers through this channel are limited, but these act more as wholesale distribution points.
- *Large Retailers* – There are a number of established large retailers with operations that extend into rural areas nationwide that offer opportunities for distributing PSPs. The most extensive of which are agricultural input suppliers and, to a lesser extent, drink distributors and filling stations. Currently no large retailers are importing PSPs and just one partnership exists with a PSP importer.
- *Small Retailers* – A number of importers have established partnerships with retailers operating a single or small number of shops. This enables importers to make their products available more widely, either in other urban areas or new districts.

### Agents

Agents are typically used to reach consumers through two methods. As last-mile entrepreneurs whereby last-mile distribution strategies are designed to simultaneously generate and meet demand in villages beyond the reach of existing commercial networks. This involves one to one selling and in doing so distributors can cover relatively sparsely populated areas with weak transport and communication links. However, last-mile entrepreneurs need training in the products, as well as building their capacity to manage finance, stock and customer relations. Partnerships with NGOs, MFIs, co-operatives and SACCOs can offer access to large numbers of potential last-mile entrepreneurs.

Alternatively, SolarAid / SunnyMoney have pioneered working with head teachers to promote and sell PSPs to the parents of students. The model has been very successful in other countries in East Africa allowing SunnyMoney to become the number one distributor of PSPs in Africa. The vast majority of PSPs sold in Malawi (circa 40,000 units) has been by SolarAid / SunnyMoney, utilising head teachers as community based agents.

### Consumers

PSPs offer consumers good quality lighting and mobile phone charging that is economical, although expensive as a single unit cost for poor consumers. However, the fact that there are few places in rural areas where PSPs can be bought means that often consumers are unaware of the benefits of PSPs, having not heard of them nor experienced them first-hand. Alternatively, they may have had a bad experience with a fake or low-quality solar product in the past, i.e. experiencing 'market spoilage'. Word-of-mouth is considered to be the most effective marketing

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<sup>1</sup> There are no PSPs manufactured in Africa and very few successful examples of assembly on the continent. China remains the prominent source of manufactured goods, providing low-cost and quality items.

tool among such populations, especially if from a neighbour, relative or respected individual in the community.

Large businesses / institutions offer significant one-off sales opportunities that have yet to be fully exploited. Businesses (often agricultural) with many employees (or smallholder farmer networks) living in off-grid areas offer another route to market. By reaching consumers through them, PSP businesses can access a large organised market, potentially selling thousands of units in a single transaction if the large business is persuaded of the benefits of providing PSPs to staff or out-growers. The cost of a PSP can be recouped through monthly salary deductions arrangements for employees if a firm is willing to offer the initial capital for the products.

Sponsors are another way to deal with a lack of capital amongst target consumers. These are relatively wealthy individuals both living in Malawi and the diaspora who give the products to their family or village members living in off-grid areas.

There are a number of businesses that operate in the 'grey market'. The grey market is defined as PSPs that have not met national or international product quality standards. These operate at small scale and are typically not specialist retailers of PSPs, rather selling PSPs alongside a diverse range of other products. Market research was conducted by BIF2 in July 2014 to explore the scale and impact of these PSPs in the market (see BIF2 – A Survey of the Pico Solar Product Grey Market in Malawi, 2014).



Data collected from this study suggests that the grey market is very small compared to the formal market. Although 80% of grey product retailers said sales were increasing and 95% said they that they will continue to invest in PSPs.

Grey products are available across the country in independent general trading and electrical goods shops as well as market stalls in cities and trading centres. 12 different grey PSP models were identified from manufacturers in China, India and South Africa. Findings from this research were disseminated amongst the PSP industry in October 2014 as part of disseminating market information in relation to the PSP market.

## Supporting Functions

### *Product Manufactures*

There are 10 manufacturers supplying the formal PSP market, none of which have a presence in Malawi. More than 80% of PSPs in use in Malawi were manufactured in China, although imports have also arrived from eight other countries in Asia, Africa, Europe and North America.

### *Finance*

Access to finance is a challenge along the value chain for importers, retailers, last-mile entrepreneurs and consumers. Importer-retailers raise funds primarily through private equity or development grants. Domestic investors have not invested in the market; reasons cited include lack of awareness of the market potential and perception of high associated risks. MFIs organise consumer finance through group loans and revolving funds; CUMO Microfinance is one of the largest MFIs in Malawi by number of clients (58,000).

### *Logistics*

Large orders are required to achieve economies of scale. Shipment delivery times are long due to distances involved and delays at



borders – this results in capital being tied up in stock for long durations.

