

Mapping the Supply Chain for Solar Lighting Products in Burkina Faso

Final Report

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The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the view of the Lighting Africa Program, its affiliated organizations, or the governments they represent.

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List of Abbreviations

Corporate Social Responsibility.....	CSR
Companie Sahélienne de Transport et de Représentation	CSTR
Entrepreneurs du Monde.....	EdM
Franc Communauté Financière Africaine.....	FCFA
Intermediary Means of Transport.....	IMT
Institute for Social and Economic Change	ISEC
Light Emitting Diode	LED
Lighting Africa program	LA
Lumen	Lm
MicroEnergy International.....	MEI
Microfinance Institution.....	MFI
Photovoltaic.....	PV
Small and Medium Enterprises.....	SMEs
Société de Transport Aoréma et Frères.....	STAF
Transport Confort Voyageurs	TCV
Transport Sana Rasmané	TSR
Terms of Reference.....	ToRs
Universal Serial Bus	USB
United States Dollar	USD
Value Added Tax.....	VAT

Executive Summary

This report summarizes the findings of an assessment of supply chains for solar lanterns that have undergone quality testing and met the Lighting Africa (LA) minimum quality standards, and similar products in Burkina Faso. MicroEnergy International, on behalf of the World Bank, authored and undertook this study, of which the **objectives** were to describe and map current supply chains and distribution models for solar lighting products, identify, describe, and map valuable sister supply chains, identify the actors along the supply chains, assess the bottlenecks and main obstacles contributing to the lack of solar lighting products in Burkina Faso that met the LA minimum quality standards, and to formulate recommendations based on the findings.

The applied **methodology** consisted of data collection and analysis in an iterative process. Data collection was done via desk research, field based observations, and expert and stakeholder interviews.

The gathered information was used to identify the following study regions based on a developed set of criteria: Ouagadougou's Periphery, Gourma Department, Yako Department and Dédougou Department.

Potential sister supply chains were identified based on inventories of products distributed by last mile retailers in a peri-urban region (Ouagadougou), in a small town (Dédougou) and in a remote village (Karo in the department of Dédougou), according to a ratio of the weight and volume of the products in relation to their final price. The identified products were cigarettes, neon tube lamps, and battery-operated lamps.

The supply chains for solar lighting products and for sister supply chains were analyzed and mapped following a bottom-up approach, beginning the analysis at the end of the supply chain. Starting with the last-mile retailers and working backward to analyze the different distributors, wholesalers or manufacturers, each step needed to deliver the product and the service to end users was investigated. Main actors involved in the delivery and transportation processes were identified and key characteristics were highlighted.

As the results of this study show, the market for solar lighting products is still in the early stages in the country, with only a few actors actively selling solar lamps.

CB Energie is the only solar lamp producer in Burkina Faso. The company produces solar lanterns using imported components in Dédougou (Western Burkina Faso). The French oil company TOTAL officially entered the Burkinabé solar lamp market in January 2013, selling solar lamps that have undergone quality testing and met the LA minimum quality standards through the company's 80 gas stations across the country, as well as through established partnerships (e.g. with the company Nafa Naana). Created in 2012, the Burkinabé company Nafa Naana sells energy efficient and renewable energy products, such as the solar lamps from TOTAL and CB Energie through two shops (in Ouagadougou and Dano) and a network of shop retailers, in addition to partnerships with community groups.

Solar lamp retail is also part of the activities of other renewable energy SMEs, though not representing a significant part of their business, with less than 500 lamps sold by such a company per year. Beyond these market-based approaches, the Burkinabé Ministry of Basic Education and Alphabetization is developing two programs to distribute free lamps to pupils in collaboration with a Taiwanese company.

Nonetheless, the above-mentioned actors face several bottlenecks in the distribution of their products, with a few of them having already developed successful strategies to overcome these challenges.

Whether transportation costs constitute a bottleneck or not will depend on the ability and willingness to pay for solar products¹, i.e. on the final price at delivery and the proposed financial model. The analysis of transportation costs shows that the volume/weight/price ratio of solar lamps is comparable to the ratios of other goods that are widely distributed through regular channels (cigarettes, battery lamps, etc.). If there is a demand, and if this demand is accompanied by adapted financial services along the supply chain and for the end user, products will reach even the most remote regions of the country.

The following recommendations result from the analysis of bottlenecks and success factors:

- **Translating needs into a demand:** End users and many crucial actors along the supply chain are not yet aware of the opportunity to meet lighting needs with solar lanterns. Accordingly, **awareness-raising** campaigns explaining the principles and the benefits of solar lamps are needed to create demand and market pull.
- **Empowering the demand side through adapted financial services:** Purchasing a solar lantern is a significant investment for the end user, even when margins for retailers and distributors are limited. Accordingly, a financial model is required that meets the end users' ability to pay, while re-enforcing their trust and willingness to pay by sharing the risks of product failure.
- **Trust building for quality products:** Fostering confidence in the longevity of quality products requires smart financial offers with a risk-sharing component. Additionally, the development and the visibility of reverse supply chains plays a crucial role when it comes to the organization of maintenance, repair and overhaul activities as well as for sustainability issues such as the recycling of batteries and other electronic trash.
- **Empowering the supply side through adapted financial services:** Manufacturers, wholesalers and retailers on all levels of the supply chain need adapted financial services. As each of these financial needs are very different, a consortium of financial institutions offering services such as revolving funds and risk capital are required in order to create a smooth push of solar lanterns into the market. Accordingly, awareness-raising activities are also crucial among financing institutions.
- **Build on existing infrastructures and sister supply chains:** The analysis of sister supply chains of the broad dissemination of demanded products such as tea, rice,

¹ Data on ability and willingness to pay for solar lamps were not yet available when this report was produced.

battery powered lamps and cigarettes clearly reveal that building on an existing distribution infrastructure is extremely efficient in terms of country coverage, distribution quantity and transportation cost. Therefore, similar distribution channels for products that have met Lighting Africa's minimum quality standards could be developed in cooperation with major Burkinabe importers and wholesalers that have expressed their interest in selling solar lamps. Most of the current suppliers of solar lamps in Burkina Faso tend to use their own vehicles for the distribution of their products, which is certainly not the most efficient solution, particularly when product sales scale up. Efforts must be made by the solar lamp industry to understand the mechanisms of freight transport in the country and partnerships will need to be developed accordingly.

- **Take local markets into the focus of awareness raising and commercialization activities:** Local markets play a key role in product distribution in remote villages. Therefore, products that have met Lighting Africa's minimum quality standards and awareness raising campaigns could be placed in a systematic and iterative manner at local markets in order to better penetrate rural areas.
- **Harmonization of Corporate Social Responsibility (CSR) and market driven activities:** Current plans for large-scale free distributions of solar lamps in Burkina Faso threaten to distort the market. Therefore, the development of strategies to harmonize these activities is recommended.
- **Adapt packaging to last mile transportation means:** With regard to distribution to the last mile, which is often done with motorcycles and where transportation costs have a major influence on margins, redesigning the packaging of solar lamps that have met LA's minimum quality standards is recommended in order to enable a more volume efficient freight.

1 Introduction

In the last decade, the market for solar lighting products in Africa has witnessed a rapid and positive evolution. Initiatives aimed at disseminating solar lighting products are expanding all over the continent. Among them, the World Bank's Lighting Africa program, which has already reached four million people, aims to provide access to clean lighting to 250 million people by 2030.

The momentum is also growing in Burkina Faso. In 2009, the Taiwanese Development Cooperation launched the "Lighting up Africa" project aimed at distributing solar lamps among schools². On January 1st 2013, Burkina Faso's budget law for 2013 introduced a cut to the import tax as well as a cut of the VAT for the importation and sales of solar energy products (Assemblée National, Burkina Faso, 2012). In terms of international cooperation, the World Bank is currently preparing a USD 50 million Electricity Sector Support Project, aimed at extending the electricity grid. After local consultations, this project has been complemented with a USD 1.5 million Lighting Africa sub-component dedicated specifically to decentralized energy access.

Private actors are also increasing their activities. Among these actors, the Burkinabé Company CB Energie³, founded in 2004, is currently the only company producing solar lamps directly in Burkina Faso, based on components imported from Europe and China and purchased locally. Since 2012, the French oil company TOTAL has used its network of gas stations across the country to sell solar lanterns that have undergone quality testing and met the LA minimum quality standards.⁴

Despite the increase of activities, the emerging market is still in its early stage. While many projects with a pilot character are indeed able to disseminate solar products, only a few are able to bring their activities to a substantial scale and ensure a sustainable market presence of their products. As stated in the Lighting Africa report (Dahlberg & Lighting Africa, 2010), this is due to a series of market development difficulties such as lack of awareness of the benefits of solar lamps, inability to pay (particularly for products of better quality) and challenges related to large scale distribution.

With regard to the first two challenges identified, lack of awareness and inability to pay, major accomplishments have been made in the last years. However, supply chain issues have not yet been prioritized (Russell Storm, 2010) even though, in many instances, they remain a significant barrier to successful market expansion, as many actors still face difficulties when it comes to delivering their products to customers. Distribution, in fact, can account for up to 50% of the final product cost in several geographies⁵ (Russel Storm, 2010), and accordingly, offers an important space for optimization in an extremely price sensitive market. The "last-mile" of the product

² <http://www.chinapost.com.tw/taiwan/foreign-affairs/2010/05/07/255465/President-touts.htm>

<http://www.catholic.org.tw/caritas/english/icdfe.htm>

³ External consultant to MicroEnergy International for this study

⁴ <http://www.total.com/fr/groupe/actualites/actualites-820005.html&idActu=2900>

⁵ Even in industrialized countries, as much as 28% of all transportation costs occur in the "last mile" (Goodman, 2005)

distribution is of particular importance in Burkina Faso and is influenced by a number of different aspects:

- Appropriate **distribution models** are needed in order to interlink the transportation of product hardware with required “soft components”. These soft components consist of, among others, awareness raising campaigns, educational measures, information on quality to price ratio, as well as technical and financial services to the customer.
- The **logistical efforts** needed to bring the product to the customer lead to increasing prices due to high transportation costs because roads and infrastructure at the last mile do not allow for fast movement of large volumes and high weights. This effect is exacerbated if road conditions are bad and seasonally affected, supplier networks are weak or non-existent, institutional capacities are missing, etc.
- The **freight exchange** is no longer executed among businesses with widely standardized processes and harmonized interfaces, but instead happens with an end user who generally needs a customized transfer of hardware and the respective soft components.

Different distribution models such as the distributor – dealer model or the proprietary distribution model have been investigated and identified for different purposes, e.g. from the Lighting Africa initiative (Dahlberg & Lighting Africa, 2010). However, the logistical aspect of the last-mile delivery remains largely unexamined.

This study aims to fill this gap by creating a link between the delivery model perspectives with research on the logistical efforts needed to overcome distribution barriers. By doing so, this study aims to expand the impact of the Lighting Africa program in Burkina Faso. The methodology implemented consists of a close examination of existing supply chains to identify bottlenecks in the delivery of products from a logistical point of view. Furthermore, this study aims to identify current actors in the solar lamp market in Burkina Faso, learn from their experiences and identify other potential actors and intermediaries (so-called “sister supply chains”) who could play a significant role in scaling up the delivery of products that have met LA’s minimum quality standards.

2 Approach

2.1 Definitions

2.1.1 Supply Chains

Within this study, **supply chains** are defined as the flow of materials and hardware products from their source to the end user. The supply chain includes purchasing of raw materials and components, manufacturing, demand planning, warehousing, transportation, after-sales service, logistics and supply chain management.

Figure 1: Solar lamp supply chain in Burkina Faso



Although supply chains for portable solar lighting products are the main focus of this study, additional products will be investigated in order to examine appropriate sister supply chains. **Sister supply chains** are defined as supply chains of products of a similar type (here a consumer product) with a similar price, weight and volume ratio.

2.1.2 Actors

Supply chains consist of two parts: the supply of components to the manufacturer, and distribution of final products to the end user. Since this study focuses on the second part of the supply chain of solar lighting products, only a fraction of the actors relevant for supply chain management are examined by the study. In the framework of this study, the relevant actors are defined as the following:

- **End users** are the ultimate beneficiaries of the product, i.e. the ones for whom the product has been designed. Within this study, end users are defined as low-income households or micro-entrepreneurs located in rural and peri-urban regions.
- The **last-mile retailers** are the final entity in the supply chain; the link between the supply side and the demand side. The last mile retailer sells the product to the end users. Therefore, a local shop owner, an individual street retailer, a retailer at a local market, a farm cooperative, a savings group, etc. can all take on this role. As the study focuses on commercial supply chains, donation based approaches are beyond the scope.
- The **distributors** buy products and store them before reselling them to other distributors, wholesalers, or last-mile retailers. In other words, distributors are intermediaries between suppliers and last-mile retailers. There may be none, one, or several of them along a given supply chain. Depending on the distribution model, distributors include wholesalers, but can also be manufacturers, NGOs or state actors.
- The **suppliers and wholesalers** are actors supplying other actors with goods and products. Within this study, suppliers/wholesalers can be importers or manufacturers. In either case, they are the first actors in contact with the final product within the country. The scope of the study does not cover suppliers providing components of the final product.

2.2 Research objectives and questions

The main objective of this study is to trace supply chains for the products that have met LA's minimum quality standards, other portable lighting products, and comparable consumer goods in Burkina Faso, in order to present the private sector context for Lighting Africa activities in the country. In particular, the study is meant to produce findings directly applicable in practice, by providing concrete recommendations of how to improve the distribution of solar lighting products to low income peri-urban and rural households through market-based approaches and capacity-building activities.

More specifically, the objectives of the research are to:

- Describe and map current supply chains and distribution models for solar lighting products (both those that have undergone quality testing and met LA's minimum quality standards, and those that have not) using a bottom-up approach
- Identify, describe and map valuable sister supply chains
- Identify the actors along the supply chains for solar lighting products and along the sister supply chains
- Assess the bottlenecks and main obstacles contributing to the lack of solar lighting products in Burkina Faso that have undergone quality testing and met LA's minimum quality standards.

- Recommend viable existing and potential supply chains and distribution models for products that have undergone quality testing and met LA’s minimum standards.

The study will identify existing and potential supply chains for solar lighting products with the capacity to significantly scale up the distribution of products in Burkina Faso that have met LA’s minimum quality standards, as well as recommend how the supply chains can be improved through market-development and market-based activities.

Accordingly, the study addresses the following sub questions:

- What are the main supply chains and distribution models for solar lighting products?
- Which sister-supply chains are viable for products that have met LA’s minimum quality standards?
- Which supply chains and distribution models face challenges/constraints and what are these challenges/constraints?
- Which supply chains/distribution models are successful and what are the success factors?
- How can the challenges/constraints of the supply chains be overcome?
- Who are the main actors at all levels of the supply chains and how are they organized? What is/are their current distribution model(s)?
- Which challenges/constraints do these actors face?
- How can the challenges/constraints of these actors be overcome?

2.3 Scope

As previously mentioned, a supply chain can be analyzed in terms of logistical aspects, or in terms of distribution models. The scope of this study requires a focus on the logistical aspects of the supply chain. Nevertheless, the study considers the following different distribution models identified by Lighting Africa (Dahlberg & Lighting Africa, 2010) in order to ensure compatibility with their preliminary work.

Table 1: Definitions of distribution models as identified by Lighting Africa

Distribution model	Definition
Distributor – dealer model	Company sells products through existing networks of generalist or specialist distributors in rural and peri-urban areas. The most common and well-understood model in developing markets, which entails a distribution hierarchy of at least two levels (distributor and dealer/retailer).
Proprietary distribution model	One company moves the product from manufacturer to in-house storage facilities to a salaried sales agent or distributor, who exclusively delivers the company’s products directly to the customer.

Institutional partnership model	The company creates a partnership with relevant institutions (NGOs, MFIs) to distribute the product among the partner's customers or members.
Franchise model	The company offers franchising packages to entrepreneurs.
	In Africa, this model is adapted either as (1) a big franchise, whereby a manufacturer has one or two franchisees in a given country, or (2) a micro-franchise, whereby, micro-entrepreneurs become franchisees.
Rental / leasing systems	The company contracts or franchises micro-entrepreneurs to set up solar-charging kiosks. Either the shop owner rents products to the customer or sells the product without a power source and offers a fixed fee for charging. The company outsources the last mile distribution for faster scale up and reaches customers that cannot afford the full product.

This report will provide narrative and graphic information about a selected number of promising supply chains, from supplier/wholesaler to end user distribution, and identify valuable lessons-learned for the future design of supply chains for solar lighting products that have undergone quality testing and met the LA minimum quality standards.

Beyond the scope of this study are:

- Detailed quantitative data on supply chains
- Urban households
- Supply chains and distribution models based on public institutions
- Supply chains for humanitarian aid and disaster relief

2.4 Methodological approach

This study was based on **data collection** and **data analysis** conducted in an iterative process. Data collection was realized via **desk research, field-based observations and expert and stakeholder interviews**. The information gathered during the first desk review was clustered into categories in relation to the research objectives and the research questions as assigned for this study. According to these parameters, the field investigation was designed and study regions were chosen. Results from the field investigation lead to the identification of potential sister supply chains and a further clarification of field study design. This process was continued throughout the whole assignment: new information from the field was analyzed instantly and then used to redefine the field investigation. The interview approach, which is added in Annex 4, was similarly adapted according to the findings from the field.

Analysis of the collected data involved the following steps:

2.4.1 Identification of study regions

For the selection of the geographical regions for the field investigation, this study developed and evaluated a set of criteria based on desk research, CB Energie's local knowledge, and on

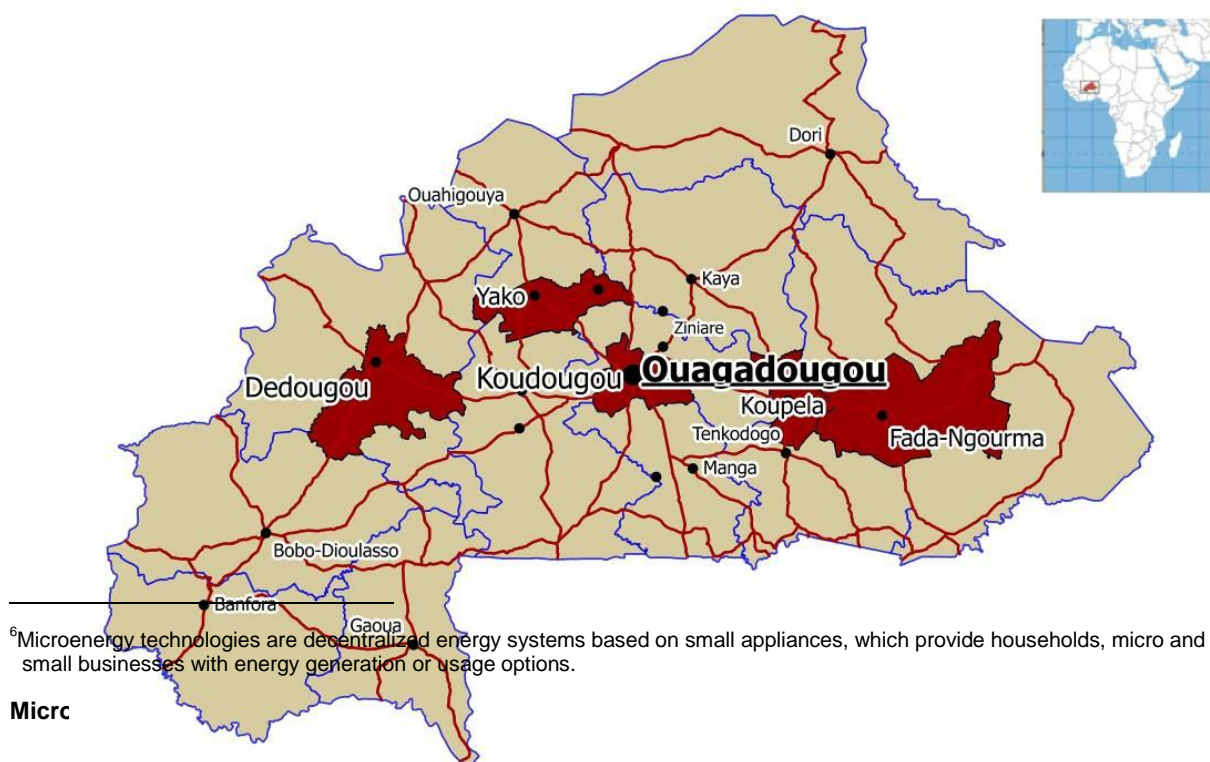
MicroEnergy International's experience with similar projects in the context of microenergy technologies⁶ (see Annex 5). The criteria were chosen in order to ensure that:

- Research in the regions was feasible in terms of security and practicability for the consultants
- Selected regions are diversified in terms of the main driving factors for the demand for solar lighting like grid connection, revenues frequency, peri-urban vs. rural areas, etc.

Based on these criteria, the following regions were chosen (see Figure 2):

- 1) **Ouagadougou's periphery**, the peri-urban area of the capital of Burkina Faso.
- 2) **Gourma Department** (excluding Fada Ngourma), located in eastern Burkina Faso, entails remote rural areas and is not easily accessible by road.
- 3) **Yako Department**, located in north-western Burkina Faso, entails remote rural areas, and is more easily accessible by road than Gourma.
- 4) **Dédougou Department**, located in western Burkina Faso with a mostly rural population and well known to the report's authors.

Figure 2: Selected study regions in Burkina Faso



⁶Microenergy technologies are decentralized energy systems based on small appliances, which provide households, micro and small businesses with energy generation or usage options.

2.4.2 Identification of potential sister supply chains

For the identification of potential sister supply chains, the field research team conducted representative shop inventories of products distributed by last-mile retailers in a peri-urban region (Ouagadougou), in a small town (Dédougou) and in a remote village (Karo in the department of Dédougou).

Shops in regional towns are not considered 'remote' in this study because these regional towns attract sellers and buyers from an entire region. Buyers and sellers come to these regional towns, passing many smaller market towns on the way. In addition, large roads connect these regional wholesale centers. On the other hand, shops or retail spaces in market towns are considered to be the first level of remoteness, because shoppers come from the more immediate region and do not pass other markets to get there – these are the closest markets to the shoppers' homes. Inventories were made in order to identify which products and brands can be found at different levels of remoteness.

Approximately ten of the most available products were classified according to a ratio of weight and volume in relation to final price. The assumption, which was confirmed during the field research, was that the cost of transportation increases with greater weight and/or volume of the transported packages of goods and with the level of remoteness of the transport destination. The aim was to understand required margins for logistics and transportation and frequency of delivery in order to make a comparison possible with portable solar lighting products available in Burkina Faso.

2.4.3 Assessment of the state of the market

The current market situation of portable solar lighting products was revealed based on desk research and on the expert interviews. Research was conducted on products, prices, sales, transportation services, and general conditions of the market.