### ***Institutions, Networks and Companies***

Established institutions, networks, cooperatives and companies present trusted channels through which PSP retailers can reach target customers. CONREMA, an industry network, exists to disseminate information regarding the off-grid energy sector and has the potential of informing market intelligence. Currently, there is no industry body representing the views and interests of PSP players

### ***Product and supplier information***

There are a large number and wide range of PSPs on the international market. Awareness of product and supplier information is limited amongst market actors, particularly further down the supply chain.

### ***Market Intelligence***

Market intelligence is only being used by market players to inform decisions on business strategy to a limited extent. There is very limited market intelligence available in the public space, and no organisation is producing it as a public good.

### ***Consumer Awareness***

Brand awareness and the associated benefits of using PSPs is very low. Market players recognise the importance of consumer awareness and many have invested in advertisement and promotion. There have been no public awareness campaigns for PSPs, although there are donor led plans via EnDev and 2020 Climate Group to support public PSP campaigns.

### ***After-Sales Service and Support***

The Malawi Energy Regulatory Authority (MERA), requires all certified solar suppliers to offer consumers at least a 1 year warranty but this is neither widely understood nor upheld. Few retailers offer to repair faults, preferring instead to simply replace items if they are within their warranty period. There are no recycling facilities for PSPs in Malawi

### ***Development Projects Pertinent to the PSP Market***

Development partners are for the first time showing a specific interest in Malawi's PSP market with plans outlined to support public awareness campaigns and to establish an industry body

## **Rules**

### ***Industry Regulation***

Companies importing solar products into Malawi must be registered with MERA, as a licensed supplier / importer. In reality unregistered products are sold in the market.

### ***Quality Control***

Malawi Bureau of Standards (MBS), a statutory organisation tasked with developing, disseminating and implementing standards through inspection and certification services, is responsible for PSP certification and quality control. It is difficult to conclude that adequate enforcement is in effect given that only products registered with MERA are evaluated and that MBS is currently unable to specifically assess PSPs.

### ***Taxation***

To receive zero duty and excise importers must be registered with MERA. 16.5% VAT is applied to the sale of PSPs. An industry body would be needed to lobby government for PSP VAT exemption; a cost-benefit analysis would be a good basis for appeal.

### **Technology Reputation**

The quality of PSPs varies within the market and it is difficult to determine the extent to which poor quality products are having.

### **Advocacy and lobbying**

Currently, there isn't any formalised advocacy and lobbying on behalf of the PSP industry in Malawi.

### **Key Market Constraints**

Less than 2.5% of households own a PSP, based on total estimate sales of 106,000 units to date, and this lack of penetration is the key symptom of a nascent market. Analysis<sup>2</sup> has shown that the lack of PSP sales is a result of three main constraints, namely: **low demand for PSPs**; **poor distribution of PSPs** to low income consumers; and **low volumes of the products available** on the market. These three factors are underpinned by a series of constraints that BIF2 will aim to tackle:

- Consumers perceive PSPs to be expensive
- Consumers cannot afford PSPs
- Consumers are not aware of PSPs
- Consumers lack trust in PSP technology
- There are a low number of formal outlets selling PSPs
- There are a low number of informal PSP sales outlets (agents)
- Some sales channels are not yet being accessed by importers
- Low number of PSP importers
- Importers are constrained by cash flow

As the PSP market in Malawi is only just emerging these constraints pertain to a small number of players, particularly in the core market. The root causes that BIF2 can feasibly address are grouped into three intervention areas with the following objectives:

- To support PSP importers to establish improved distribution and marketing strategies
- To support PSP importer-retailers to establish consumer finance models; explore solutions using both new technologies and partnerships with finance providers
- To demonstrate and communicate the value of the PSP market to multiple stakeholders through the dissemination of market information, facilitation of a business forum and through influencing key stakeholders.

It must be noted that these are the first phase of interventions and following further research additional interventions will be established.



<sup>2</sup> See: BIF2 Malawi Pico-Solar Market - Market Analysis and Strategy (2014)

## **Market Strategies and Interventions**

Key to BIF2's objective is that consumers can realise the benefits of improved performance in the pico solar product market. The strategy to deliver these benefits will be to focus initially on addressing constraining factors in the market where BIF2 can most quickly and easily operate. In addition, opportunities for further interventions that will strengthen and build on the impact of the initial activities, will be explored through further research. Interventions are designed to not only achieve change at the level of individual businesses, but to ensure long term, systemic changes are realised in the market through further dissemination and supporting activities involving other market actors.

### ***1) Improved Marketing and Distribution Strategies***

The intervention will address non-optimal marketing strategies, the lack of effective product promotion and limited supply chains. Two prominent importers are piloting a wide range of distribution channels and spending heavily in marketing; BIF2 support will facilitate learning and analysis, and help provide focus to ensure investment in effective and profitable strategies.