2.4.4 Supply chain analysis and mapping

When retracing supply chains, it is essential to begin the analysis at the focal point. Each step needed to deliver the product and the service to end-users was investigated, starting with the last-mile retailers and working backward to analyze the different distributors, wholesalers or manufacturers. Once the strategic or process information was gathered, the data was analyzed and visualized in supply chain maps.

2.4.5 Actor analysis and mapping

The study conducted an analysis of crucial actors (from last-mile retailers to distributors and wholesalers) who influence the uptake of goods.

The objective was to gain an in-depth understanding of:

- Key characteristics of involved actors (e.g. size of enterprise, area of operations, product lines carried, price of products, number and type of sales, etc.)
- Perception of opportunities and constraints of involved actors (interest, ability/desire to expand operations)
- Structure of the stakeholder network (e.g. power relations, existing and potential partnerships).

2.4.6 Final analysis of findings

The study analyzed the main highlights and trends from the identified supply chains for solar lighting and comparable consumer products. Based on the findings, market barriers and success factors were identified. Finally, the study drew conclusions on the findings and formulated recommendations on how to address the identified bottlenecks and market barriers with appropriate interventions.

3 State of the market of solar lamps

The market for portable solar lighting products is still in its infancy in Burkina Faso. Prior to January 2013, solar portable lamps were available on a limited basis with only a few importers in the country. Most were not sold directly to the end user, but instead were supplied to the government, international actors or NGOs (with technical requirements specified by way of call for tenders) for projects intended to provide lighting to poor populations or non-electrified areas (i.e. lamps for pupils: see description of the project “Une lampe pour l’Afrique”, in Section 5.6).

CB Energie

CB Energie is the only producer of solar lamps in the country. It has been operating for the last 10 years and aims to provide lighting to a demographic of rural, non-electrified, poor, while fostering the development of new manufacturing activities in the country, and creating technical employment positions in an environment otherwise marked by high unemployment.

The solar portable lamps available prior to January 2013 were more expensive, and not affordable for most of the Burkinabé population. Only a few initiatives from the government and NGOs focused on the supply of these products, using a “charity” approach financed by international donors (not market or profit based but as donations to poor communities).

TOTAL

At the end of January 2013, the French petrol distribution company TOTAL launched a major campaign in Burkina Faso within the frame of its “TOTAL Access to Solar”⁷ program; an initiative aimed at providing access to lighting in different African countries. Since, they have brought lamps that have met LA’s minimum quality standards to the market at a significantly reduced price. This project launch has been accompanied by a large marketing campaign that has increased the awareness of solar lighting products among potential end users and other suppliers /distributors, through its 80 gas stations all over the country.

Additional companies

Indeed, most stakeholders in the sector have notably been focusing on bringing these products to the market in the last few months. However, the availability and diversity of products remains limited. As revealed in the field research, new models will be available by August 2013. There are plans to open a base in Ouagadougou and to distribute the lamps through small and medium enterprises. Bigger companies are also planning to enter the market with their own products.

Most initiatives aimed at distributing solar lamps in Burkina Faso are still very recent or are still in the planning process. Solar lighting products currently available or planned for introduction to the market in Burkina Faso are listed in the table below. The details concerning distribution models and supply chains will be described in the following chapters.

Table 2: List of solar lighting products in Burkina Faso

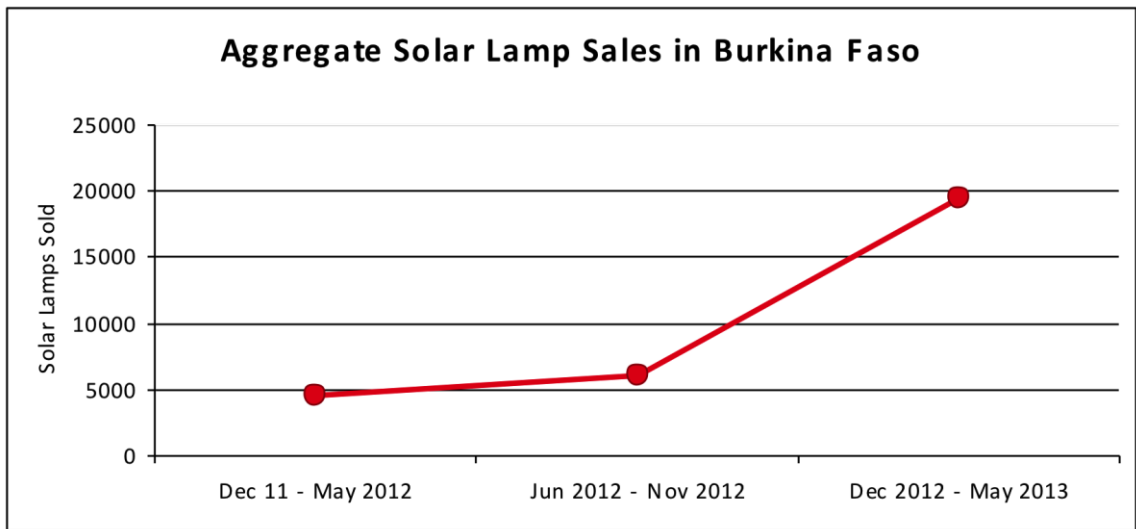
⁷ <http://www.total.com/en/our-challenges/driving-shared-development-/our-actions/access-to-energy-201064.html>

Product	Met LA's minimum quality standards
Fosera Scandle 200	Yes
Sun King, Eco and Solo	Yes
Sunvis Solar: Multifunction solar lighting kit	No
MG photocall	No
MG power	No
Small Lamp CB Yelee	No
Medium Lamp CB Yelee	No
Big Lamp CB Yelee	No
ru-811	No
S10 D.Light	Yes
S250 D.Light	Yes
Barefoot power: Firefly TM Mobile	Yes
Tough stuff	Yes
Sundaya Utlitium	Yes
Sun King	No
SpeedTech Solar Light Bar 20W	No
SpeedTech Mini Solar Light Bar 10W	No
SpeedTech Solar Bank with Lighting 5 W	No
SpeedTech Solar Square with lighting 1,2 W	No

Additional products, mainly imported from China, have been seen in field observations and wholesalers in Ouagadougou also reported that solar lamps manufactured in China are circulating in the markets. However, a few of them were generic products, with no particular brand. The simplest models cost between FCFA 4,500 and FCFA 7,000 (USD 9.15 to USD 14). Arnaud Chabanne, CEO of CB Energie estimates that no more than 5 to 10 containers, i.e. a few thousand of such lamps, could have been imported in the last year. This number might rise however, given the tax cut on solar products, which entered into effect in January 2013.

The following graph indicates the aggregate sales of the products presented in Figure 3 since December 2011.

Figure 3: Solar Lamp Sales in Burkina Faso



The low market penetration of solar lanterns became evident during the field research for this study. Solar lanterns were rarely seen. However, suppliers and wholesalers interviewed by the field research team in Yako and Fada N’Gourma stated that they are interested in solar lamps because of their utility during frequent power cuts and savings over the cost of batteries. Others expressed their interest in solar lamps but showed reluctance to purchase them because they assumed that their usual clients would not be willing to pay for them.

4 Transportation of goods in Burkina Faso

4.1 Transportation means

Transportation services for goods available in Burkina Faso are based on private registered passenger transport companies and individual, often non-regulated (informal) transportation services.

In the last few years, Ouagadougou has seen a significant increase in the number of bus stations and designated departing sites that can be found all around the city. There are approximately ten private transport companies (STAF, TSR, and TCV are among the best known) offering a better quality service and serving a wide range of regional and international destinations. In addition, there are uncountable numbers of individuals that offer transportation services for specific destinations and are easily identifiable by regular users. Registered companies and the informal individual transporters cover the entire country, and provide passenger and goods transportation services. Goods are usually loaded on the roofs of the vehicles.

In addition to formal bus companies, the informal individual transportation system plays an important role in responding to the needs and high mobility of traders, by servicing all possible routes and remote villages. Regions of Burkina Faso that are not covered by the formal companies are covered by informal transportation services. In addition, informal transportation offers flexible and wider timeframes (for example, when a STAF bus leaves at 3:00 PM, informal transport buses offer service for those who arrived late or in cases that tickets for the formal bus service were sold out).

The types of transport means used in Burkina Faso are inter alia 10-ton trucks, buses, minibuses, taxis, tricycle motorbikes, motorcycles, bicycles, donkey chariots, man-powered chariots and wheelbarrows. The choice for transportation means depends significantly on the distance to the destination point, the financial means of the person and size of the business, and the nature of the goods to be transported. For example, 10t trucks are used for heavy merchandise traveling long distances and are also used within the capital, from wholesalers to big market distributors. At a regional level, tricycle motorbikes go distances up to 50km.

Transportation at the last-mile depends on the capacity of the last-mile retailers. Most use a tricycle motorbike, followed by motorcycle, bicycle, and wheelbarrow by foot.

Picture 1: Tricycle motorbike at Sankariare market



The distributors of solar lamps interviewed for this study expressed a strong preference for using their own transportation vehicles for independence and efficiency purposes. However, this is not always possible. Some actors use private bus companies for the transportation of their products, as it is not always economical to travel to distant regions, which additionally depends on the quantity of the order for a given destination. All of the solar lamp retailers interviewed own at least one vehicle. Bigger companies own a whole company fleet. The following table summarizes the transportation means used by the main solar lamp distributors in Burkina Faso.

Table 3: Transportation means of main solar lamp distributors

Distributor	Transportation means	From	To
1	Own van, private bus companies	Dédougou	Anywhere in the country
2	Company trucks	Ouagadougou	Gas station network
3	Own tricycle motorbike, own truck	Ouagadougou	Ouagadougou, Dano
4	Own car	Ouagadougou	Ouagadougou
	Private bus company	Ouagadougou	Outside Ouagadougou
5	Own car, private bus company	Ouagadougou	Ouagadougou, Ouaghigouya
6	Own truck	Ouagadougou	Anywhere in the country
7	Own cars	Ouagadougou	Anywhere in the country

4.2 Transportation costs in the passenger transport companies

The criteria to calculate the price of transport with a private registered bus company differs between companies and is calculated in consideration of distance, weight, and value of the product. In addition, the prices are highly dependent on the available capacity and daily conditions, e.g. if there is still space in the bus, the price will be lower because the companies

want to fill the bus to full capacity. Also it was stated in interviews that the calculation of the transport costs are based more and more on the value of the transported product. That is, for example, why the transportation costs of the mobile phones (see table 4) are relatively high per km compared to cigarettes.

Table 4: Typical prices for transportation of goods by private bus companies as indicated by retailers and wholesalers

Product	Transportation means	From	To	Distance	Transportation cost total FCFA	Price/ package-km
Flashlights (package of 12)	Private bus company	Ouagadougou (Sankariaré Market, Zabre Raaga)	Yako	110 km	1,000 / package	9
Solar panels (5-10 pcs.), Charge controller (5-10 pcs.)	Private bus company	Ouagadougou	Yako	110 km	8,000 for all	n.a.
Cigarettes (12 cartons/package)	Private bus company	Ouagadougou	Yako	110 km	100/package	0,9
Mobile phones (50-100 pcs.)	Private bus company	Ouagadougou (marché du soir)	Fada	223 km	1,500 / package	6,7

Transportation of cigarettes is less expensive than transportation of other goods because they are carried as passenger baggage within the bus, as opposed to freight.

4.3 Transportation costs in individual transportation services

The prices of informal transportation normally depend on distance and have rapidly increased in the last few years due to increased mobility and increased demand. The prices do not differ much from those of the established companies.

The table below (Table 5) indicates typical prices for transportation as stated by interviewees during the field mission. Transported products are indicated in product groups because the traders usually pack several products together. Since the transportation price per package is calculated informally by estimations based on the package dimensions, traders try to assemble different products into one package, e.g. 6 cartons of cigarettes together with 10 battery-powered lamps. It was also observed during the field mission that traders wrap different packages together in old rice bags, so that it is considered to be one package, as this generally cost less than sending several small packages.

Transportation costs are higher per km for short distances and on unpaved roads. This confirms the assumption that transportation at the last-mile is the most expensive. In comparison to this, transport of large quantities with big trucks is less expensive, because of the price reduction

when large quantities of packages are transported and because the trucks only service paved roads. The price for a hired (entire) truck is FCFA 100,000.

Table 5: Typical prices for transportation of goods with individual transportation services

Product	Transportation means	From	To	Distance	Transportation cost FCFA	Price/ package-km
Rice (25kg bag)	Hired taxi moto	Arbolé	Zonogbega	7 km	100 / package	14.2
Rice (25kg bag), Tea, (carton 50x40x40) Cigarettes (12 cartons/package), Torches (carton 50x40x40, 20 pcs.)	Hired motorcycle	Yako	Lemseré	35 km	250 / package	7.5
Rice (25kg bag), Tea (carton 50x40x40) Cigarettes (12 cartons/package), Torches (carton 50x40x40, 20 pcs.)	Hired taxi moto	Yako	Yako	5 km	50 / package	10
Rice (25kg bag)	Hired 10 ton truck	Ouagadougou	Yako	110 km	5,000/ton, 2,000 with unload service	1.5
Battery lamps (10 lamps), Torches (20 pcs.) Solar panels (5-10 pcs.)	n.a.	Pouytenga	Gounghin	58 km	500 / package	8.6
Battery lamps (10 pcs.), Torches (20 pcs.)	Hired truck	Ouagadougou (Sankariaré)	Fada	223 km	300 / package	1.3
Rice (25kg bag), Tea (carton 50x40x40)	10 ton truck	Ouagadougou (grand marché)	Fada	223 km	100,000 per truck (shared with others)	n.a.
Torches (20 pcs.), Cigarettes (12 cartons/package)	10 ton truck	Fada	Villages north/east	n.a.	100 / package	n.a.

4.4 Rural Freight Transportation Services: The region of Dédougou

Boucle du Mouhoun lies in the northwest of the country and is the 2nd most populous region in Burkina Faso. About 1.4 million Burkinabé are spread out over an area of 35,000 km².

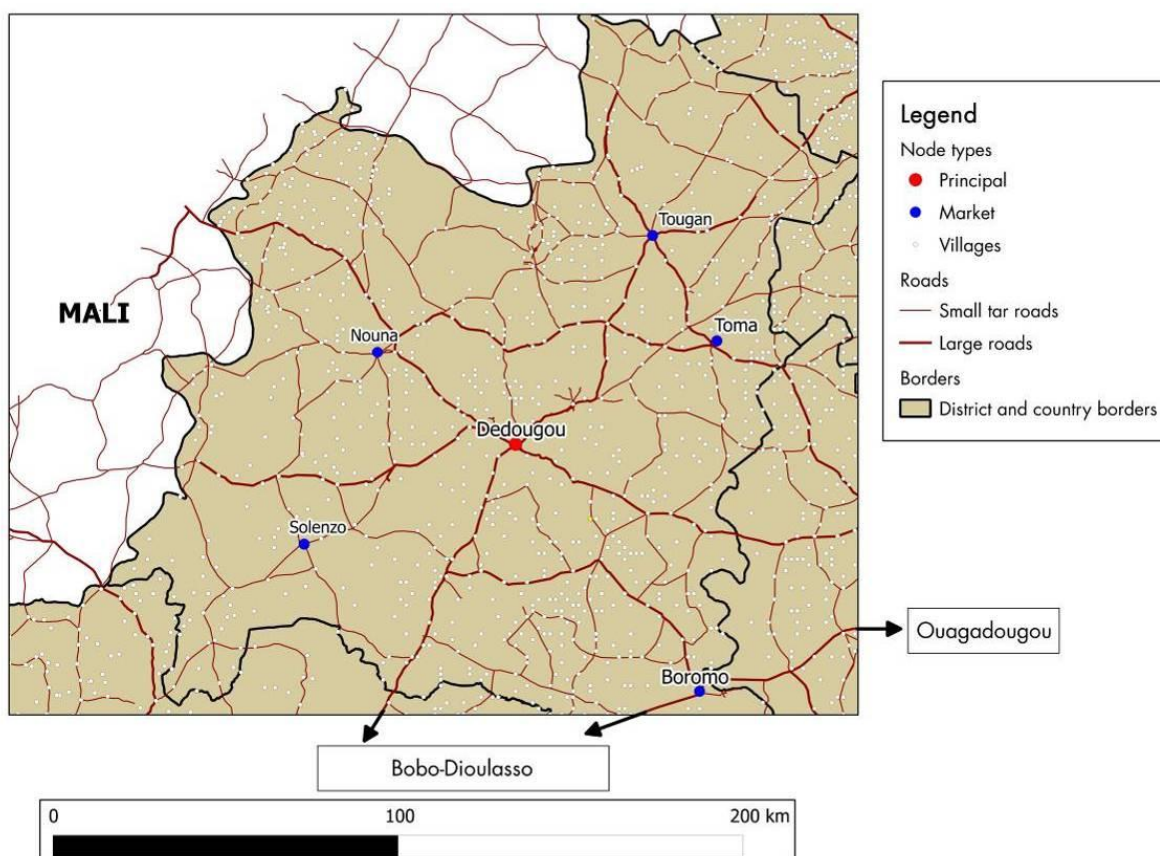
In 2007, the World Bank commissioned a study about rural transport services in Africa, during which, extensive fieldwork was carried out in Dédougou. The report covers relevant insights that

helped in answering several questions of this study. This section intends to briefly summarize its findings with an update of current conditions based on the findings of the field mission.

4.4.1 Regional hub and spoke system

The region is made up of six provinces, each with an administrative center in a market town. These towns are (in order of population): Dédougou, Nouna, Solenzo, Tougan, Boromo and Toma. The region's capital, Dédougou, is located about 280km west of Ouagadougou. The national transport corridor between Ouagadougou and the 2nd biggest city, Bobo-Dioulasso, serves as an important spoke road. Most traffic passes to and from Dédougou on provincial spoke roads. Cross-border transport coming from Dédougou passes through Djibasso before continuing to Mali.

**Figure 4: Map of the region of Dédougou
(MEI representation according to Starkey, 2007)**



4.4.2 Means of transportation

There are three main types of transportation available in the region of Dédougou: small bush taxis (Peugeot pickups), large bush taxis (mini-buses and old 20-30 seater Renault Super Goellettes) and large 10t trucks. As these operate on the main roads only, intermediary means of transport (IMT) also play an important role. These are most commonly motorcycles, bicycles, or tricycle motorbikes. Most medium distance journeys (10-40 km) are traveled by these IMTs. Tricycle motorbikes are widely used for transport within a village, or to and from markets.

Public transportation services are only available on main roads, and not in rural areas. Commercial transportation services to rural areas are very limited and based on IMTs only.

According to Starkey (2007), passenger fares are approx. USD 0.05-0.11/km. If the journey is short or the road is in poor condition, the fare increases. Freight transport by large trucks costs approx. USD 0.15-0.22/t-km. If the distance is short, a rural taxi is regularly used, with an increased fare.

The table below provides examples of freight costs.

Table 6: Examples of freight costs in the region of Dédougou for transporting a 100kg sack of grain (Starkey, 2007)

Transport type	Start	Finish	Distance [km]	Price total [CFA]	Price/t-km [US\$]
Truck	Solenzo	Dédougou	87	700	0.15
	Nouna	Djibasso	60	600	0.19

	Dédougou	Nouna	55	500	0.17
	Dédougou	Kara	22	250	0.22
Horse cart	Djibasso	Pia	14	250	0.34
	Djibasso	Bomborokoura	50	300	0.11

The available transportation infrastructure differs largely between dry and rainy seasons. While rural taxis operate throughout the whole year, larger trucks cannot enter most of the villages in the rainy season⁸, and during that time, will only travel the main routes and to market towns. Also at that time, rain barriers are built to protect the roads.

Harvest time is at the beginning of the dry season and induces a surge of truck operators into villages to purchase grains to sell in other regions.

On the main roads, various control barriers have to be overcome. Set up by police, customs, or the department of forestry, transport operators are stopped and required to pay a fee, usually around USD 1 or USD 2. Their presence increases drastically during market days, e.g. on the road to Djibasso, and the amount charged increases from USD 1 on a regular day to USD 5 on market days.

During the rainy season, trucks in a hurry that do not want to stop at a rain barrier, make small payments to continue on the road nevertheless.

4.4.3 Understanding markets

Traffic flow in the region is greatly influenced by market schedules. The biggest market in the Dédougou region is in Djibasso. While this town is fairly small, every Thursday thousands of people travel to the market to buy and sell goods. The main road to Djibasso that experiences minimal motorized transport during most of the week is filled with trucks, buses and rural taxis on the day of the market.

People cover a distance of up to 80km to reach markets like the one in Djibasso. Markets occur either weekly, every five days or every three days. The population travels by tricycle motorbike, bicycle or on foot and mainly uses unmapped, “invisible” pathways.

In addition, many smaller rural markets have gained importance but have not yet developed into towns. They also attract several hundred visitors, who travel many kilometers to get there.

4.5 Conclusions

Freight transport in Burkina Faso is organized in an informal and a formal sector, dominated by private bus companies. However, in both sectors, prices for transportation services are difficult to anticipate. Even the formal bus companies manifest “informal characterizations” as the price depends on how much the bus is already loaded and negotiations with the bus company staff.

⁸ The rainy season starts in the months May or June and it lasts for about 4 months .

These daily changing conditions and arbitrary price setting make it difficult to calculate appropriate margins for the products, or to properly organize the transportation of goods, as long as only small quantities are involved and the demand is not on a regular basis.

As a result, interviewed solar lamp distributors prefer to transport their products with their own vehicles, as it is both cheaper and much more reliable than other last-mile transportation methods.

The most common transport means for long distances is the 10t truck, or a van for smaller quantities. Transportation at the last-mile is done with smaller vehicles like tricycle motorbikes and motorcycles due to poor road conditions, especially during the rainy season, and because the transport of small quantities of products is more cost effective with these small and flexible vehicles.

Markets play an important role in distributing products to the last-mile. Sometimes, thousands of people come to the markets, covering distances up to 80km. Assembling people from different villages in one place and on one day, makes markets the perfect location for awareness raising and selling lamps to different target groups.

5 Mapping, presentation and analysis of supply chains for solar lamps

5.1 CB Energie

5.1.1 The company

CB Energie is the only solar lamp producer in Burkina Faso. The French Engineer Arnaud Chabanne (external consultant to MicroEnergy International for this study) founded the company in 2004. CB Energie is currently (May 2013) comprised of 40 employees. These employees produce the solar lamps at the assembling plant in Dédougou; work on the large installations in the field; and work in supporting departments consisting of commercial service and marketing, after sale service, and administration. Employees have the opportunity to engage in multiple departments; they can e.g. work on marketing operations in the morning and producing solar lanterns in the afternoon. Finally, 2 to 3 employees work in CB Energie's retail shop in Ouagadougou. All operations are undertaken jointly as much as possible, in order to optimize costs. The commercial service and marketing staff visits retailers regularly in the different regions to distribute the lamps, thereby monitoring the sales, providing training, and conducting joint marketing activities (market demonstrations, etc.).

5.1.2 The products

Currently, CB Energie manufactures one model of solar lamp that comes in two sizes: "small" and "big", and one "big" lamp with a mobile charging device. The lamp is based on a kerosene lamp model, which is converted into a solar lamp by fixing a solar panel on the top of the lamp, replacing the wick by a LED bulb, and connecting this to a battery at the bottom of the lamp. The solar panel of the big lamp with a mobile charger can be detached from the lamp itself during transport and lighting. They have designed two additional models to add to their product line, which are not based on a kerosene lamp: a reading lamp ("liseuse") and a portable lamp ("balladeuse"). The first unit of these has already been produced. In addition, CB Energie produces solar home systems, mini and classic "solar streetlights" (large, non-portable lamps for domestic or public use – courtyard, street) and small radios adapted to solar technologies.

Picture 2: CB Energie Workshop in Dédougou






CB Energie imports a major part of the components used (PV panels, batteries, kerosene lamps, LEDs, ON/OFF switches, electronic components). However, CB Energie sources the packaging, cables, hot melt glue and other small pieces locally.

Orders for components are placed among suppliers that arrive via transport ship either to Ghana, Togo or Côte d'Ivoire. Containers are the most profitable but require very large orders per shipment. Imported components are then delivered by train (Côte d'Ivoire) and trucks to Ouagadougou, and then brought to Dédougou by CB Energie's own van and driver.

The solar lamps are then assembled and stocked in CB Energie's own warehouse in Dédougou. For transportation, lamps are placed individually in a fabric wrapping. Lamps are then placed in cardboard boxes in groups of 10 (big lamp with charger), 20 (big lamp) or 30 (small lamp), irrespective of the transportation means.

Table 7: List of solar lighting products, CB Energie

Product	SMALL LAMP	BIG LAMP	Big lamp
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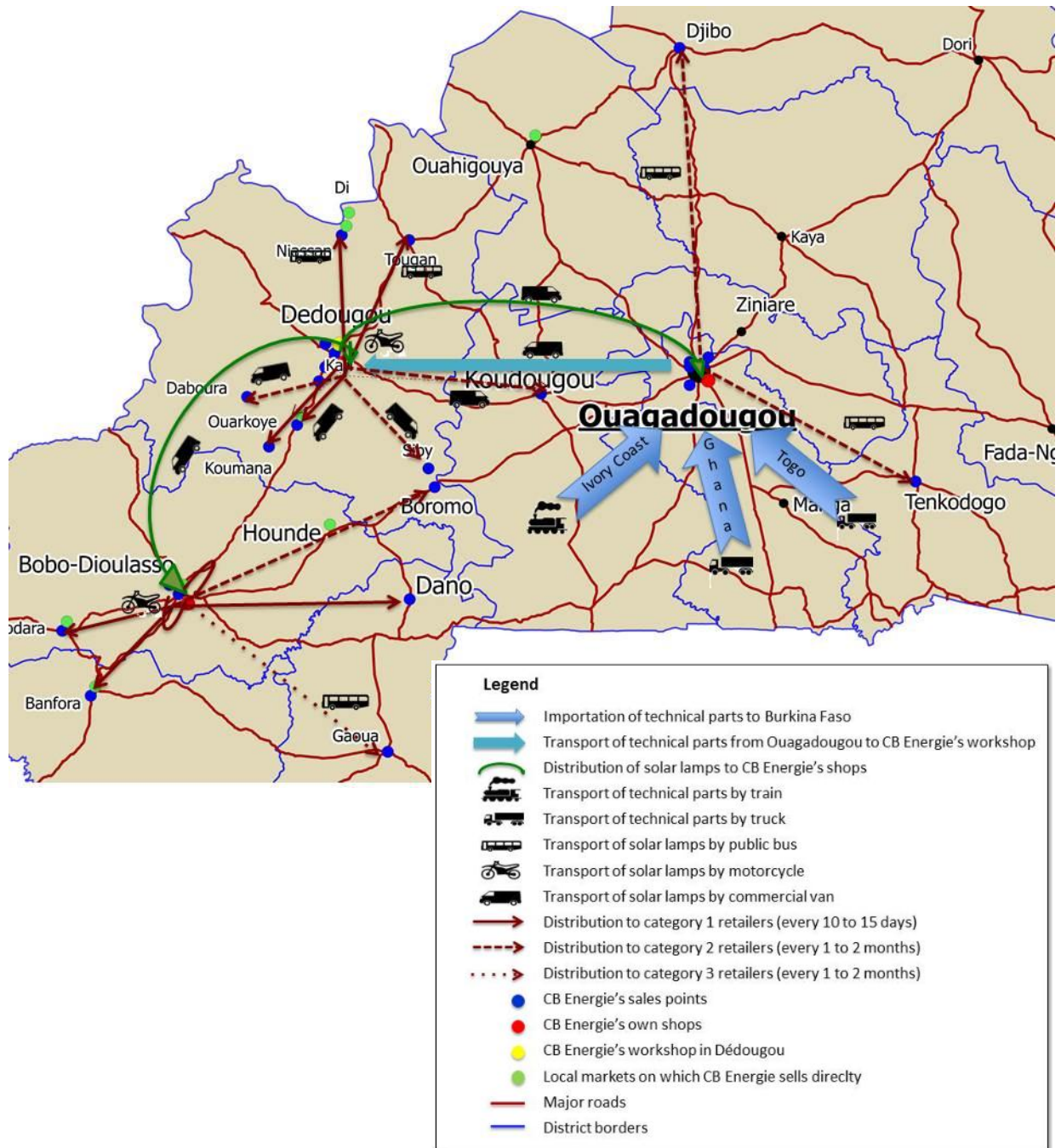
	moyenne lampe CB Yelee	grande lampe CB Yelee	lampe charge portable CB Yelee
			
Illumination	1 level	2 levels	2 levels
Illumination radius	5 m	10 m	10 m
Voltage	3,6 V	6 V	6 V
Mobile phone recharge	No	No	Yes
Height	27,5 cm	33,5 cm	33,5 cm
Weight	0,8 kg	2,7 kg	2,7 kg
Light time	> 10 hours	> 10 hours	> 10 hours
Warranty	1 year	1 year	1 year
Life span	5 years	5 years	5 years
Met LA Minimum Standards	No	No	No

5.1.3 The distribution network

CB Energie is distributing its ready-to-use lamps via a mix of Distributor/Dealer and Proprietary Distribution models. Lamps are distributed either to CB Energie's own shops (in Dédougou and Ouagadougou) or directly to local last-mile retailers. About 20 retailers across western, southern, and central Burkina Faso sell CB Energie's solar lamps.

CB Energie distributes its products every 10 to 15 days to the most important retailers (described in the following as category 1 retailers), and every month, or every two months to the rest of its retail partners (described below as category 2 and 3).

Figure 5: Distribution model, CB Energie



Proprietary Distribution model: distribution via CB Energie’s own shops

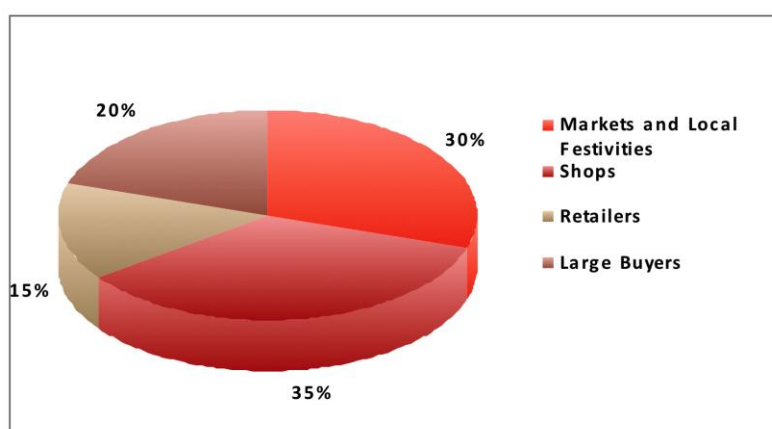
CB Energie owns two retail shops: one in Dédougou and one in Ouagadougou. The company distributes its lamps to the shops with its own van and driver. Due to the deficient state of the roads, transport costs are very expensive. Dust greatly affects the functionality of vehicles. There is a lot of dust and vehicles break down regularly. After-sales services are also affected by road conditions.

Further, CB Energie strives to distribute and demonstrate its lamps in a diversity of locations and occasions, including:

- Weekly or bi-weekly local village markets (in Ouarkoye, Bobo Dioulasso, Orodara, Banfora, Hounde, Di, Niassan and Ouahigouya)
- Quarterly larger markets
- Yearly pilgrimages, local religious or traditional festivities, and occasional evening gatherings, where they can market their products by providing solar lanterns as prizes, thereby presenting their products to large crowds
- Yearly regional (trade) fairs, the craftsmen fair, the international renewable energy fair of Ouagadougou (SIERO)
- Yearly congress of their partner “Association La Voûte Nubienne”
- Yearly festivals such as FESPACO (Cinema), FESTIMA (masks and arts), Festival of Koudougou, “Fête du Paysan”, “Fête du Cheval”, “Fête du Fonio”, etc
- Yearly sporting events, such as along the route of the “Tour du Burkina Faso”.

After these events, CB Energie notices a spike in sales. Overall, CB Energie estimates that approximately 30% of sales are made through markets and local festivities, while 35% are made in the shops, 15% by the retailers and 20% by larger buyers (such as health and education-focused NGOs).

Figure 6: CB Energie Sales by location



Distributor/Dealer Model: Distribution via retailer network

Since the beginning of 2013, CB Energie now divides **retailers into three different categories** according to their sales performance to provide them with different repayment models:

- Category 3: A retailer that sells less than 30 lanterns per month is classified in this category. The retailer buys the lanterns for 100% of the price from CB Energie and keeps the margin from the sale. There are currently 4 retailers under this category.
- Category 2: The retailer sells more than 30 lanterns per month. The retailer pays 40% of the price of the lantern upfront and the rest once the unit has been sold. There are 8 retailers in this category presently.
- Category 1: The retailer sells more than 100 lanterns per month. Lanterns are paid for after final sale. 10 of the retailers currently fall into this category.

Local last-mile retailers living close to one of CB Energie's shops pick-up their supplies themselves. Lamps are delivered to the others by tricycle motorbike (for up to 20 pieces) or by bus (over 20 pieces). Sometimes the lanterns are picked up together with other products by tricycle motorbike. Transport costs vary.

Once last-mile retailers have picked up their stocks at the closest CB Energie shop or bus station, they bring them to their villages by tricycle motorbike, bicycle, van, car, or, if the bus stops near the village by foot or with a wheelbarrow. CB Energie also delivers lamps on its way to retailer training, monitoring, and joint marketing travels to prevent multiple trips and save fuel / labor costs.

The retailers sell the lanterns through the following channels:

- Retailer's shops: More than 15 of the last-mile retailers distribute solar lamps within their own shops. Often it is food shops selling daily use products such as rice, oil, sugar, batteries, cigarettes, telephone cards, etc. In addition, in the cities, it is usual to find retailers who are owners of small bars or local restaurants.
- Local markets: Retailers visit local markets to advertise and sell the lanterns.
- Local festivities: Retailers use the occasion of local festivities to showcase and sell the lanterns.
- Peddlers: Retailers sell the lanterns as peddlers within their respective neighborhoods.

Local retailers are recruited by teams from CB Energie or by other retailers. Among the selection criteria, retailers must show interest in renewable energy and have a fixed place to stock their lamps. CB Energie signs a contract with the retailers attached with copy of their ID card in case of dispute. CB Energie gives them 3-4 different products and trains the retailer on the proper marketing for the lanterns.

CB Energie strives to organize 2-3 day training sessions for its retailers once a year. They entail an introduction to solar energy, the different lamps, other CB Energie products, after-sales service and maintenance. There is also a session on marketing and how to keep track of sales. They visit solar installations, do practical experiments, and show short videos. Retailers finally receive a catalog and flyers inscribed with their own names. Once a retailer starts selling the products, she/he becomes an official seller.

5.1.4 Analysis of Challenges and Success Factors

CB Energie is the only local producer of solar lamps in Burkina Faso, with a growing tendency. However, the company has not yet been able to significantly scale up its activities and sales due to:

- The difficulty of retailers in meeting upfront costs related to the purchase of its lamps
- The lack of awareness, understanding and trust of end-customers regarding the advantages of solar lamps in comparison to battery or kerosene lamps
- The (financial) difficulty of finding and training skilled retailers.

According to CB Energie, which remains in regular contact with its clients through its retailers, the majority of their clients is satisfied with the product and service, and are willing to buy other models or recommend the company to family and friends. Awareness of solar lighting is increasing. But still, the general population lacks knowledge about solar lamps and often does not know the difference between a conventional lamp and a solar lamp. The rural population also does not trust the one year warranty of CB Energie lamps, i.e. they do not believe that the lamps will last for a year, or that the company will replace or repair the product if needed within that period.

Since it is not sufficient to simply display solar lanterns in the shops, CB Energie addresses this issue by undertaking product presentations and demonstrations at markets, traditional festivities, commercial and cultural fairs. Furthermore, the company also experimented with successful partnerships with civil society actors already involved in awareness-raising campaigns (such as the “Association La Voûte Nubienne” working on energy efficient housing) to undertake joint campaigns and, therefore, share related costs. These activities are most appropriate in reaching a more rural, remote population, especially because they take place in local native languages.

Marketing activities also require the identification, selection and training of appropriate retailers. Not all retailers are able to advertise, reach out to customers or demonstrate the functions of the lanterns. CB Energie tries to overcome this barrier by adequately training the retailers. However, the company also lacks the financial means to conduct more regular and thorough training sessions, which might explain why sales through local retailers do not yet represent the majority of total sales.

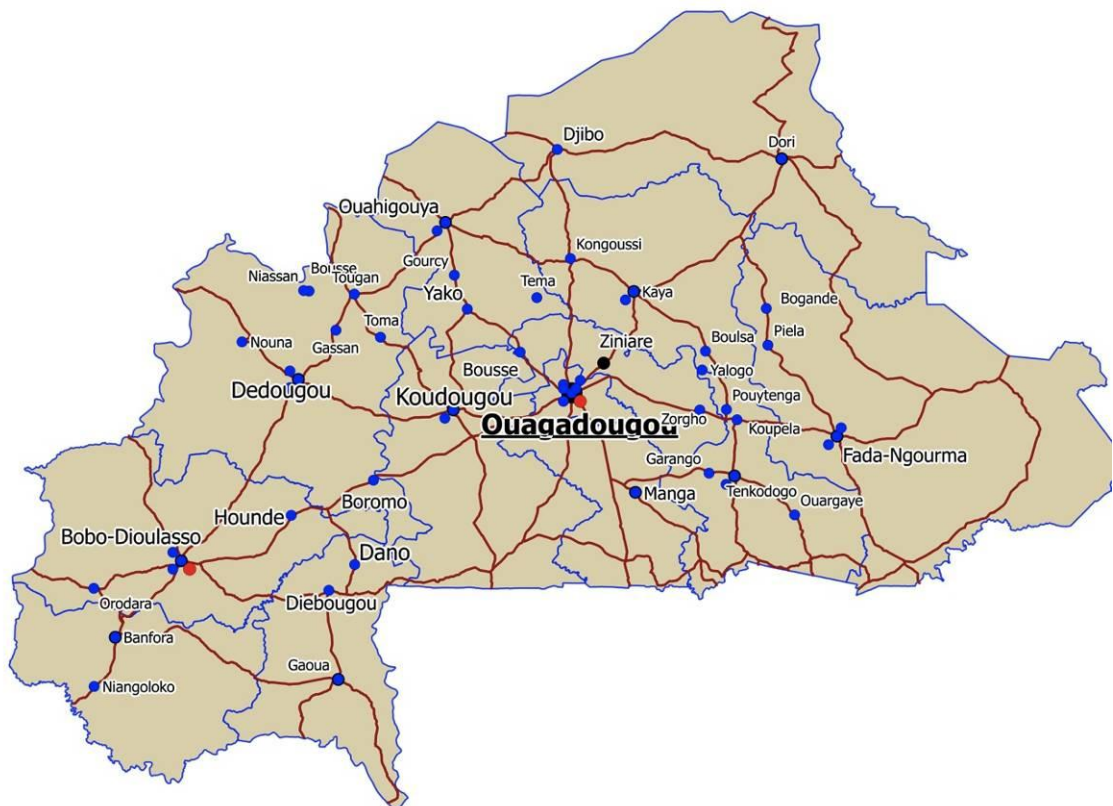
With regards to after-sales services, CB Energie currently offers the replacement of batteries, which have a lower life expectancy (approximately two years) than the rest of the lamps' components (approximately five years). Customers can bring or send (via an acquaintance) the lamps back to one of the shops (in Ouagadougou, Dédougou or Bobo-Dioulasso) where the company replaces the batteries for an extra charge.

5.2 TOTAL

5.2.1 The Company

TOTAL is one of the world's leading oil companies. The company is present in Burkina Faso with 80 gas stations deployed across the country.

Figure 7: Sales points for solar lighting products, TOTAL





TOTAL began its solar lantern activities in Burkina Faso in 2011 with a six-month feasibility study to analyze customers' ability and willingness to pay, and to assess the demand and need of the local population. This feasibility study was followed by a pilot project, whose first phase took place from 2011 to 2012. The second phase of this pilot project started in January 2013.

5.2.2 The Products

TOTAL sells the solar lanterns D-Light S10 and D-Light S250 and Sundaya Solar-Home-Systems (SHS) Sundaya Ulitium and SundayaT.Lite, which have all undergone quality testing and met the LA minimum standards. These products are sold under TOTAL's own brand "Awango by TOTAL".

Table 8: List of solar lighting products, TOTAL

Product	SMALL LAMP	MEDIUM LAMP	SHS MODULE
---------	------------	-------------	------------

	S10 D.Light	S250 D.Light	Sundaya Utilitium
			
Illumination	2 levels	4 levels	3 levels
Number of lamps	1	1	1 to 4
Illuminance	14 - 20 lm	20 - 70 lm	25 - 240 lm
Wattage	0,25 W	1 W	7 W
Height	19,8 cm	13 cm w/o panel	18 cm w/o panel
Weight	0,25 kg	0,35 kg w/o panel	0,26 kg w/o panel
Mobile phone recharge	No	Yes	Yes
Other functions	Can also be charged through a phone charger, attached to the grid	Can also be charged through a phone charger, attached to the grid	Can also be charged through a charger attached to the grid, System can be extended from one up to four lamps
Light time	4-8 hrs depends on setting	4-12 hrs depends on setting	6-60 hrs depends on setting
Warranty	1 year	1 year	2 years
Life span	2-5 years	5-7 years	5-7 years
Met LA minimum quality standards	Yes	Yes	Yes

5.2.3 The Distribution Network

After import the products are stocked in Bobo-Dioulasso and Ouagadougou. The lamps are then distributed to all TOTAL gas stations across the country in TOTAL's own trucks, together with TOTAL's other products (such as lubricants), which are displayed in the gas stations. This makes it possible for TOTAL to keep transportation costs low. Each gas station orders new lamps from the headquarters in Ouagadougou, depending on the local demand.

Beyond the distribution through its gas stations, TOTAL also works together with agreed vendors for its Awango solar lighting products. After a vetting process to verify their business capacity, vendors go through a standard training session on product use, product advertisement

and guarantee coverage. TOTAL sells and delivers products directly to the agreed vendors, unless they are situated in very remote areas, in which case they have to pick up the products personally at the closest TOTAL gas station. TOTAL strives to enlarge its network of agreed vendors in order to facilitate the financing of its lighting products beyond its gas stations. A partnership has already been established with Nafa Naana, a private company affiliated to the French NGO Entrepreneurs du Monde (see next chapter).

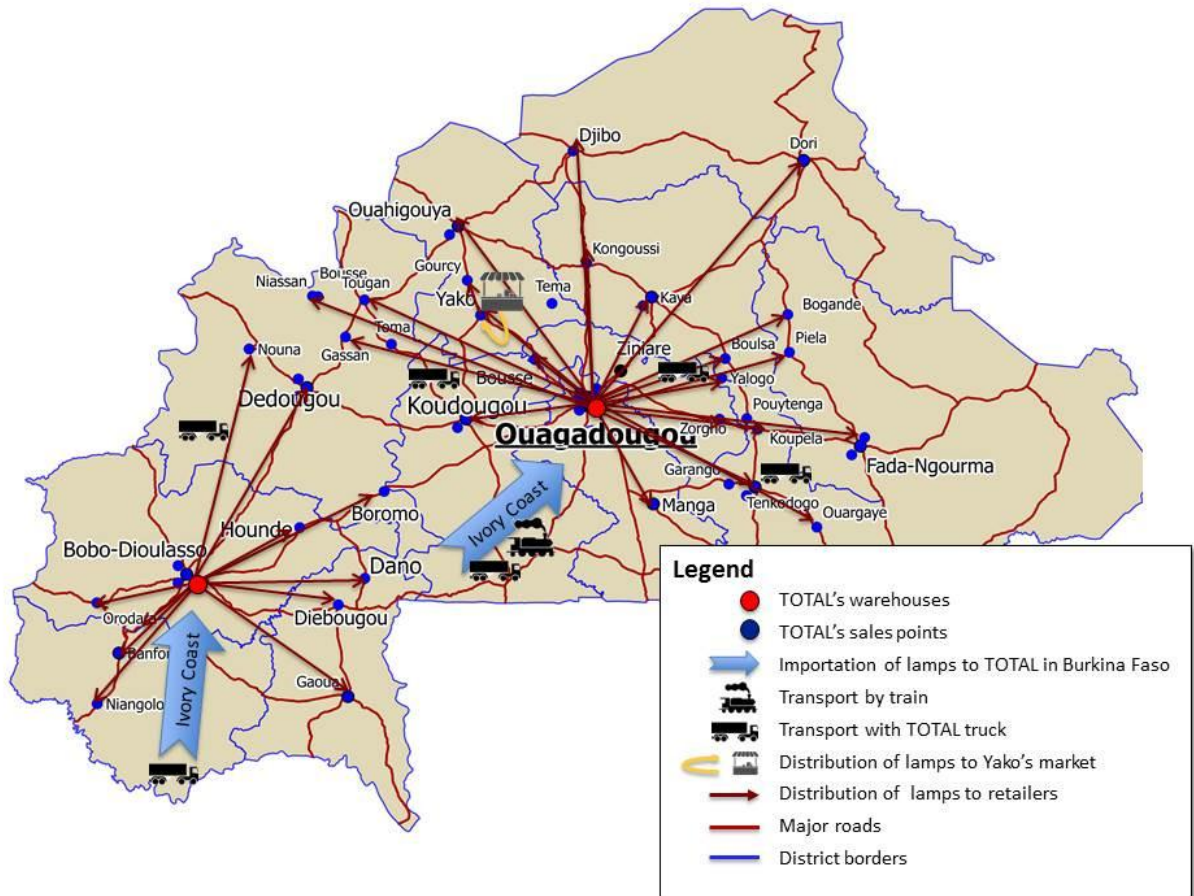
5.2.4 Analysis of Challenges and Success Factors

TOTAL stated that local transportation means were not an option for them due to efficiency reasons. This is why the company decided to rely on its own truck fleet for the transportation of solar lamps, and does not encounter any challenges in this respect.