It is expected that a small number of distribution channels and marketing strategies will prove to be superior, and that this innovation and discovery will offer learning for other players in the market. Where necessary the improved strategies will promote new and expanded distribution and marketing partnerships.

### ***2) Consumer Finance***

The intervention will address the identified key constraint: consumers cannot afford the purchase price of PSPs. This is despite poor consumers paying more for poor quality lighting (and phone charging) through small and regular payments according to household cash flows.

Technology developments are expected to play a significant role in these models, with mobile money and pay-as-you-go at the forefront in reducing transaction costs and facilitating consumer credit. Initially, BIF2 is exploring support to one importer-retailer piloting a pay-as-you-go (PAYG) scheme, providing assistance to analyse and refine the business model. The intervention will support another importer-distributor seeking to establish a consumer finance offering in partnership with a number of MFIs. If an efficient consumer finance model can be developed it is expected to be very successful due to the low levels of income; minimising the transaction cost and achieving scale are the key challenges.

### ***3) Market Intelligence and Influencing***

The publication of a market trend report and the facilitation of a business forum / conference will be explored to promote business networking and encourage inward investment from different stakeholders. Whilst continual and ad hoc engagements will seek to influence key supporting functions and rule makers to promote a sustainable commercial PSP industry, for example the establishment of an industry body and the implementation of a public awareness campaign. In such events BIF2 will play a supporting role unless circumstances change and there is reason to believe these partners are not able to deliver the outcomes required. In this instance, BIF2 will re-evaluate the situation and if necessary take a leading role by collaborating directly with appropriate stakeholders.

Under this intervention BIF2's strategy will therefore be to maximise synergy with, and influence the priorities of, other development partners and projects such as SolarAid, Energising Development, USADF, WB, SE4All, CONREMA and the Scottish Government. These partners will be included specifically in exercises to facilitate uptake of BIF2's interventions into the wider market.

An overview of each intervention area and progress to date is detailed in the table on the following pages.

Intervention	Area of Constraint	Intervention Statement	Systemic Change	Activities	Results
Improved marketing and distribution strategies	Poor distribution of PSPs and low volumes of PSPs on the market	To pilot innovative marketing and distribution strategies among PSP importers.	<ol style="list-style-type: none"> <li>1. Novel routes to market are exploited (e.g. collaboration with diverse distributors, new sales channels) to increase the availability of PSPs to low income consumers.</li> <li>2. Importers will better locate and utilise research to understand consumer preferences, identify target groups to whom products may most successfully be sold and build promotional campaigns on this solid foundation.</li> <li>3. PSP Importers make better use of agents as a sales channel.</li> </ol>	<ol style="list-style-type: none"> <li>1. Support to importers to develop innovative relationships and business models to sell greater volumes of PSPs cost effectively.</li> <li>2. Support importers to find new ways of researching consumer needs and sourcing market intelligence in a sustainable way. Assist these importers with innovative promotional approaches that best target their consumer groups.</li> <li>3. Support importers to identify groups of individuals who are best suited to be agents and find novel ways to engage and train these agents.</li> </ol>	<ol style="list-style-type: none"> <li>1. PSPs are more widely available to consumers.</li> <li>2. Importers promote PSPs effectively.</li> <li>3. Importers make best use of agents as a distribution mechanism.</li> </ol>
Consumer Finance	Affordability of PSPs and Low demand for PSPs.	To increase access to credit and / or savings mechanisms to PSP consumers.	Importers access or develop new means to facilitate credit for target consumers. New products are developed by existing MFIs or savings service providers to enable consumers to purchase PSPs.	Identify technological or other methodologies to provide credit and / or savings options to facilitate PSP sales. Work with credit and savings institutions to find innovative ways to assist consumers in paying	Low income consumers can afford to purchase PSPs and there is an increase in demand for the products.

				for PSPs.	
Market Intelligence and Influencing	The PSP industry in Malawi is new and underdeveloped	To provide market intelligence to improve the understanding of market actors and stakeholders, and influence key initiatives supporting PSP market development.	<ol style="list-style-type: none"> <li>1. Raise profile of PSPs amongst key market stakeholders.</li> <li>2. Market players scaling up their operations</li> <li>3. Improved business models</li> </ol>	Communicate and raise the profile of the PSP market to multiple stakeholders through the dissemination of market information and through maintaining influential partnerships will ensure there is greater market competition, transparency and awareness.	<p>Market players and stakeholders have an improved understanding of the market through access to information.</p> <p>Market players and stakeholders have forum to network and share innovations.</p> <p>BIF2 is coordinated and harmonised with other key PSP market development initiatives.</p>

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NOVEMBER 2014



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