TOTAL identified first challenges at the customer level, with customers not understanding the exact coverage of warranty provisions (conception problems vs. misuse). The product return rate is quite low so far. According to one station manager, the relatively high price of the lamps makes them unaffordable to the large majority of the population, so that market saturation could be reached quickly if no alternative financing channels are found.

While TOTAL's experience with solar lighting products in Burkina Faso began quite recently, it has been very successful thus far. While there has not been enough time to draw definitive conclusions, among the key reasons behind Total's first success, is its existing logistical infrastructure, which allows the company to make important economies of scale in the distribution of the products at a national level. Also, the financing of a large simultaneous marketing campaign along the distribution channels, with radio announcements (including in local languages Mooré and Dioula), street posters, and advertisements in print media, contributes to raising awareness of solar lighting products in the country.

Figure 8: Distribution network, TOTAL



5.3 Nafa Naana

5.3.1 The Company

Nafa Naana was created as a Burkinabé social business in 2012. It is a further evolution of a development project called “Une femme, un foyer, une forêt”, implemented by the French NGO Entrepreneurs du Monde (EdM), aimed originally at distribution of improved cookstoves.

Nafa Naana’s office is located within EdM’s offices in Ouagadougou. Furthermore, they have two selling points (boutiques-relais) in Ouagadougou and in Dano.

Picture 3: Employee of Nafa Naana explains functioning of solar lamp



5.3.2 The Products





Nafa Naana aims to scale up the distribution of energy-efficient and renewable energy products such as improved cookstoves, gas cookstoves, solar lamps and *bitamtoré* (thermo-boxes to conserve heated food).

In respect to solar lamps, Nafa Naana has been distributing 2 of CB Energie’s lamps since late 2012, and entered into a partnership with TOTAL to distribute some of their lamps beginning in January 2013.

As with previous products, Nafa Naana will only maintain new models in the shops if they are well accepted by the customers.

Table 9: List of solar lighting products, Nafa Naana

Product	SMALL LAMP	BIG LAMP	SMALL LAMP	MEDIUM LAMP
---------	------------	----------	------------	-------------

	moyenne lampe CB Yelee	grande lampe CB Yelee	S10 D.Light	S250 D.Light
				
Illumination	1 level	2 levels	2 levels	4 levels
Number of lamps	n.a.	n.a.	1	1
Illuminance	5 m (illumination radius)	10 m (illumination radius)	14 - 20 lm	20 - 70 lm
Voltage / Wattage	3,6 V	6 V	0,25 W	1 W
Mobile phone recharge	no	No	19,8 cm	13 cm w/o panel
Height	27,5 cm	33,5 cm	0,25 kg	0,35 kg w/o panel
Weight	0,8 kg	2,7 kg	no	yes
Other functions	none	None	Can also be charged through a Nokia phone charger, attached to the grid	Can also be charged through a Nokia phone charger, attached to the grid
Light time	> 10 hours	> 10 hours	4-8 hrs depends on setting	4-12 hrs depends on setting
Warranty	1 year	1 year	1 year	1 year
Life span	5 years	5 years	2-5 years	5-7 years
Met LA minimum standards	No	No	Yes	Yes

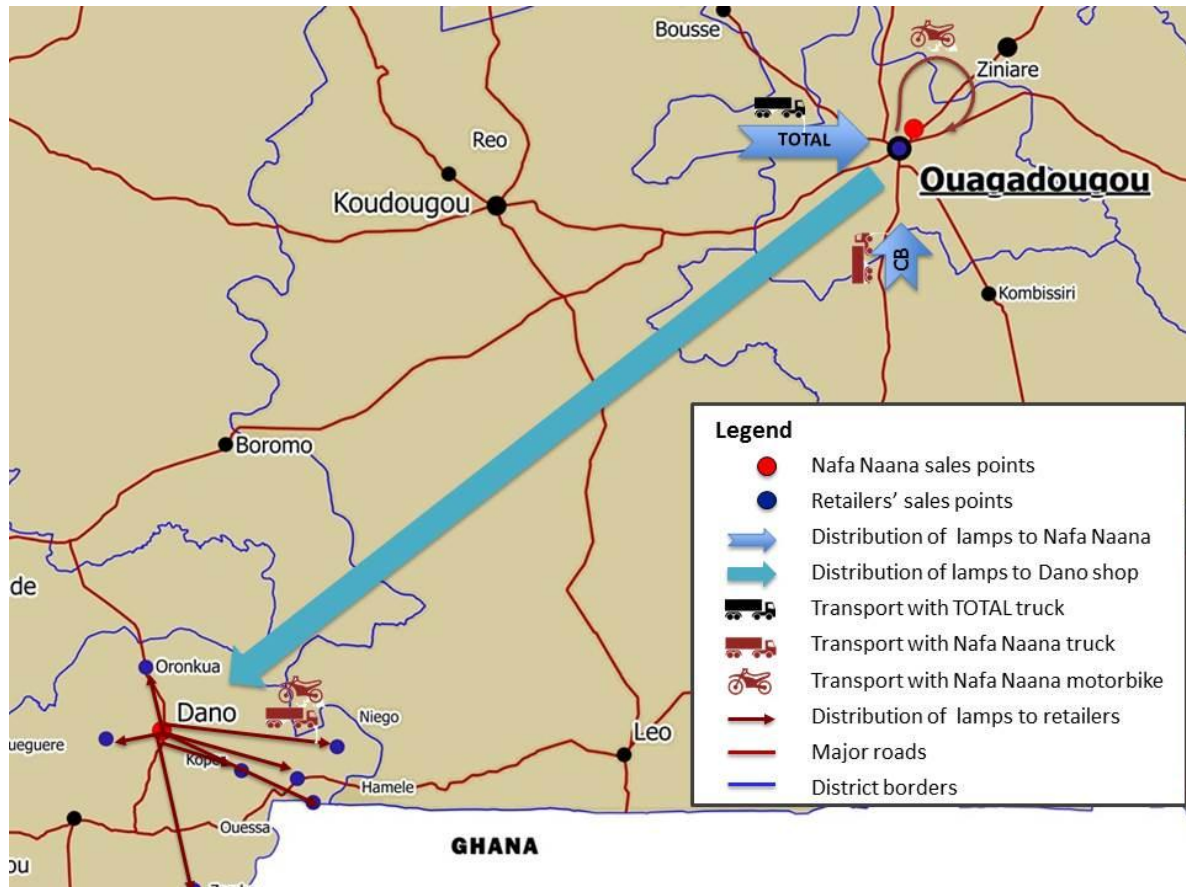
5.3.3 The Distribution Network

Nafa Naana buys lamps from CB Energie's shop in Ouagadougou as the need arises. TOTAL delivers the products directly, on the way to their own gas stations in the region.

Products are distributed in Nafa Naana's two shops ("boutiques relais") in Ouagadougou and Dano. Furthermore, Nafa Naana relies on a growing network of shop owners who offer Nafa Naana's lamps in their retail shops, next to the improved cookstoves. These retailers are trained in sales strategies for solar lamps in a two-day workshop (including training on Nafa Naana's partnership conditions, advantages and use of the products, sales arguments and environmental protection). So far, eight such shop owners offer Nafa Naana's solar lamps (one

in Ouagadougou and seven in the Loba region -- see figure). Additional retailers have been trained, but are not yet operational. Nafa Naana stocks the lamps and distributes them to the retailers with its own truck and tricycle motorbikes. End customers come to the shops by their own means (car, tricycle motorbike, bicycle, on foot) to buy the lamps.

Figure 9: Distribution model, Nafa Naana



Nafa Naana also partners with associations in Ouagadougou and Dano (mostly women's associations, rural manufacturers, and agricultural cooperatives). Associations purchase solar lamps for their members, targeting in particular those who can take up income-generating activities due to the lamps (extending their working hours, charging mobile phones, etc). Nafa Naana brings the lamps to the associations with one of their tricycle motorbikes. The lamps are then distributed to the associations' members.

Nafa Naana offers staggered payment mechanisms for some solar lamps through partnerships with community-based associations. The company has already partnered with a dozen associations to finance solar lamps. When an association expresses interest, an inventory of the members' needs is taken and then Nafa Naana delivers the products with the payment of the first installment. In a few instances, a group leader serves as an intermediary to take the inventory of needs and to collect the installments.

So far, the sale of solar lamps has been experimental in character.

5.3.4 Analysis of Challenges and Success Factors

Nafa Naana identifies the main challenge thus far as the sustainability of lamp sales, since current prices and associated margins are not sufficient to cover the distribution expenses.

Furthermore, the high upfront costs of solar lamps represent a barrier for many potential customers. The development of microfinance mechanisms is a promising solution to tackle this barrier, as it allows Nafa Naana to reach groups of customers at the Base of the Pyramid.

5.4 Smart Energy Services

5.4.1 The Company

Smart Energy Services is a private Burkinabé company created in 2012 by Martin Van Dam, a Dutch national with long-standing experience in solar energy in West Africa.

5.4.2 The Products

In its shop based in Ouagadougou, the company sells solar lamps and solar home systems directly to end-customers. In addition, Smart Energy Services also sells solar pasteurization units, solar mobile phone chargers and efficient bio-air conditioning.

The products are presented in Table 10.

Table 10: List of solar lighting products, Smart Energy Services

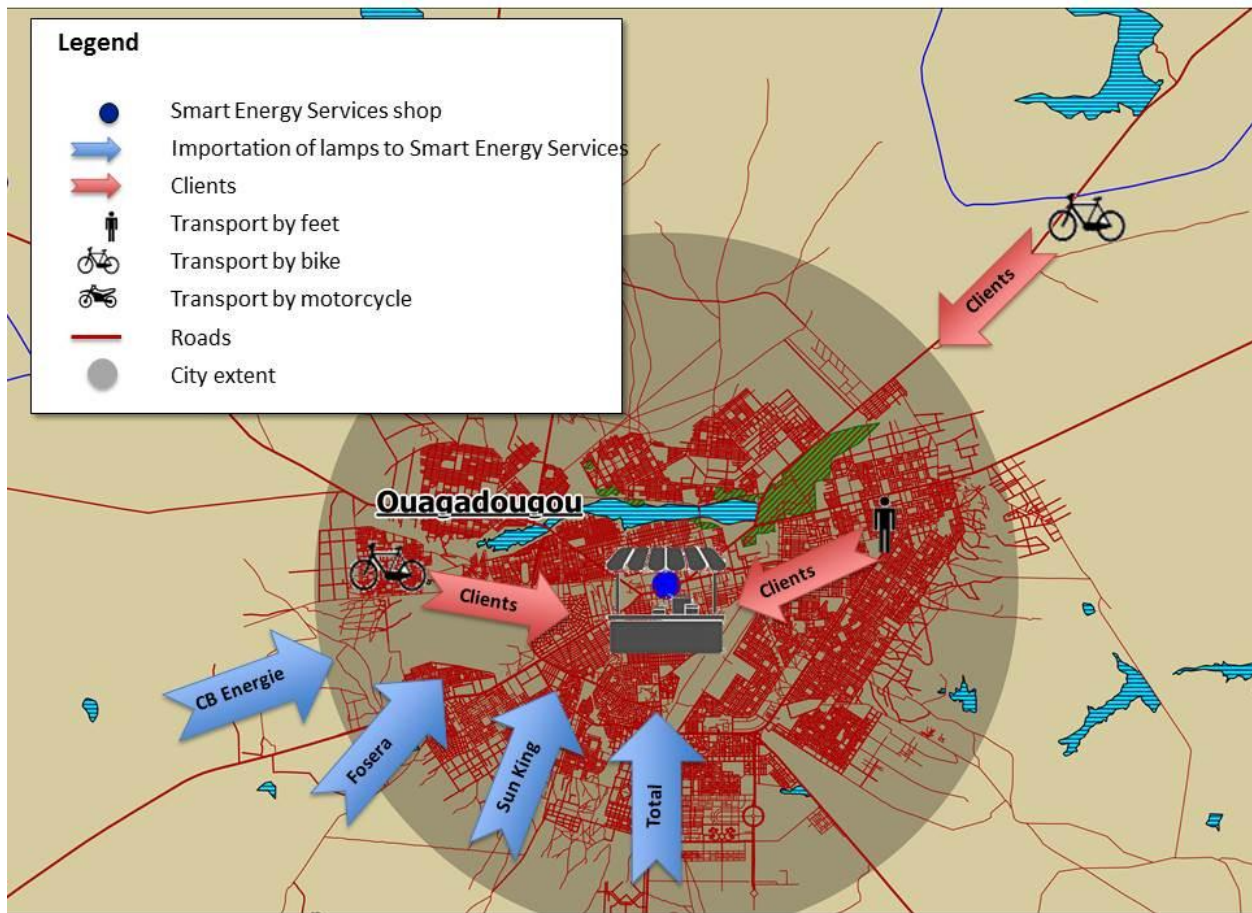
Product	SMALL LAMP	BIG LAMP	SMALL LAMP	SMALL LAMP	MEDIUM LAMP	SMALL LAMP	MEDIUM LAMP
	Moyenne lampe CB Yelee	Grande lampe CB Yelee	Fosera Scandle 200	Sun King Eco	Sun King Pro	S10 D.Light	S250 D.Light

							
Illumination	1 level	2 levels	1 level	1 level	1 level	2 levels	4 levels
Illuminance	5 m (illumination radius)	10 m (illumination radius)	140 - 160 lm	4 - 25 lm	20 - 100 lm	14 - 20 lm	20 - 70 lm
Number of lamps	n.a.	n.a.	8	n.a.	n.a.	1	1
Voltage / Wattage	3,6 V	6 V	3,25 V	3,3 V	6,6 V	0,25 W	1 W
Mobile phone recharge	No	No	Only in daylight	No	Yes	No	Yes
Height	27,5 cm	33,5 cm	n.a.	n.a.	n.a.	19,8 cm	13 cm w/o panel
Weight	0,8 kg	2,7 kg	n.a.	n.a.	n.a.	0,25 kg	0,35 kg w/o panel
Other functions	None	None	Radio possible	None	Battery life indicator	Can also be charged through a phone charger, attached to grid	Can also be charged through a phone charger, attached to grid
Light time	> 10 hours	> 10 hours	4 - 70 hours depending on setting	4 - 30 hours depending on setting	3 - 30 hours depending on setting	4-8 hrs depends on setting	4-12 hrs depends on setting
Warranty	1 year	1 year	2 years	2 years	2 years	1 year	1 year
Life span	5 years	5 years	10 years	5 years (battery)	5 years (battery)	2-5 years	5-7 years
Met LA minimum standards	No	No	Yes	Yes	Yes	Yes	Yes

5.4.3 The Distribution Network

Smart Energy Services brings all lamps to its stocking locations with its own car. When customers order its products outside of Ouagadougou, the company sends them by bus (private bus companies STAF and TSR or informal services). Smart Energy Services only named one instance in which a few lamps were sold in the region of Ziniare, the rest were sold in Ouagadougou.

Figure 10: Distribution network, Smart Energy Services



5.4.4 Analysis of Challenges and Success Factors

Limited availability of solar lamps

Smart Energy Services' main challenge in the last years has been, similar to other renewable energy SMEs, the lack of availability of solar lamps in Burkina Faso. The offer of the major importers in Burkina Faso was limited to a few models at a high price. The recent availability of additional products has made more companies interested in distributing solar lamps, but Smart Energy Services believes that the often fixed, low margins on products makes it unattractive, if not impossible for companies with limited resources to distribute them, particularly in rural areas.

Cost of finding and training last-mile retailers

Smart Energy Services also affirmed that finding the appropriate last-mile retailers was among its main challenges. The company plans to expand its market to rural areas by developing a partnership-based distribution model, working with women's saving groups, farmers' groups and teachers.

Training last-mile retailers is also a challenge according to Smart Energy Services. Appropriate last-mile retailers need to be both skilled in marketing techniques and well connected to potential customers.

5.5 Actualité Energie

5.5.1 The company

Actualité Energie is a Burkinabé solar company in operation since 2002, working in the photovoltaic sector to provide electricity and thermal energy. The company mainly installs and maintains solar panels, but also manufactures solar powered cookstoves.

Mr. Nébié Lassina is the general manager and works with a permanent team of around 15 people. The company further works with four commercial agents (two of which are based in the office).

Besides Ouagadougou, the company works mainly in the regions of Ouahigouya (their biggest market), Bobo-Dioulasso, and Kombissiri.

Picture 4: Advertisement for Actualité Energie's offer of micro-financed solar products



5.5.2 Products and Distribution Network

Actualité Energie has limited experience with solar lamps. In 2009, Actualité Energie’s Spanish partner, the NGO Sol Solidaire, enabled the purchase of a stock of solar lighting kits. Although they sold very quickly, the company could not bear the cost of a new order.

Since April 2013, Actualité Energie distributes Sun King and Fosera Scandle products.

Table 11: List of solar lighting products, Actualité Energie

	SMALL LAMP	SMALL LAMP	MEDIUM LAMP	BIG LAMP
Product	Fosera Scandle 200	Sun King Eco	Sun King Pro	Sunvis Solar Multifunctional solar lighting kit
				
Illuminance	140 - 160 lm	4 - 25 lm	20 - 100 lm	n.a.
Number of lamps	8	n.a.	n.a.	2 x 21
Voltage / Wattage	3,25 V	3,3 V	6,6 V	6 V
Mobile phone recharge	Only in daylight	No	Yes	Yes

Other functions	Radio possible	None	Battery life indicator	Battery charger
Light time	4 - 70 hours depending on setting	4 - 30 hours depending on setting	3 - 30 hours depending on setting	10 - 20 hours
Warranty	2 years	2 years	2 years	n.a.
Life span	10 years	5 years (battery)	5 years (battery)	n.a.
Met LA minimum standards	Yes	Yes	Yes	No

5.5.3 Analysis of Challenges and Success Factors

In total, Actualité Energie has only sold 15 units of the three models of lamps (not including the kit). While there is a demand, the company cannot afford to make new orders. Finding the right partner for such a purchase would be crucial, since current wholesalers' margins are too high to allow for further levels of retail to end-customers.

5.6 SpeedTech & the Development Project “Une Lampe pour l’Afrique”

5.6.1 The Project

The development project is a joint development project from the Burkinabé Ministry of Basic Education and Alphabetization and from the Taiwanese cooperation, SpeedTech. Launched in June 2010, its objective is to distribute solar lamps to school pupils in Burkina Faso to enhance their presence in school and allow them to study after dusk.

5.6.2 The Products

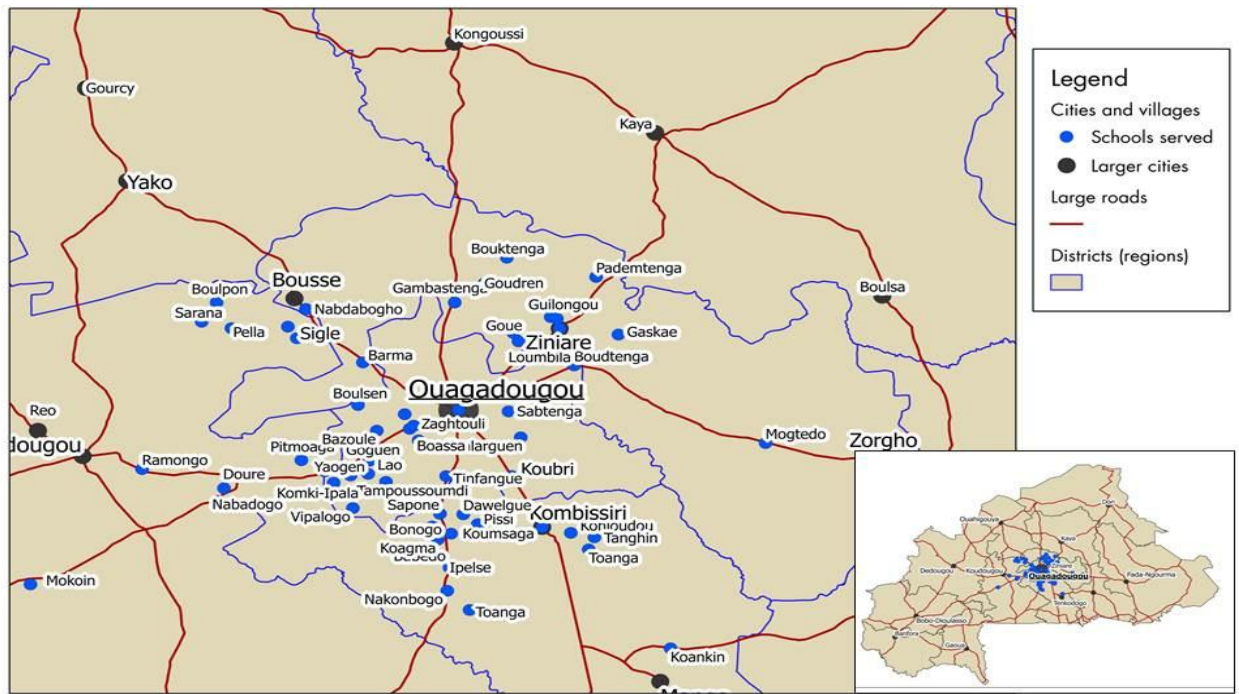
Three products have been distributed:

- Semi-autonomous solar lamps (which need to be recharged in school every morning) (capacity: 6 hours)
- Autonomous solar lamps (can be recharged anywhere) (capacity: 6 hours)
- Solar Home Systems with four neon lights for community lighting (capacity: 7-8 hours)

5.6.3 The Distribution Network

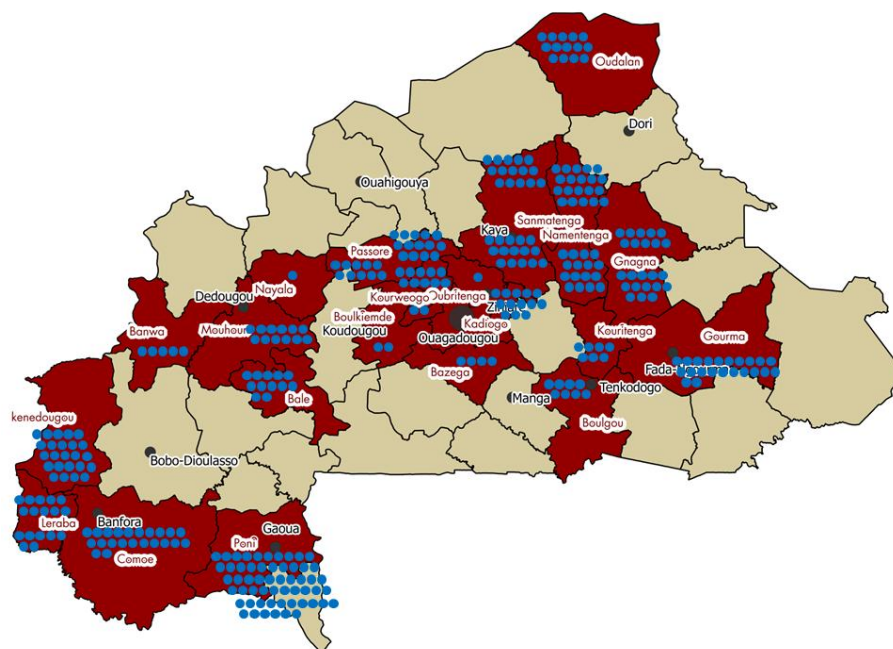
In a first pilot phase (2011-2012), 15,403 lamps were distributed in 63 schools in the Centre, Centre-Ouest, Plateau Central, and Centre Sud regions. The areas covered by this distribution are shown in the following map.

Figure 11: Beneficiary schools of the first phase of the Project "Une lampe pour l'Afrique" (2011-2012)



The project will be extended to 13 further regions in 2013-2014 to 120,000 pupils in 600 schools, prioritizing schools where the success rate is below average. For 2013, beneficiary schools have already been identified in the areas shown in Figure 12, amounting to a total of 54,715 pupils. No schools have been identified yet for 2014.

Figure 12. Beneficiary schools of the second phase of the Project "Une lampe pour l'Afrique" (2013)



Project costs are borne by the Republic of Taiwan (FCFA2.6 billion, USD 5.3 million) and the Government of Burkina Faso (FCFA 343,970,000, USD 700,000).

Products were imported from Taiwan by airfreight for the pilot phase. They will be imported by maritime cargo for the scale-up phase. They are distributed by truck to the schools. The company in charge of the distribution of the lamps was not yet selected when finalizing this report. When interviewed, the project coordinator did not know about the Lighting Africa program.

5.6.4 Analysis of Challenges and Success Factors

With 15,403 lamps already distributed and more than ten times more to come in the next two years, the project “Une Lampe pour l’Afrique” is the largest lamp distributor in Burkina Faso at the moment. However, this is due to the fact that lamps are donated, and not sold, by the Republic of Taiwan and the State of Burkina Faso. Such a donation-based distribution model has the potential to scale-up very fast, but also bears the risk to gravely undermine the development of market-based supply chains for solar lighting products by decreasing the willingness to pay for these products among the population.

5.7 Agritech

5.7.1 The Company

Agritech is a private company based in China, created in 2007 and present in several countries in West Africa: Benin, Togo, Ghana, Côte d’Ivoire and Burkina Faso. Agritech works in a wide range of sectors such as the exportation of goods, after-sales and maintenance services, and product supply, including e.g. biodiesel products, tablets, sesame seeds and shea butter. The

company is also responsible for the regional implementation of the National Biogas Plan in Burkina Faso. The company started to work with solar technology in 2008, however it did not start distribution of portable solar lamps until very recently.

Agritech's Burkina Faso team is comprised of approximately 50 staff, with one office and stock site in Ouagadougou and one in Bobo Dioulasso. The company has sales representatives at the local level and hires external engineers for specific assignments.

5.7.2 The Products

Agritech has only recently brought samples of MG lamps to Burkina Faso, namely MG Photocall (medium size) and MG Power (small size).

Picture 5: MG Photocall (medium size)



Both models have a USB port and can be used as a torch or as a table lamp and can charge a mobile phone. These products are not yet for sale. Agritech is preparing a campaign to distribute these lamps that will be part of a larger program of the Ministry of Basic Education and Alphabetization called “One pupil, One lamp” (“Un élève, une lampe”) aimed at providing solar lamps for every primary school pupil in Burkina Faso. The company is currently negotiating with the Ministry. The exact number of lamps to be provided by Agritech and the distribution period will depend on the Ministry's decision. Agritech categorizes this project as part of its Corporate Social Responsibility plan and as a promotion campaign for solar technology and for their brand awareness. Ultimately, Agritech aims to stimulate the demand for larger solar technologies such as solar home systems.

Picture 6: MG Power (small size)



5.7.3 The Distribution Network

For their general installations and deliveries, the company owns two pick-up trucks and one car in Burkina Faso, and uses private bus companies such as TSR, TCV, Raquieta and STAF. In addition, clients also come directly to Agritech's offices to pick up their orders. The company does not have a specific distribution network for solar lamps since it has not yet entered the market and intends to delegate distribution to state authorities.

5.7.4 Analysis of Challenges and Success Factors

Agritech plans to open a shop ("boutique témoin") in every region in order to enhance its distribution in rural areas. However, the company identifies its main challenge as the recruitment of qualified salespeople with the ability to sell a wide range of products in a proactive manner. The qualifications for these positions have not yet been defined.

The company does not see a business case for solar lamps, having chosen to distribute them free of charge as a promotional tool for larger PV systems.

5.8 Soltech

5.8.1 The Company

Soltech BF is a private Burkinabé company located in Ouagadougou selling solar products to private individuals and distributors. Currently, Soltech BF has 15 permanent staff and around 50 temporary staff working regularly on installation sites. Soltech has sold solar lamps for more than four years and develops its own products (such as solar home systems with detachable neon lighting for courtyards).

The company has an administration office and a stocking place in two locations in Ouagadougou, but no retail shop. Soltech was created in 1995 by Mr. Alain Nana and has acted

as the representative of the Taiwanese solar product manufacturer Speedtech in Burkina Faso since the end of 2010.

5.8.2 The Products

The company's product catalog mentions solar lamps but does not offer any specific product references. Mr. Nana affirmed that solar lamps sold were mostly from Speedtech – the company offers five different solar lighting products from 0.75W to 20W. However, Soltech has not sold any solar lamps in 2013.

5.8.3 The Distribution Network

Soltech distributes solar lamps through a Direct-to-Consumer Model. The company orders solar lamps from Speedtech directly in Taiwan. They are delivered by air cargo. Soltech owns ten cars to transport its different solar products to anywhere in the country, and therefore never uses private bus companies. Mr. Nana affirmed that distribution is not an issue for his company. However, solar lamps seem to play only a marginal role in the company's overall activities.

5.8.4 Analysis of Challenges and Success Factors

Soltech believes that the market for solar energy is very large. However, Soltech is mainly active in larger solar installations.

In terms of awareness-raising, Taiwanese products such as Speedtech solar lamps are increasingly well known in Burkina Faso, given the number of public donations, public relations support from the Taiwanese Embassy, and the according media coverage.

5.9 K&K

5.9.1 The Company

K&K is a private Burkinabé company that has been operating in the renewable energy sector in Burkina Faso for the last 15 years. Although they provide a wide range of products and services, K&K is currently focusing on the supply of solar refrigerators, solar panels, etc. In Ouagadougou, the company has two retail shops and a separate stocking site.

5.9.2 The Products

K&K sells portable lighting lamps, however these only represent a small percentage of business activities, and are supplied as a complement to their other products. K&K has sold the model ru-811 for the last 1.5 years. These are electric lamps that have been adapted to solar technology, and are rechargeable. Even though sales of these lamps are limited, a new order will be placed if the remaining stock runs out. For the last year, K&K has also imported the Fosera lamps (Scandle 200).

5.9.3 The Distribution Network

The ru-811 lamps are imported from China and France. K&K brings them by maritime cargo to Burkina Faso, covering shipping costs. Fosera lamps are sent by air cargo and the transport price is included in the purchase.

K&K owns around 10 vehicles for their own use and does not offer delivery services. Their clients cover for the transportation of their goods. Among the clients there is a wide range of actors, from individuals to medium and large distributors (i.e. Smart Energy Services).

5.9.4 Analysis of Challenges and Success Factors

Solar lamps are a complementary activity for K&K as they are too expensive for their target clients. K&K does not see a large market for solar lamps without subsidization and K&K's CEO plans to buy and donate solar lamps to the pupils of his village.

5.10 Other solar lamps

MicroEnergy International's field missions in the departments of Dédougou, Yako, and Fada N'Gourma and in Ouagadougou indicate that the market for solar lamps other than those studied so far (mostly cheap models imported from China) is comparably modest in size. According to CB Energie's CEO Arnaud Chabanne, between 2 to 5 containers containing such products (i.e. a few thousands units) might have entered Burkina Faso so far. This number might rise however, given the tax cut on solar products, which went into effect in January 2013 in Burkina Faso.

Picture 7: Dynamo and Solar Lamp LS-360 on Sankariaré Market (Ouagadougou)



At the level of **remote villages**, other solar lamps are very rare: No solar lamps of any kind were seen or mentioned by interviewed shop retailers in remote villages around Yako (Lèmséré and Zonogbega). The same applies to remote villages in the Fada N'Gourma region (Diapangou

and Tangaye, and Gounghin). In Gounghin, one shop owner affirmed that he had already seen solar lanterns, but did not buy them because they were too expensive for his customers. No such lamps were observed when visiting local retailers in Karo, either (remote village visited in the Dédougou department).

At the regional **city** level, the situation is different from one region to the other. In Yako, no solar lamps were seen (beyond TOTAL's) and several shop retailers (Oking and Airtel mobile phones shops, ISEC, etc) had never heard of solar lamps. At the Grand Marché in Fada N'Gourma, one large battery lamp retailer (selling approximately 450 lamps per week) had never seen solar lamps. Another one said he had bought solar lamps for FCFA 6,000 (USD 12.20) from a wholesaler in the Market of Sankariaré in Ouagadougou (one of the three main markets in the city center) and was able to sell them all. At the Pouytenga market (between Ouagadougou and Fada N'Gourma but more relevant to the north-east Region than the Market in Fada N'Gourma, according to local dwellers), one shop was identified that had sold 100 solar flashlights for FCFA 4,500 (USD 9.15) per unit over the last months. This shop imported their products (including battery lamps and solar panels) themselves directly from Dubai by airfreight. No solar lamps were seen when observing local retailers in Dédougou.

In **peri-urban Ouagadougou** (Boulmiougou neighborhood), one shop visited, reported having already sold solar lamps, but could not say how many.

In the **Ouagadougou city center**, wholesalers were visited in the three main markets: Grand Marché, Sankariaré, and Zaabre Daaga.

At the Sankariaré Market, one wholesaler sold solar lamps costing approximately FCFA 7,500 (USD 15.25), alongside battery operated lamps. The product was imported directly from China, by maritime cargo through Lomé (Togo). A Burkinabé partner based in China takes care of the exportation. Wholesalers either pick the products up in Lomé (a bit less expensive, according to this wholesaler) or have them delivered by 10t trucks to Ouagadougou.

At Grand Marché, two unidentified models costing FCFA 17,500 (USD 35.58) each, were found in one shop, imported directly from China along with other electronic devices (battery lamps, radios, solar panels, TVs, etc.). Another battery lamp wholesaler said that he had had solar lamps in the past, costing FCFA 7,000 (USD 14.23) but affirmed that the margin was too low to continue selling them.

5.10.1 Analysis of Challenges and Success Factors

Thus far, importation of other solar lamps has been modest because of the lack of organized importation channels, the uncertainty of the demand for wholesale importers, and the costs related to the value-added and importation tax. It is probable however, that these importations will significantly rise in the next months (e.g. similarly to the neighboring country Mali) following the recent tax cut on solar products.

6 Mapping, description and analysis of sister supply chains

6.1 Selected potential sister supply chains

Based on the method described in chapter 2 of this report, the following supply chains were identified as potential sister supply chains among products available at the last-mile:

- Hamilton cigarettes
- Neon tube lamps and
- Battery lamps

These products have a ratio in both price per weight and price per volume comparable to the solar lamps available in Burkina Faso. Table 12 shows the price/weight/volume ratio calculation for solar lamps available in Burkina Faso. The price to volume ratio is 3 on average, and the price to weight ratio 15. Table 13 shows the example of the analysis of one shop inventory in the village of Karo. With a ratio of 3 (price to volume), and 15 (price to weight) the cigarettes have the closest value to that of the lamps.

Table 12: Weight/volume/price ratio for solar lamps available in Burkina Faso

Solar Lamp	CB Yelee Petit	CB Yelee Moyene	CB Yelee Grande	Dlight S10	Sundaya Utilium - 1 bulb	Sundaya Utilium - 4 Bulb	Sun King Eco	Sun King Pro	Average
Size of lamp (cm)	Height x Diameter 22.5x15	Height x Diameter 27.5x15	Height x Diameter 33.5x20	20 x 8.8 x 8.8	10x10x18	10x10x21	17.8x17.2 x29.2	17.8x16.5 x 30.5	
Volume of lamp package cm ³	3,976	4,860	10,524	1,823	7,800	19,500	8,907	9,294	8,335.5
Price to volume ratio FCFA/cm ³	3	3	3	3	4	4	1	2	3
Weight	700	800	2700	300	1700	4700	610	1180	
Price to weight ratio F CFA/g	16	16	11	18	16	17	12	16	15
Price FCFA	11,000	13,000	30,000	5,500	28,000	80,000	7,500	19,000	24,250

Table 13: Example of shop inventory (village of Karo)

The product	Matches (x100 boxes)	Condom (package of 22 boxes with 4 each)	Soap	Carton of cigarettes	Tea Cheval x4	Led battery lamp	Neon tube 6W 12 volts (from Morocco)	Phone card credit
Size of product (LxBxH in cm)	26x15x7,5	23x12x7	8x8x6	30x9x5	20x7x4,5	20x10x6	23x4x5	2,5x1,5
Volume of product in cm ³	2925	1932	384	1350	630	1200	460	1
Price to volume ratio F CFA/cm ³	1	1	1	3	1	1	3	667
Weight of single product in g	500	250	500	250	250	420	220	10
Price to weight ratio F CFA/g	3	4	1	16	2	4	7	50
Price in FCFA	1,500	1,100	350	4,100	600	1,500	1,500	500
Purchasing frequency	Every week	Every week	Every 5 to 10 days	5 times a week	3 to 5 times a week	4 times a week	Every month	3 to 5 times a week
Purchase quantity	2 units per month	3 units per month	200 to 400 units per month	20 units per months	25 units per month		12 to 20 units a year	3000 units per month
Means of transportation to reach the shop?	Own tricycle	Own tricycle	Own tricycle	Own tricycle	Own tricycle	Motorcycle	Motorcycle	Motorcycle
Who brings the product to the shop?	The shop owner personally	The shop owner personally	The shop owner personally	The shop owner personally	The shop owner personally	The shop owner personally	The shop owner personally	The shop owner personally
Costs of transportation	Fuel (3 liters) or 6500 FCFA for the trip (50km)	Fuel	Fuel	Fuel	Fuel	Fuel	Fuel	Fuel

A further criteria for choosing potential sister supply chains is the similarity of products in terms of end use. Neon tube lamps and battery lamps are dedicated to the same end use as solar lamps, in addition to having a comparable price per volume.

Cigarettes on the other hand, do not share an end use, and the supply chain of cigarettes is less comparable with the ones of solar lamps; at least as long as small quantities are transported. Cigarettes do not face the same challenges concerning the fragility of the product

during transport as solar lanterns, and they are often transported as passenger baggage within the bus.

Additional products were also investigated during the field research, such as radios, torches, rice, tea, and cereals, since retailers and wholesalers often sell and transport a range of products. The transportation of rice, tea and cereals was investigated in order to evaluate potential differences between supply chains for food products and further consumer goods, particularly electronic devices. Radios and torches are of particular interest because of the similar final use of the product. The aim was to check for potential differences between electronic devices in terms of transportation.

6.2 Analysis of potential sister supply chains

This chapter presents the results from key informant interviews and field observations of the distribution and supply of the identified potential sister supply chains in the study regions of Yako, Fada and the Ouagadougou peri-urban periphery. Insights about the supply chains are presented in tables and maps to provide an overview of the product flows within the hub and spoke systems, and to present differing transportation means and costs.

Picture 8: Batteries and lamps in a shop in Yako



Complex and effective systems of markets play a crucial role in distributing consumer products in the visited regions. End users, suppliers and wholesalers all purchase goods at these commercial centers. Markets attract thousands of people, primarily reaching the consumer by intermediary means of transportation or on foot. (ANNEX 8)

Last-mile retailers either buy their stock in a large nearby shop, or, if they can afford the trip, travel to the next market or regional town. They transport small amounts of goods with intermediary means of transport like bicycle, tricycle motorbike or motorcycle.

Due to limited financial capacities, last-mile retailers often purchase only what they are certain to sell, i.e. what the customers usually order, such as rice, cigarettes, washing powder, concentrated tomato sauce, soap, etc. The transportation frequency is higher since they cannot afford to buy large quantities at once. A few of them travel several times per day to the nearest

shop to buy products for their costumers. As a result, the margin they earn for these products is very low. Thus, supply to remote villages is highly demand driven.

Interviewed last-mile retailers own small shops at the village level and get their supplies from:

- The nearest small-scale wholesaler
- The nearest larger shop
- The local market

Smaller-scale wholesalers and owners of larger shops (mainly situated in regional towns) are able to pay larger costs upfront, and therefore, get their supplies from the large markets in Ouagadougou and bring them to their respective stocks in the cities where regional markets are located, or even import directly from other countries. Since the traveled distances are higher and they rarely own vehicles, it is common to use private bus companies and hired trucks as transportation means.

The supply of big brands, however, is different. Retailers and wholesalers order the products in Ouagadougou, where the companies hold their stocks. The products are then delivered directly to the regional towns with the company's own vehicles. The companies also take care of the marketing in the villages and at the markets, where the company staff attend by means of smaller vehicles such as tricycle motorbikes and motorcycles.

Large wholesalers that have the capacity to pay large upfront costs on purchasing and transportation, import consumer products to Ouagadougou or to the main regional towns. They primarily use 10-ton trucks to transport their stocks. Most of them own these vehicles.

The supply of consumer goods in Burkina Faso operates on the basis of a hub and spoke system (Starkey, 2007) at several levels. Burkina Faso's key transport hub is the capital, Ouagadougou, from where imported products are distributed all over the country. Key rural transport hubs in the regions are provincial, regional and market towns, and villages. The various hubs and spokes use combinations of transport means including trucks, buses, tricycle motorbikes, motorcycles and bicycles. The sister-supply chains selected for this study are all transported within these hub and spoke systems.

6.2.1 The hub and spoke system of Yako

Yako is the main market town of the Yako department (see figure 13). Last-mile retailers from villages situated in a radius of approximately 20-30 km, like Tindila and Lemseré, come here to buy their stocks. Retailers from Zonogbega buy their stocks in Arbolé. Products available in Yako are either bought directly in Ouagadougou, or from wholesalers in Yako, who buy the products in Ouagadougou. Wholesalers and shop owners organize the transport themselves using private bus companies, informal transportation services or their own vehicles.

Figure 13: The hub and spoke system of Yako

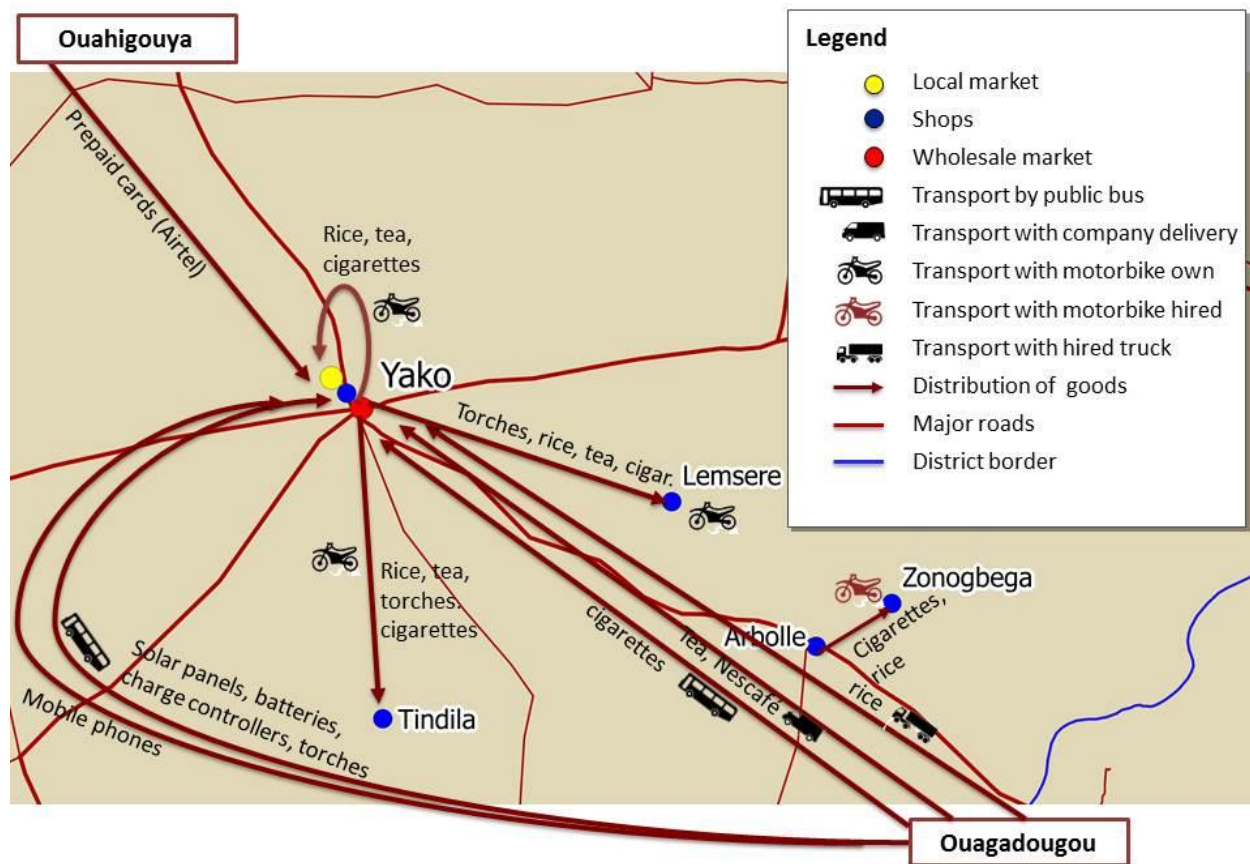


Table 14: Hubs, spokes, transportation means and exemplary prices in Yako

Product	Seller	From hub	To hub	To village	Transportation means	Transportation cost FCFA	Distance	Price/package-km FCFA
Cigarettes (12 carton/package)	Last-mile retailer	Arbolé		Zonogbega	Hired tricycle motorbike	n.a.	7 km	n.a.
Rice (25 kg bag)	Last-mile retailer	Arbolé		Zonogbega	Hired taxi moto	100	7 km	14.2
Cigarettes, Rice, Tea, Torches	Last-mile retailer	Yako		Tindila	Own tricycle motorbike	n.a.	27 km	n.a.
Rice (25kg bag), Tea, (carton 50x40x40) Cigarettes (12 cartons/package) Torches (carton 50x40x40, 20 pcs.)	Last-mile retailer	Yako		Lemsere	Hired motorcycle	250 / package	35 km	7.5
Rice, Tea, Cigarettes, torches	Market shop owner	Yako	Yako		Hired taxi moto	50 / package	n.a.	n.a.

Flashlights (package with 12)	Shop-owner	Ouagadougou (Sankariaré Market, Zabre Daaga)	Yako		Private bus company	1,000 / package	110 km	9
Mobile phone	Shop-owner	Ouagadougou	Yako		n.a.	n.a.	110 km	n.a.
Telephone card (Airtel)	Shop-owner	Ouahigouya	Yako		n.a.	n.a.	110 km	n.a.
Solar panels (4 per package), batteries, charge controller	Shop-owner	Ouagadougou	Yako		Private bus company	8,000	110 km	n.a.
Rice (25 kg bag)	Wholesaler	Ouagadougou	Yako		Hired 10 ton truck	5,000/ton, 2,000 including unload	110 km	1.5
Cigarettes (12 cartons/package)	Wholesaler	Ouagadougou	Yako		Private bus company	100/package	110 km	0.9
Tea and Nescafé	Wholesaler	Ouagadougou	Yako		Delivered	n.a.	110 km	n.a.

6.2.2 The hub and spoke system of Fada

Fada is the main market town of the Gourma Department. Every Sunday there is a large market where mainly large wholesalers sell their products to retailers from the surrounding villages. The second market town in the region is Pouytenga, where the market takes place every three days. As it was stated in key informant interviews in Diapango, it is cheaper to travel to Pouytenga than to Fada, even if Fada is closer. As a result, retailers who can afford it, go to buy their stock in Fada. Last-mile retailers who cannot afford even to travel to the market towns buy their stocks in nearby villages, as is the case e.g. between Tangaye and Diabo.

Fada N’Gourma is also a transportation hub for cross border transport with the neighboring countries of Niger, Benin and Togo. Wholesalers selling their stocks to retailers in the region are situated there. The products are transported with trucks to and from the neighboring countries and to smaller towns and villages of Burkina Faso.

Figure 14: The hub and spoke system of Fada

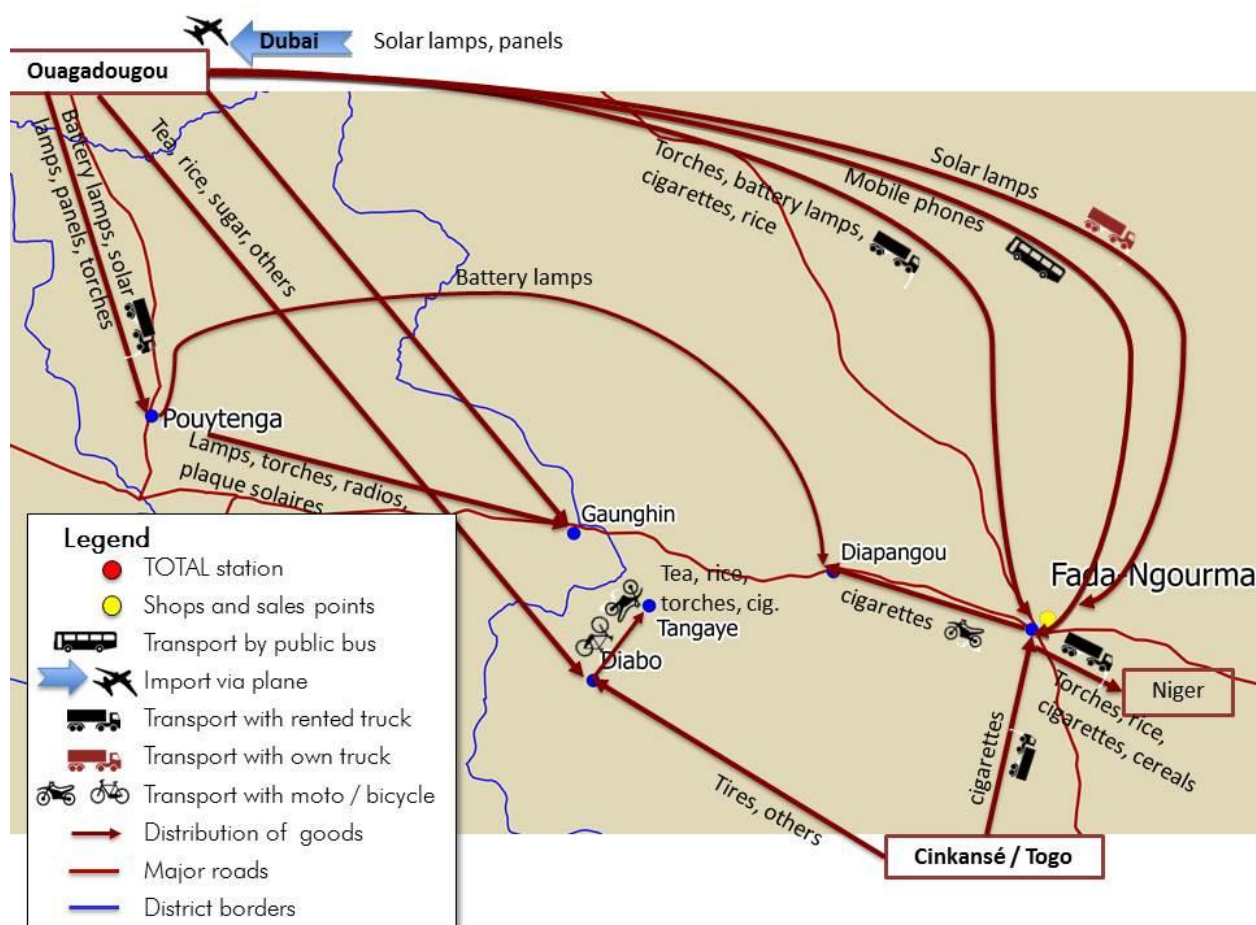


Table 15: Hubs, spokes, transportation means and prices in Fada

Product	Involved actor	Imported from	From hub	To hub	To village	Transport means	Transport cost FCFA	Distance	Price/package-km
Cigarettes	Last-mile retailer		Fada		Diapangou	Own motorcycle	n.a.	20 km	n.a.
Battery lamps (10 pcs./package)	Last-mile retailer		Pouytenga		Diapangou	n.a.	n.a.	78 km	n.a.
Tea, rice, torches	Last-mile retailer		Diabo		Tangaye	Own motorcycle	n.a.	9 km	n.a.
Tea, cigarettes	Last-mile retailer		Diabo		Tangaye	Bicycle	n.a.	9 km	n.a.
Battery lamps, torches solar panels	Last-mile retailer		Pouytenga		Gaunghin	n.a.	500 / package	58 km	8.6
Battery lamps, torches	Market shop owner		Ouagadougou (Sankariaré)	Pouytenga		n.a.	n.a.	135 km	n.a.
Solar torches	Wholesaler	Dubai via Ouagadougou		Fada		Airplane + truck, tricycle	n.a.		n.a.

						motorbike			
Battery lamps, torches	Salesman		Ouagadougou (Sankariaré)	Fada		Hired truck	300 / package	223 km	1.3
Mobile phones	Salesman		Ouagadougou (evening market)	Fada		Private bus company	1,500 / package	223 km	6.7
Rice (25 kg bag)	Wholesaler		Ouagadougou (grand marché)	Fada		10 ton truck	100,000/truck (shared with others)	223 km	1.1
Cigarettes	Wholesaler	Togo via Cinkansé		Fada		n.a.	n.a.		n.a.
Rice (sack)	Transporter		Fada	n.a.		Car	1,000	n.a.	n.a.
Cereals (sack)	Transporter		Fada	n.a.		10 ton truck	500	n.a.	n.a.
Torches, cigarettes	Transporter		Fada		villages north/east	10 ton truck	100 / package	n.a.	n.a.

6.2.3 The hub and spoke system of Ouagadougou

Retailers or regional wholesalers mostly buy their stock in Ouagadougou. Large wholesalers (“Grands Commerçants”), who are mainly based in **Ouagadougou**, import the vast majority of consumer products available in Burkina Faso. They import their stocks primarily from China and Dubai by maritime, cargo train, truck and, in rare cases, by plane. From Ouagadougou they sell the products to further wholesalers all over the country (figure 15).

This network of wholesalers is very complex with multiple and diverse links, which is hardly transparent to outsiders; information not only on volumes of imports, sales, and taxes, but also on the provenance and quality of the products, is handled with high discretion.

In addition to in the regions and rural areas, markets also play a crucial role in Ouagadougou. Often wholesalers have several shops there. Interviewed regional wholesalers stated that they buy their stocks on the markets in Ouagadougou. The most relevant markets in Ouagadougou are:

- Sankariaré
- Grand Marché
- Zaabre Daaga (Evening Market)

Field observation and interviews in Ouagadougou revealed that the five largest wholesalers of rice, for instance, are all based at the Grand Marché of Ouagadougou. Large wholesalers transport products to their warehouses by truck. The retailers and smaller wholesalers use their own means of transportation to bring their products to the regions.

Figure 15: The hub and spoke system of Ouagadougou

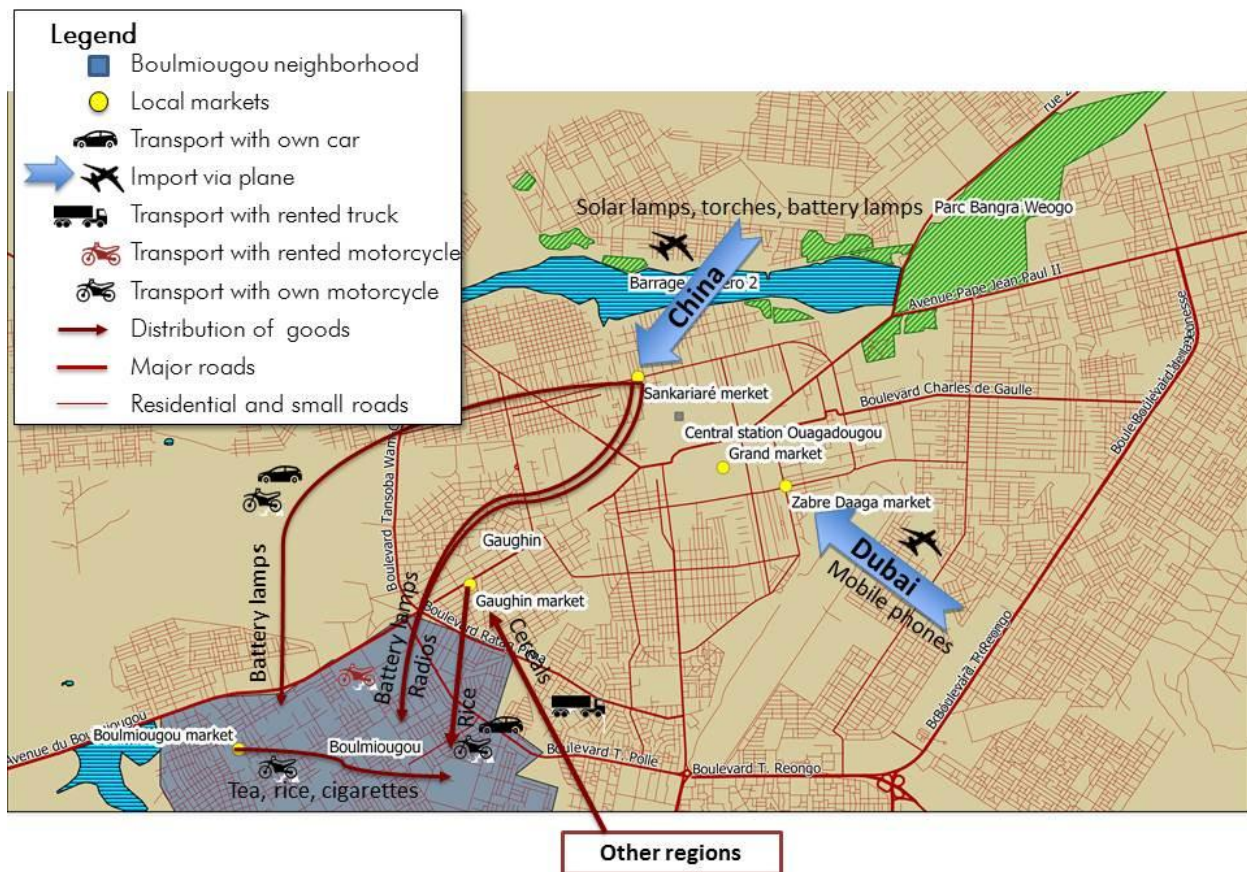


Table 16. Hubs, spokes, transportation means and prices in Ouagadougou periphery

Product	Seller	Imported from	From hub	To hub	To neighborhood	Transportation mean	Transportation cost FCFA
Rice, tea, cigarettes	Last-mile retailer		Boulmiougou		Boulmiougou	Own motorcycle	
Battery lamps	Last-mile retailer		Ouagadougou (Sankariaré)		Boulmiougou	Hired tricycle motorbike	50
Radio	Last-mile retailer	China	Ouagadougou (Sankariaré)		Boulmiougou	Bike	

Rice	Retailer		Gounghin (grand marché)		Boulmiougou	Tricycle motorbike, car	Variable fees
Battery lamps	Retailer		Ouagadougou (Sankariaré)		Boulmiougou	Tricycle motorbike, car	Variable fees
Solar lamps	Retailer	China		Ouagadougou (Sankariaré)			
Torches	Wholesaler	China		Ouagadougou (Sankariaré)			
Rice	Wholesaler				Whole country/ neighborhoods		
Sugar (50 sacks)	Transporter				Neighborhoods		750
Local cereals	Retailer	Regions of Burkina Faso		Gounghin (grand marché)			1,000 /100 kg
Divers products	Retailer			Gounghin (grand marché)		Tricycle motorbike	75 / sack, 50 / package
Mobile phone	Retailer	Dubai		Ouagadougou (evening market)		Airplane	1,000 / kilo
Solar lamps	Retailer	China		Ouagadougou (evening market)			
Battery lamps	Retailer	China		Ouagadougou (evening market)			

6.3 Conclusions

The following conclusions can be summarized based on the above-described hub and spoke systems.

In the scope of this study, **no significant differences between the sister supply chains** with regard to transportation means, transportation costs and distribution models could be found. In general, wholesalers and retailers transport a range of different products. Transportation costs and means depend on distance, quantity of goods and on the financial capacity of the retailer/wholesaler. Trucks are used for long distances and large quantities of goods, mainly between Ouagadougou and the regional towns. This is the most cost effective means of transportation. For shorter distances intermediary means of transport, which are more expensive, such as tricycle motorbikes and motorcycles are used. The findings revealed that solar lamp distributors preferred using their own trucks for transporting products over long distances and their own tricycle motorbikes for short distances, also in consideration of poor road conditions in rural areas.

The costs for transportation indicated in table 17 are rough estimates based on the findings from the field research. Based on the findings regarding transportation costs, transportation of solar lamps is expected to cost FCFA 5 per package of ca. 10 lanterns (depending on the size) for longer distances (Ouagadougou to Bobo Dioulasso) and between FCFA 20 and 10 for shorter distances.

The distribution is organized for all products in a similar manner. It is split between different levels of the hub and spoke system. At each level different actors organize the transportation. Wholesalers only sell up to the level of regional towns; from there, retailers organize the supply. Last-mile retailers buy from the next larger shop where they can afford to go.

Figure 16: Sister supply chains flowchart

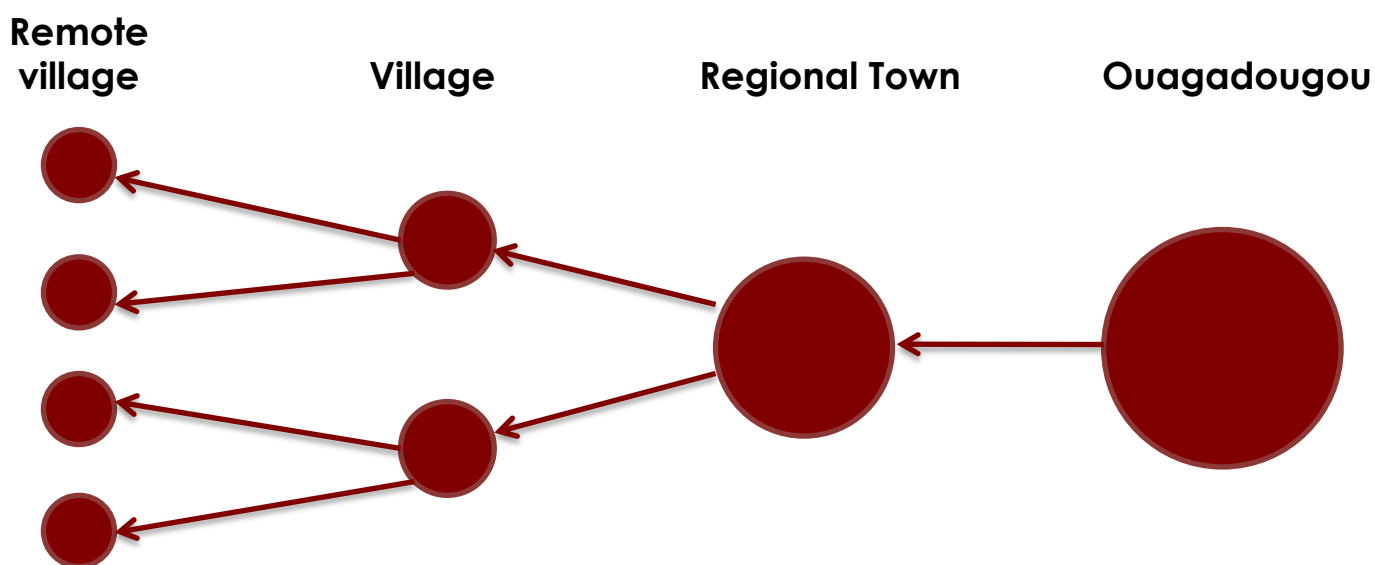


Table 17: Sister Supply Chain Transportation Costs and Means

	Retailer last-mile	Retailer small wholesaler	Wholesaler
Price/Package	FCFA 50 - 250	FCFA 100 - 1,000	FCFA 1,000 - 2,000
Transportation means	Tricycle motorbike, motorcycle	Tricycle motorbike, motorcycle	Private bus company truck
Expected price/package solar lamps	FCFA 200	FCFA 500	FCFA 1,000
Preferred transportation mean for solar lamps	Own vehicle, tricycle motorbike	Own vehicle, tricycle motorbike	Truck

Large and medium wholesalers, who are the intermediaries to the local and last-mile retailers, are actors who could effectively distribute solar lamps across the entire country. Annex 8 presents six of the largest wholesalers in Burkina Faso, four of them selling products identified as similar to solar lighting products, which declared during interviews as having an interest in

selling solar lamps. A short summary of their respective supply chains provides an overview of their distribution potential.

Another list of contacts of wholesalers specialized in larger solar products (i.e. PV panels) and battery lamps at Ouagadougou's Grand Marché can be found in ANNEX 7.

At the village level, there is little to no specialization regarding product groups. However, lack of working capital leads to highly demand driven and risk-averse stocking behavior of last-mile retailers, who only purchase products they are sure to sell. This means that in addition to pushing the solar products via wholesalers into the market, a **pull for solar lamps has to be created**. A **demand for the products has to be created** via awareness raising campaigns and marketing in order to create a pull for the product.

At the regional level, where small wholesalers are active, specialization regarding product groups can be observed, e.g. cereals, electrical devices, and daily goods.

Battery lamps have the **most promising sister supply chain**. Suppliers of battery lamps may be more interested in adding solar lamps in their portfolio since they are already selling lamps. This was corroborated during the interviews with retailers and wholesalers often stating their interest in also selling solar lamps, and some already having started to do so (generic products with no particular brands, or brands too negligible to be listed exhaustively in this report). Furthermore, the suppliers of electrical devices might have technical knowledge and could, therefore, have higher capabilities to sell the products including soft components such as product information and information about usage requirements.

The above findings along with the findings described in Chapter 4 on transportation lead to the **following recommendations**:

- Use one's own transportation means to the regional towns and markets in order to be independent from unstable transportation costs and schedule.
- Create a strong demand with marketing campaigns
- Provide marketing training for wholesalers and retailers specialized in electrical devices
- Make sure products are packaged in a way that motorcycles can easily transport them to the last mile
- Besides distribution and transport with one's own vehicles, an additional strategy could be to cooperate with large wholesalers. Interviewees stated that if large wholesalers sell a product, the product is available everywhere because of the wholesalers' power to push products in the market.
- Search for organizations and partners that are able and willing to provide working capital to retailers in order to enable them to buy a small stock of lamps. Share the risk with the loan-provider to encourage the retailers to offer solar lamps at a remote level, even if local demand is not strong yet.

7 Main findings

7.1 Mapping of commercial actors distributing solar lamps

The market for portable solar lighting products is still in its infancy in Burkina Faso, with only one producer and less than a dozen importers active in this field. Their experience and size vary in many aspects, from large multinational companies to small and medium enterprises. They also differ with regard to distribution models, main activities, and share of the market.

CB Energie, Actualité Energie, Soltech and K&K have up to 15 years of experience in solar product distribution in Burkina Faso, whereas TOTAL, Nafa Naana and Smart Energy Services have been present in the solar lamp market for less than one year.

Only CB Energie focuses on the distribution of solar lamps. Other companies such as Nafa Naana, Soltech, Agritech and K&K mainly focus on the distribution of other (solar or renewable energy) products. The distribution of solar lamps is a complementary activity to their usual business, with a few of them responding to calls published by the government or international development organizations.

Smaller companies and NGOs, who need to break even in shorter terms in order to develop a sustainable solar lamp business, have limited opportunities to organize awareness raising campaigns or to offer financing at the last mile in order to create the necessary pull in the market. The low ability and willingness to pay by the end users, reported by a few actors during the interviews, also limit the possibilities to cover costs through adequate margins. For larger companies, distribution and awareness raising on a national scale is easier to implement, particularly since they consider it a part of their corporate social responsibility activities.

Table 18: Highlights of existing distribution models and supply chains

Distributor	Size of company	Present in BF (years)	Evolution of sales	Distribution model	Activity focus on solar lamps (yes/no)
CB Energie	Medium	15	Slow, steady	Distributor-Dealer, Proprietary distribution	Yes
TOTAL	Large	<1	Growing	Institutional Partnership, Proprietary	No
Nafa Naana	Small	<1	n.a.	Proprietary	No
Smart Energy Services	Small	<1	Insignificant	Proprietary	No
Actualité Energie	Small	12	Insignificant	Proprietary	No
K&K	Medium	15	Insignificant	Proprietary	No
Soltech	Medium	18	Insignificant	Proprietary	No
Agritech	Large	7	Insignificant	Proprietary	No

None of the actors claim significant sales so far. However, while TOTAL's sales are (comparatively) rapidly growing, CB Energie's sales are slow although they have experienced steady growth over the last four years. Nafa Naana's activities began too recently to identify a trend. All other retailers have insignificant sales (under 500 units per year). This is also true for the other types of lamps on the informal market. In terms of free distribution, the development project "Une Lampe pour l'Afrique" has distributed 15,000 lamps in the last two years and plans to distribute 120,000 more by the end of 2014. Agritech is also planning to donate solar lanterns to pupils in rural areas of Burkina Faso (within the framework of a regional campaign aiming to distribute 1 million lamps in all West African countries where Agritech is present: Benin, Togo, Ghana, Ivory Coast and Burkina Faso).

7.2 Solar lamp distribution and supply

Among the distribution models presented in chapter 1, the following are implemented for distribution of solar lamps in Burkina Faso.

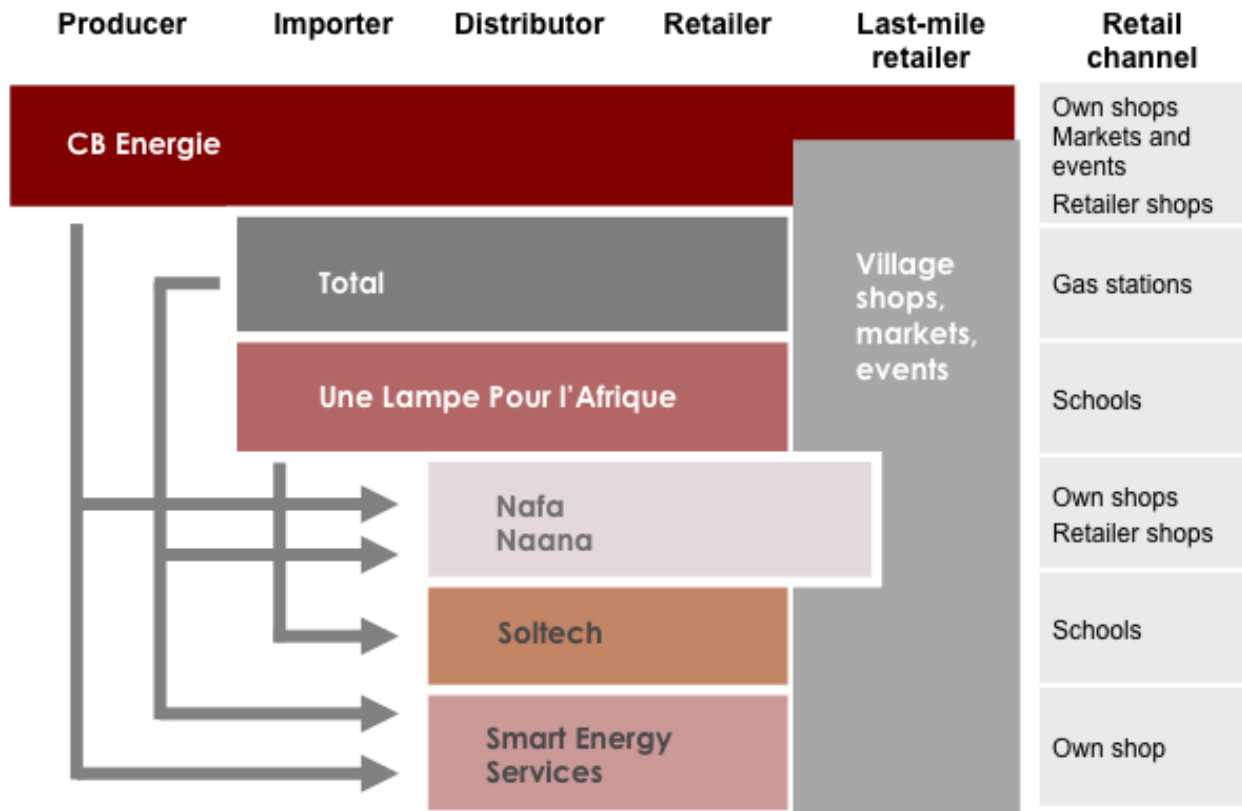
- CB Energie uses a mix of Distributor-Dealer and Proprietary Distribution Models
- TOTAL works mainly with a Proprietary Distribution Model, but also entered into a partnership with Nafa Naana (Institutional Partnership Model) and aims to develop more of these partnerships
- The other solar energy SMEs also use a Proprietary Distribution Model
- During the study, no examples of the Franchise and Rental/Leasing models were found for portable lighting products

Actors also differ with regards to the integration of the supply chain into their activities (see Figure 17). CB Energie is currently the only actor who covers the whole supply chain from production up to last-mile retail.

At the current state of the market, important synergies could be leveraged if players would collaborate in their distribution activities: centralized, large-scale and widespread distribution has the biggest potential to transport products in the most effective manner from the capital to the town level; then, stakeholders who are more specialized in enabling and strengthening local markets and rural communities, such as microfinance actors, SMEs, NGOs and cooperatives can take over to ensure the last-mile distribution.⁹

Figure 17: Supply chain integration of main solar lantern distributors

⁹ Data on ability and willingness to pay for solar lamps were not yet available when this report was produced.



7.3 Sister supply chains

Products identified as potential sister supply chains in the scope of this study were cigarettes, neon tube lamps, and battery lamps. Further products investigated were radios, torches, rice, tea, and cereals. During field investigation with interviews and observations, no significant differences between the supply chains of these products in terms of actors involved, transportation means from the capital city to the remote village level, cost, or distribution models could be identified. However, the wide spread of these products shows that it is possible to distribute in the country without one’s own distribution facilities, if local wholesalers and distributors are integrated in an adequate manner.

The most common transport means for long distances is by 10t truck, or for smaller quantities a van. Transport at the last-mile is done with smaller vehicles such as tricycle motorbikes and motorcycles due to poor road conditions, especially during the rainy season.

Actors can be differentiated according to the different steps of the supply chains. Retailers and last-mile retailers take care of the last-mile transport between villages and regional towns. Larger retailers and small and medium wholesalers take care of the transport from the main transport hub Ouagadougou to the regional towns. Large wholesalers import the products to Burkina Faso and sell from their stocks in Ouagadougou, with a few of them also being located in the regional towns.

Markets play an important role in distributing products to the last-mile. Sometimes, thousands of people come to the markets. Assembling people from different villages in one place and on one day renders markets the perfect locations for awareness raising and selling lamps to different target groups.

Battery lamps have the most promising sister supply chain because of the similarity of the product with regard to its final use. Wholesalers and retailers of battery lamps may be more interested in adding solar lamps to their portfolio since they are already selling lamps and might have higher capacities to sell the product together with its soft components like product information and information about use requirements.

7.4 Bottlenecks and success factors

Demand-related bottlenecks and success factors

All solar lamp distributors encountered stressed the lack of awareness, understanding and trust of the population regarding solar lighting products, which are required to create a pull on the demand side of the market. This was confirmed during the field investigations. There was an overall lack of awareness of solar lamps in remote villages. Most villagers encountered in remote areas of the regions of Yako and Fada had still never heard of solar lamps. Among those who were aware of their existence, many lacked the understanding about the technical differences between solar and battery lamps. They would mistakenly affirm that a shop sells solar lamps, while this shop would actually sell battery lamps. According to a manager in Yako, the lack of understanding of warranty coverage also prevents customers from investing in solar lamps. The level of awareness of solar lamps is higher among retailers than among customers, since retailers travel more regularly to larger villages and cities to purchase their products. However, a local battery lamp retailer in Yako affirmed that his lack of trust towards the exact life expectancy of solar lamps prevents him from purchasing them.

According to one company, this lack of trust is related to the lack of experience of rural customers with high-quality, long-lasting products, and with warranty mechanisms. Accustomed to highly obsolescent products, the majority simply does not believe that the higher price is justified by a higher life expectancy, nor that the real possibility of return, repair, or exchange of the product in case of malfunction, exists.

Some of the solar lamp retailers undertake awareness-raising activities, including product presentations at markets and other gatherings; a large advertisement campaign on the radio, in the streets and in print media; and presentations of products to groups.

The lack of a clearly defined demand for solar lamps that could be up-taken by last-mile retailers is not yet found in the country, even though the need for this kind of technology exists. Furthermore, last-mile retailers found in Fada and Yako regions currently work with very low cash flow and, hence, direct their purchases to the identified demand of their customers.

Supply-related bottlenecks and success factors:

Reaching the Base of the Pyramid is costly. Whether **transportation costs** constitute a bottleneck or not will depend on the actual ability and willingness to pay for solar products¹⁰, i.e. on the final price and financing mechanism at delivery. So far, the analysis of transportation costs from the capital city to remote rural areas shows that the volume/weight/value ratio of solar lighting products that have met LA's minimum quality standards is comparable to the ratios of other goods that are widely distributed through regular channels (cigarettes, battery lamps, etc.). This means **it is mainly a question of value proposition and financing at the last mile that has to be solved.**

One way to reduce transportation costs would be to include the transportation of solar lamps in large transportation infrastructures. This is how TOTAL, for example, is able to realize economies of scale when delivering its lamps to the main towns of Burkina Faso. TOTAL's centralized transportation model for solar lamps is by far the most efficient, but requires an already existent, well-organized and far-reaching transportation infrastructure and is cross-subsidized by the co-transportation of other goods with higher margins.

As marketing and awareness raising is critical for product placement, **marketing costs** represent a bottleneck for energy SMEs to scale up their activities, since they do not have the means to finance large campaigns to significantly support the uptake of their products, particularly as awareness is not only needed for specific products but for the use of solar lamps in general.

These costs have been reduced in different ways in Burkina Faso:

- Inclusion in general brand promotion;
- Partnerships with NGOs to share the costs and take advantage of their ability to mobilize public funds;
- Target commercial hubs (such as regional markets, traditional festivities, fairs and festivals) to reach as large an audience as possible;
- Mobilization of community group leaders who can pass on the (marketing) information to a larger audience at the Base of the Pyramid.

Capacity-building efforts are the next bottleneck for solar product distribution. Solar lamp retailers differentiate between the costs of recruiting and the costs of training their retailers.

For example, one solar company stated that finding the appropriate last-mile retailers would be key to further develop their activities in rural areas. Two other companies affirmed that trainings were very costly. A few companies offer training to their retailers in a systematic manner. This training entails general information on solar lamp functions and advantages, warranty coverage, and marketing techniques.

In order to optimize capacity-building costs, companies have to target potential retailers that have qualified salesmen and that are already connected to potential customers. Without this network, companies may have a limited reach.

¹⁰ Numbers were not available yet, when this study was conducted

The costs of capacity building are one of the reasons why distribution models involving many remote retailers have not proved successful thus far. In this respect, it is telling that only small amounts of total sales of solar lighting products are made through local retailers, and that no micro-franchise model exists in Burkina Faso for solar lamps.

In addition, building capacities does not significantly help in the uptake of solar lamps if there is not enough pull on the demand side to foster the commercial activities of these retailers.

Financial bottlenecks and success factors:

The **upfront costs** of most solar lamps (between FCFA 5,500- FCFA 45,000) were often said to be **too high** not only as compared to most of the rural population's ability to pay, but also to trigger the population's willingness to pay. In Gounghin in the Fada region for example, a last-mile retailer said that he believed that his customers could not pay the price of solar lamps, which is why he would not purchase them.

Whether this perception can be verified in the field, is the subject of a parallel study on lighting consumption in Burkina Faso. Independently of this, one solution to reduce the upfront costs of solar lamps and thereby extend the availability of solar lamps to larger segments of the population is to develop alternative financing mechanisms. In this respect, one company is developing a very promising approach, targeting savings groups in order to offer staggered payments for its lamps.

According to all minor solar lamp retailers, battery lamp wholesalers encountered at the Grand Marché in Ouagadougou, and last-mile retailers encountered at the village level in the Fada and Yako regions, the **margin** fixed by some companies for selling solar lamps is **too low** at the moment to sustain their business, i.e. to cover their expenses. For a higher margin they would need to sell the lamps for a higher price. A shop owner in Yako affirmed that a margin of approximately FCFA 2,000 per item would motivate him to purchase and retail solar lighting products.

There does not seem to be a general understanding among the population about the long-term financial advantages of solar lamps as compared to battery lamps. Battery lamps, which were identified as a valuable sister supply chain to build on for introducing solar lanterns that have met LA's minimum quality standards in Burkina Faso (through cooperation with respective wholesalers), have a much lower up-front price than solar lamps. Replacing battery lamps by solar lamps via the battery lamp wholesaler network will require awareness raising efforts among the population.

Another bottleneck is the **financing difficulties affecting energy SMEs** wishing to buy stocks of solar lamps. For example, one company was only able to purchase lamps with the help of an external partner. The company is willing but not able to purchase a new stock of lamps, and states that it would need a loan of approximately USD 61,000 to order a container of lamps for retail. This problem explains the current general lack of available solar lighting products (in quantity, quality, or diversity of products) in Burkina Faso.

Policy

A major aspect affecting importers of solar products in Burkina Faso is the budget law, which entered into force on January 1st, 2013, which introduces a value-added tax and import tax exemption for the importation of solar products. Similar provisions have had very positive effects on the solar market of neighboring countries (such as Mali, for example) and will undoubtedly strengthen the Burkinabé solar market as well. It is too early, however, to observe the impact of this law, as most importers are still placing or receiving their first tax-free orders.

8 Recommendations

The following recommendations result from the analysis of bottlenecks and success factors in the previous chapters.

8.1 Translating needs into a demand

Although the need for cost effective and sustainable lighting is identified in rural and peri-urban Burkina Faso, beneficiaries on the demand side and many crucial actors along the supply chain are not yet aware of the opportunity to meet this need with solar lanterns. Accordingly, awareness raising campaigns explaining the principles and benefits of solar lamps in general, and those that have met Lighting Africa's minimum quality standards in particular, are crucial in order to create a demand and market pull.

8.2 Empowering the demand side through adapted financial services

Purchasing a solar lantern is a significant investment for the end user, even when margins for retailers and distributors are limited. It not only requires more cash up front than substitute lighting means such as battery lamps or kerosene lanterns; it requires trust in the longevity and the return on the investment of the product. Accordingly, a financial model is required that meets the ability to pay of the end users, while re-enforcing their trust and willingness to pay by sharing the risks of failure to a certain extent. An attractive financing and risk sharing proposition can create a sustainable pull in the market without distorting it, as it can happen through the limitation of margins, which appears to place a particular burden on the last mile retailers interviewed during this research.

8.3 Trust building for quality products

Fostering confidence in the longevity of quality products such as those that have met Lighting Africa's minimum quality standards can be realized through smart financial offers with a risk sharing component. In addition, the development and the visibility of reverse supply chains are critical, so that end users understand where products which do not perform can be returned to the retailer and the manufacturer. These reverse supply chains can also play a crucial role when it comes to the organization of maintenance, repair and overhaul activities, as well as for sustainability issues such as the recycling of batteries and electronic trash. However, the implementation of reverse supply chains is challenging, and requires a commercial approach with a carefully crafted set of incentives. Investigations are recommended in order to also identify the valuable "sister supply chains" in these cases.

8.4 Empowering the supply side through adapted financial services

Interviews during this study as well as previous research in the scope of the Lighting Africa initiative¹¹ clearly reveal a need for financing along the whole supply chain and not only at the end user level. Manufacturers, wholesalers, and retailers on all levels of the supply chain need adapted financial services. These financial needs are very different, starting from initial capital for R&D, working capital to purchase inputs and produce finished goods, working capital to extend credit to retailers, working capital to extend credit to end users, to risk capital, etc. A consortium of financial institutions willing to finance the supply chain is required to provide revolving funds and risk capital in order to create a smooth push of solar lanterns into the market. Accordingly, awareness-raising activities are also crucial among financing institutions.

8.5 Build on existing infrastructures and sister supply chains

The power of TOTAL's distribution model and the broad dissemination of demanded products such as tea, rice, battery lamps and cigarettes through the studied sister supply chains clearly reveal that building on an existing distribution infrastructure is extremely efficient in terms of country coverage, distribution quantity and transportation cost. Therefore, similar distribution channels for products that have met LA's minimum quality standards should be developed in cooperation with major Burkinabe importers and wholesalers that have expressed their interest in selling solar lamps. Consequently, the availability of products that have met LA's minimum quality in all major cities of Burkina Faso would be enhanced, and economies of scale in transportation would reduce the final cost.

Additionally, battery lamp and solar product importers and wholesalers at the markets of Ouagadougou should also be encouraged to include solar lamps that have met LA's minimum quality standards in their product portfolio and to pass them on to their clients at the city level. A list of interested wholesalers is attached in ANNEX 7 of this report.

Most of the current suppliers of solar lamps in Burkina Faso prefer to use their own vehicles for the distribution of their products, which is certainly not the most efficient solution, particularly when product sales scale up.

While studying the potential sister supply chains, it appeared that large wholesalers in Burkina Faso have the power to push products into the market and to distribute them even into very remote areas. Wholesalers of battery lamps appear to be the most promising for solar lamps because they possess a certain level of technical knowledge, which could be helpful in the transportation of soft components (like end use requirements) of solar lamps. Efforts must be made by the solar lamp industry to understand the mechanisms of freight transport in the country and partnerships need to be developed accordingly.

¹¹ See the PPT Presentation „Access to Finance Challenges and Opportunities Workshop“ from Dalberg Development Advisors, May 20th, 2010

8.6 Take local markets into the focus of awareness raising and commercialization activities

While studying the supply chains and delivery models for solar lamps and other products, it appeared that local markets played a key role in product distribution into remote villages. Therefore, products that have met LA's minimum quality standards and awareness raising campaigns could be placed in a systematic and iterative manner at local markets in order to better penetrate rural areas.

Systematic training and marketing materials should be provided to last-mile retailers, outlining the basics of solar energy, the functioning and advantages of solar lamps (financial, health, environmental), and if necessary, marketing and demonstration techniques (in particular as they relate to solar lamps), stock management and accounting.

8.7 Harmonization of CSR and market driven activities

Current plans exist in Burkina Faso for large-scale free distribution of solar lamps such as the projects "une lampe pour l'Afrique" and "un élève, une lampe". Such practices threaten to distort the market and undermine the sustainable development of a market-based industry as end users generally refuse to pay for a product or a service if they assume that there is a possibility to get it for free. Therefore, it is recommended to develop strategies that harmonize these activities, e.g. by orienting the donations towards awareness raising activities. Lamps should only be donated to lead users, who have a leadership role within their communities, such as teachers or religious leaders.

8.8 Adapt packaging to last mile transportation means

With regard to the last mile transportation, which is often done with motorcycles and where transportation costs have a major influence on margins, redesigning the packaging of solar lamps that have met LA's minimum quality standards is recommended in order to enable a more volume efficient freight.

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Annexes

ANNEX 1: Set of criteria developed for the identification of the study region

ANNEX 2: Interview approach

ANNEX 3: Interview guidelines adapted to the study

ANNEX 4: List of Interview partners

ANNEX 5: Map of villages and cities visited during the field mission

ANNEX 6: Detailed description for sister supply chains

ANNEX 7: List of contacts of wholesalers specialized in solar products and battery lamps at Ouagadougou's Grand Marché

ANNEX 8: List of large wholesalers interested in selling solar lamps

ANNEX 9: Main markets of Burkina Faso

ANNEX 1: Set of criteria developed for the identification of the study region

	Ouagadougou's periphery	Northern Houet Department	Far Northern Burkina Faso	Gourma Department	Yako Department	Dedougou Department
Demand-driven Criteria						
Geography	Peri-urban area	Rural/remote rural area	Remote rural area	Rural/remote rural area	Rural/ remote rural area	Rural/ remote rural area
Predominant Ethnic group	Mossi	Bobo	Peulh	Gourmanché & Mossi	Mossi	Bwa
On vs. off-grid	Partially connected	Mainly off-grid	Mainly off-grid	Mainly off-grid	Mainly off-grid	Mainly off-grid
Climate	Sudanese-Sahelian	Sudanese	Sahelian	Sudanese-Sahelian	Sudanese-Sahelian	Sudanese-Sahelian
Knowledge of solar lamps	Total	Total	Total	Total	Total	Total/CBE
Supply-driven Criteria						
Accessibility by roads	Good	Only two main paved roads	Only a few paved roads	Only a few paved roads	Only one paved road	Only one main paved road
Predominant settlement type	Concentrated	Concentrated, scattered	Concentrated, scattered, nomadic	Concentrated	Concentrated	Concentrated, scattered
Revenues affected by seasonality	No	Yes	No	Yes	Yes	Yes
Infrastructure affected by seasonality	No	No	No	No	No	No
Existing solar lamp distribution model	Own distribution, Distributor-Dealer network, Franchise/Institutional Partnership	Own distribution, Distributor-Dealer network	None	Distributor-Dealer network	Distributor-Dealer network	Own distribution, Distributor-Dealer network
Feasibility criteria						
Practicability for consultants	Excellent	Good	Poor	Good	Good	Excellent
Security	Secure	Secure	Difficult	Secure	Secure	Secure
Selected for analysis	YES	NO	NO	YES	YES	YES

ANNEX 2: Interview approach

- Interview focus:
1. Identify bottlenecks and success factors for supply chains for SLPs and comparable products
 2. Identify main actors
 3. Verify ToR relevant hypotheses
 4. Think in terms of recommendations for Lighting Africa Activities

Questions for Last-Mile Retailers:

- What kind of solar lighting products do you sell? Why do you sell them?
- What other products do you sell?
- How many and how often do you sell these products? (last 6, 6-12, or 18 months) (*solar lamps or products from sister supply chains*)
- Does the demand depend on the season? If yes, why?
- Who are your suppliers for the different products? (*ask for phone number*)
- How is the transport organized? And who organizes the transport?
- Do you also send products from here to somewhere else? If yes, why and where?
- How much does the transport of SLPs cost compared with other products?
- Do you propose after sales service for certain products? If yes, why and how?

Questions for Suppliers:

- How long have you been in business?
- Do you do any other activities? If yes, what?
- How is your staff structured?
- Who contacts you for delivery, the sender or the receiver?
- How is the delivery organized?
- From whom do you get the products/inventory?
- How do the SLPs enter the country? And where?
- How are the products transported at each step, from import to end-user? Which transportation means do you use? How much does the transport cost? How much time does the transport take?
- Who are the intermediaries at each step?
- Do you also store products? If yes, what, where and how?
- How many vehicles do you own? And what kind of vehicles?
- Do you see differences between the regions of BF regarding the last-mile distribution of your products? If yes, which ones and why? If no, why?
- Do you face difficulties? If yes, what kind of difficulties (financial, logistical, marketing...?)
- If yes, how would you overcome these difficulties? Who or what could help you overcome the difficulties?

Questions for Distributors:

- How long have you been in business?
- Do you do any other activities? If yes, what?
- How many selling points do you have and where ?
- How many SLPs do you sell in each shop/region?
- How do you organize the distribution? How do you reach the customer? (*the goal is to understand the whole distribution model, the last-mile is the most important*)
- In which distribution model do you recognize your business/organization? (*present the models to them*)
- From whom do you get the products/inventory?
- How are the products transported at each step, from import to end-user? Which transportation means do you use? How much does the transportation cost and how long does it take?
- Who are the intermediaries at each step?
- Do you see differences between the regions of BF regarding the last-mile distribution of your products?
- Do you own vehicles? If yes, how many?
- Do you also store products? If yes, where and how?
- How do the products enter the country and where?
- Do you face difficulties in your business? If yes, what kind of difficulties?
- If yes, how would you overcome these difficulties? Who or what could help you overcome the difficulties?

ANNEX 3: Interview guidelines adapted to the study

(English summary of the following question topics is found in Annex 2)

Interview: Distributor of solar lamps

Introduction:

- Depuis combien de temps travaillez-vous dans ce secteur d'activité?
- Avez-vous d'autres activités? Si oui, lesquelles?

La distribution

- Combien de points de vente avez-vous et où sont-ils situés? (*Demandez une liste avec les adresses*)
- Quel types de lampes solaires vendez-vous (marque, taille, utilisation, etc)?
- Combien en avez vous vendu (au cours des 6 derniers mois, des 6 à 12 derniers mois et des 18 derniers mois)? Combien en avez vous vendu dans chaque magasin/région? A quel prix? (*Demandez une liste avec les chiffres exacts*)
- Comment organisez-vous la distribution? Comment atteignez-vous les clients? (*le but est de comprendre l'ensemble du modèle de distribution, de l'import jusqu'au consommateur final; le dernier détaillant est le maillon le plus important*)
- *Lors de l'interview, amenez une carte du Burkina Faso et demandez à votre interlocuteur de dessiner les routes de transport et les flux de marchandises en meme temps qu'il/elle explique le modèle de distribution.*

Supply chain

- Par qui obtenez-vous les produits/stocks? (*Demandez les noms et les adresses*)
- Comment les produits sont-ils transportés à chaque étape, de l'importation jusqu'au consommateur final? Qui s'occupe du transport ? Par quels moyens de transport? Combien vous coûte le transport? Combien de temps dure t-il? (*Recueillez l'information la plus détaillée possible*)
- Si vous travaillez avec des services de transport : est-ce que les services de transport sont performants?
- Possédez-vous des véhicules pour assurer le transport? Si oui, combien?
- Avez-vous une assurance pour le transport et/ou les produits transportés ? Si oui, combien vous coûte l'assurance ? Quel est le nom de la compagnie d'assurance ?
- Qui sont les intermédiaires à chaque étape?
- Stockez-vous également des produits? Si oui, où et comment?

- Comment les produits arrivent-ils sur le territoire? (par avion, train ou camion)? Quel est leur point d'entrée?

Bottlenecks, challenges

- Voyez-vous des différences à propos de la dernière étape de distribution (last-mile) de vos produits en fonction des régions du Burkina Faso?
- Rencontrez-vous des difficultés dans votre activité? Si oui, quelles sortes de difficultés? Si oui, comment pourriez-vous surmonter ces difficultés? Qui ou quoi pourrait vous y aider ? *(Si l'interlocuteur ne répond que brièvement, demandez-lui de détailler sa réponse)*

Interview: last-mile retailer

Distribution

- Quel type de produits d'éclairage solaire vendez-vous (marque, taille, utilisation, etc)? Pour quelle raison les vendez-vous?
- Quels autres types de produits vendez-vous?
- Combien et à quelle fréquence vendez-vous ces produits (au cours des 6 derniers mois, des 6 à 12 derniers mois et des 18 derniers mois) ? *(lampes solaires ou chaînes de distribution apparentées)*
- La demande varie t-elle en fonction de la saison? Si oui, pourquoi?

Supply chain

- Par qui obtenez-vous les produits/stocks? *(Demandez les noms et les adresses)*
- Comment les produits sont-ils transportés jusqu'à vous? Qui s'occupe du transport ? Par quels moyens de transport? Combien vous coûte le transport? Combien de temps dure t-il? *(Recueillez l'information la plus détaillée possible)*
- Si vous travaillez avec des services de transport : est-ce que les services de transport sont performants?
- Possédez-vous des véhicules pour faire le transport? Si oui, combien?
- Avez-vous une assurance pour le transport et/ou les produits transportés ? Si oui, combien vous coûte l'assurance? Quel est le nom de la compagnie d'assurance ?
- Expédiez-vous des produits de ce point à un autre? Si oui, pourquoi et où?

Service après vent

- Proposez-vous un service après-vente pour certains produits? Si oui, pourquoi et sous quelle forme?

Bottlenecks, challenges

- Rencontrez-vous des difficultés dans votre activité? Si oui, quelles sortes de difficultés? Si oui, comment pourriez-vous surmonter ces difficultés? Qui ou quoi pourrait vous y aider ? *(Si l'interlocuteur ne répond que brièvement, demandez-lui de détailler sa réponse).*

Interview: wholesaler, retailer

Introduction :

- Depuis combien de temps travaillez-vous dans ce secteur d'activité?
- Avez-vous d'autres activités? Si oui, lesquelles?
- Quelle est la structure de votre organisme?

Supply chain :

- Par qui obtenez-vous les produits/stocks? (*Demandez les noms et les adresses*)
- A qui livrez-vous les produits/stocks ? Qui vous contacte pour la livraison : l'expéditeur ou le destinataire?
- Comment les produits sont-ils transportés à chaque étape, de l'importation jusqu'au consommateur final? Qui s'occupe du transport ? Par quels moyens de transport? Combien vous coûte le transport? Combien de temps dure t-il? (*Recueillez l'information la plus détaillée possible*)
- Comment les produits arrivent-ils sur le territoire (par avion, train ou camion)? Quel est leur point d'entrée?
- Si vous travaillez avec des services de transport : est-ce que les services de transport sont performants?
- Possédez-vous des véhicules pour assurer le transport? Si oui, combien?
- Avez-vous une assurance pour le transport et/ou les produits transportés ? Si oui, combien vous coûte l'assurance? Quel est le nom de la compagnie d'assurance ?
- Qui sont les intermédiaires à chaque étape?
- Stockez-vous également des produits? Si oui, où et comment?

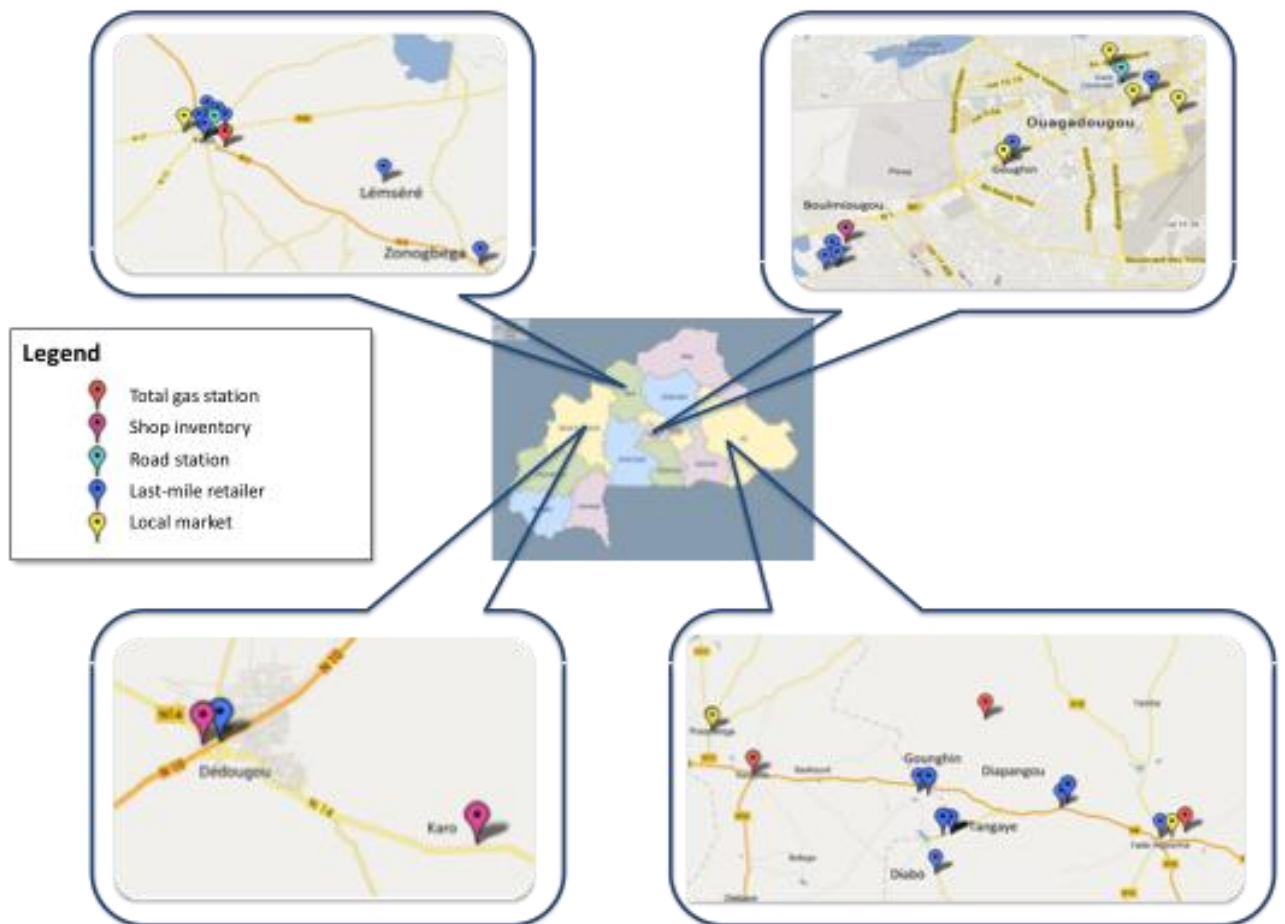
Bottlenecks, challenges

- Voyez-vous des différences à propos de la dernière étape de distribution de vos produits en fonction des régions du Burkina Faso? Si oui, lesquelles et pourquoi? Si non: pourquoi ?
- Rencontrez-vous des difficultés dans votre activité? Si oui, quelles sortes de difficultés (financières, logistiques, marketing,...)?
- Si oui, comment pourriez-vous surmonter ces difficultés? Qui ou quoi pourrait vous y aider? (*Si l'interlocuteur ne répond que brièvement, demandez-lui de détailler sa réponse*).

ANNEX 4: List of Interview partners

Date	Location	Institution	Person	Position	Telephone number	E-Mail Address
5/31/13	Ouagadougou	TOTAL	Ms.Nafy KONDE	Social Program Officer	50 32 50 10	nafy.konde@total.bf
6/1/03	Ouagadougou	Smart Energy Services	M. Martin VAN DAM	Managing Director	66 19 89 55	vdammartin@gmail.com
6/3/13	Ouagadougou	PPS	M. Amselme RUNGUNDU	Renewable Energy Department Manager	71847512 /50342224	rungundu@yahoo.fr
6/4/13	Ouagadougou	Soltech	M. Alain Tambi NANA	Chief Executive Officer	70 20 34 50	nasol@fasonet.bf
6/4/13	Ouagadougou	NafaNaana	Ms. Claire Le Ster	Social Enterprise Officer	71 73 50 28	claire.lester@entrepreneursdumonde.org
6/6/13	Ouagadougou	Actualité Energie	Ms. Lassina NEBIE	Managing Director	70 00 35 55	forage@yahoo.fr
6/6/13	Ouagadougou	Agritech	M. Marx MITHOUN	Energy Department Manager	78 02 78 68	mithmarx@agritechfaso.com
6/3/13	Ouagadougou	K&K	Mr. Joachim KINDA	General Manager	70 26 56 41	joachim.kind@voila.fr
6/6/13	Ouagadougou	SNV	Mr. Willem BRON	Energy Department Manager		
6/7/13	Ouagadougou	Ministère de l'environnement	Mr. Watta OUEDRAOGO	Dir Assainissement prévention des risques	70 26 64 78	ouedwata@yahoo.fr
6/7/13	Ouagadougou	Projet 1 lampe pour Afrique	Mr. TRAORE Adama	Coord National	70 23 84 76	lfpled@yahoo.fr

ANNEX 5: Map of villages and cities visited during the field mission



ANNEX 6: Detailed description for sister supply chains

The hub and spoke system of Yako

- The last-mile retailer from **Zonogbega** gets his stock (**rice, cigarettes, tee, batteries, and torches**) in Arbolé, which is a major town 7km away. He transports the products by taxi-moto, which costs 100 FCFA for a bag of rice.
- The last-mile retailer from **Tindila**, comes 3-4 times a week to Yako. He transports his stock (**rice, Nescafé, milk, cigarettes**) with his own moto-taxi. He has bought three TOTAL lamps to use in his shop but he is the only one in his village.
- A shop-owner from **Yako**, who sells **battery lamps, radios and battery torches**, gets the products once a week in Ouagadougou, from the Sankariaré Market and from Zabre Raaga (Evening Market). Wholesalers based in China import the products. The shop owner transports the products by public bus to Yako; it takes two hours and costs 1,000 FCFA per package with a reduction for larger quantities.
- The **mobile phone** shop owner from **Yako** gets her stocks 1-2 times per week directly in Ouagadougou. The Airtel credit cards are bought in Ouahigouya. She also sells to last-mile retailers living ca. 20 km away. Normally she sells ca. 20 telephones at once.
- A market shop owner from **Yako**, who **sells rice, tee, cigarettes and torches**, buys the products from a wholesaler in Yako. For transportation he uses the taxi-moto service, which costs 50 FCFA per package.
- The electronic shop owner from **Yako** sells solar panels, batteries, charge controller, etc. He gets his stock in Ouagadougou once a month, and transports it via public transportation or bus. For one transport he pays 8,000 FCFA.
- A wholesaler from **Yako** gets his;
 - **Rice** once a week from Ouagadougou and transports it with a 10 ton truck. This transportation, which is also used by other clients, costs 5,000 FCFA per ton.
 - **Tea and Nescafé** are delivered directly to their shop after paying for the **order** in Ouagadougou
 - **Cigarettes** come from Ouagadougou by bus, which cost 100 FCFA per package (12 packs).

The hub and spoke system of Fada

- The **last-mile retailer for cigarettes** from **Diapangou** gets his stock in Fada and brings it to his village by motorbike.
- Another **last-mile retailer** from **Diapango** gets his stock (tea and torches) in **Pouytenga** every two weeks. He goes to **Pouytenga** instead of Fada because it is less expensive.
- The **last-mile retailer** from **Tangaye** gets his supplies (**tea, rice, torches, sugar**) in the near village **Diabo** every day. He transports the products with his motorbike.

- **Suppliers** from **Diabo** get their supply from Ouagadougou or Cinkansé.
- The **last-mile retailer** from **Gounghin** gets his stock (battery lamps, torches, radios, plaque solaire) from the market of **Pouytenga**, to where products are supplied from Dubai. He goes there every two days.
- The **supplier** for battery lamps and torches from **Pouytanga** gets his stock from **Ouagadougou** Sankariaré market.
- The supplier for battery lamps, solar panels, torches and solar torches gets his supply from Dubai. He flies with Ethiopian Airlines. From Ouagadougou he transports the stock by truck or moto-taxi
- The **wholesaler** for **battery lamps** and **torches** from Fada buys his stocks in Ouagadougou on Sankariaré market every Friday to be ready for the market on Sunday. He transports the products via non regulated truck transportation, which costs ca. 300 FCFA for one package. He transports 30 to 40 packages each time. He sells only large quantities, e.g. to clients from Niger.
- The **wholesaler** for **mobile phones** from Fada goes two to three times per week to Ouagadougou to buy his stock at the Marché du Soir. He uses public transport, which costs 1,500 FCFA per package and 7,000 for the passenger ticket.
- The **wholesaler** for **cigarettes** from Fada gets his stocks from Togo via Cinkansé. It's less expensive to bring the cigarettes from Togo than to buy them in Ouagadougou.

**ANNEX 7. List of contacts of wholesalers specialized in solar products and battery lamps at Ouagadougou's
Grand Marché**

Company	Description	Name	Service	Address	Telephone	E-mail	Selling Solar products
GLOBAL TRADE & CO	Interested in solar products; applies to tenders for solar product supply	DAMIBA Arnaud	Head	Patte d'Oie - Ouagadougou	70947686	arnauddamiba@yahoo.fr	Yes
GUIRO Salif	Importer of LED battery torch lamps	GUIRO Salif	Head	Grand Marché de Ouagadougou	78826542	-	No
GUIRO TASSERE	Solar Product Importer	GUIRO Tasséré	Head	Grand Marché de Ouagadougou	70266672	-	Selling PV, batteries, regulators, TVs.
EKAMF	Major importer of LED battery lamps	KABORE Moumouni	Head	Grand Marché de Ouagadougou	70551950/ 78625396/ 68218234	ekamf68@yahoo.fr	Yes: selling solar lamps
E.SA.DE.F	Major importer of LED battery lamps	DERRA et SANA	Head	Grand Marché de Ouagadougou	DERRA 78155360/ 75684838 SANA 78272176/ 75428989	derra_s79@yahoo.fr	Yes: solar lamps
KOUTOU	Major importer of good quality solar products, selling several solar lamps as well	KOUTOU Daouda	Head	Grand Marché de Ouagadougou	70249849	ksdaouda@yahoo.fr	Yes: selling other solar lamps with radio ,solar panels, batteries, regulators.
OUEDRAOGO	Miscellaneous wholesale imports	OUEDRAOGO Hamadé	Head	Grand Marché de Ouagadougou	70292714	-	Interested in solar products
OUMBOURE	Major importer of LED battery lamps	OUMBOURE Idrissa	Head	Grand Marché de Ouagadougou	78838012/ 74257025	-	Yes: used to sell solar products
TSR Transport/ négoce	Miscellaneous wholesale imports	SANA Rasmané	CEO	01BP832 Ouagadougou 01	50342524	tsrgti@yahoo.fr Website : www.tsrgti.com	No

ANNEX 8: List of large wholesalers interested in selling solar lamps

Company	Description	Name	Function	Telephone	E-mail	Website	Supply Chain	Selling Solar Products	Interest in distributing LA Products
CORAM	Wholesaler of food products and households goods	Mr Jean-Paul NANA	Sales	70232487	baf.coram@fasonet.bf	N/A	4 depots (Ouagadougou, Koudougou, Dédougou, Bobo-Dioulasso), then distributing to wholesalers at city level	No	Yes
DIACFA MATERIAUX	Group FADOU AFRIQUE - Construction material, High Tech	Mr Kabré	Director of Sales	50306297	info@groupefadoul.com	http://www.diacfa.com/spip.php?article1	Two depots in Ouagadougou and Bobo-Dioulasso	Some products	Yes
GRUPE OBOUF Access oil	Stations Access Oil – Assembling of motorbikes – main consumption products (Distributor Jumbo – represents TRESOR (oil, tomatoes, sardines, spaghettis)	Mr Stéphane Wenceslas SANOU	General Secretary	50334683 / 70620848	pcp_faso@yahoo.fr	www.accessoil-bf.com	Two depots in Ouagadougou and Bobo-Dioulasso; wholesaler network across the country at city level	No	Very interested
KAIZER	Group WATAM KAIZER (West African trading and manufacturing)	Mr Omar OUEDRAOGO	CEO	50346331	watam.communication@gmail.com	N/A	Ten depots across the country and wholesaler network at city level	No	N/A

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<p>LE BON SAMARITAIN</p>	<p>Miscellaneous Wholesaler</p>	<p>Mr Karim CONVOLGO</p>		<p>50314301</p>	<p>skari1@hotmail.fr</p>	<p>N/A</p>	<p>Only distributing in Ouagadougou (3 shops) and Bobo-Dioulasso (1 shop)</p>	<p>No</p>	<p>Very interested</p>
<p>WINNER INDUSTRIE</p>	<p>Dry-cell Batteries, Matches, Battery lamps</p>	<p>Mr Fati TRAORE</p>	<p>DG</p>	<p>20970201/70 204841</p>	<p>traorefati@yahoo.fr</p>	<p>www.winner-bf.com</p>	<p>Headquarters in Bobo-Dioulasso, 6 vehicles to distribute to a network of wholesalers in all main towns; 3 local retailers selling to shops in per-urban areas</p>	<p>No</p>	<p>Very interested - company presentation mentions the wish to diversify activities with solar lighting products</p>

ANNEX 9: Main markets of Burkina Faso

Market	Town	Province	Region	Frequency	Comments
Grand Marché	Ouagadougou	Kadiogo	Ouagadougou	Daily	Largest market in Burkina Faso, supplying all sorts of products for the whole country
Zaabre Daaga	Ouagadougou	Kadiogo	Ouagadougou	Daily	Specialized market for the sale of mobile phones and similar electronic devices
Marché de Sankariaré	Ouagadougou	Kadiogo	Ouagadougou	Daily	Specialized market for the sale of portable lighting products
Marché de Bobo – Dioulasso	Bobo Dioulasso	Houet	Hauts-Bassins	Daily	Second largest market in Burkina Faso
Grand Marché de Fada	Fada N'Gourma	Gourma	East	Sundays	Large Market supplying all sorts of products to the east Region toward the Niger border
Marché de Pouytenga	Pouytenga	Kouritenga	North-East	Every three days	Large market supplying all the north-east region, cheaper than Fada and closer than the capital
Marché de Tenkodogo	Tenkodogo	Boulgou	Center-East	Every three days	Important market for imported products from Togo
Marché de Ouahigouya	Ouahigouya	Yatenga	North	Every three days	Third largest city in Burkina Faso, largest market in the region supplying all sorts of products, especially imported from Mali
Marché de Gorom - Gorom	Gorom - Gorom	Oudalan	Sahel	Thursdays	Important market for imported products from Mali
Marché de Koudougou	Koudougou	Boulkiemdé	Center - South	Daily	Important market supplying main towns of the region
Marché de Banfora	Banfora	Comoé	Cascades	Sundays	Important market for the southern areas with imported goods from Ivory Coast

