

LESSONS LEARNED FROM SOLAR SECTOR INFRASTRUCTURE DEVELOPMENT IN AFRICA AND ASIA

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ABSTRACT

The development of a viable and sustainable private sector infrastructure is crucial for any market based implementation of renewable energy in rural areas in developing countries. In existing markets like Kenya, a complex and diverse network of intermediary actors take part in the distribution chain between manufacturers and the end-users. In this network, buying decisions are based on a wide variety of criteria; often intangible factors such as trust are more important than price. Starting from these insights, we have developed innovative approaches to solar market development, which have been tested in real market settings in Tanzania and Western China. There appears to be a wide potential for innovative market based interventions to strengthen and accelerate solar market development in a sustainable way. This paper highlights the lessons learnt from our sector infrastructure development work and translates them to the policy level.

1. INTRODUCTION

Lack of access to modern energy services has been recognised as a major obstacle for more than 2 billion poorer people in developing countries to move away from poverty, take development into their own hands and upgrade their quality of life.

In 2001, the G8 heads of state had declared “providing clean, affordable and reliable energy a key element towards sustainable development” after thorough research and stakeholder consultations. The G8 concluded a.o. that the much needed creation of widespread commercial renewable energy markets faces significant challenges: mobilising private capital, developing and aggregating dispersed markets, extending (financial) services down to the retail level, building business and maintenance infrastructure, etc.

Most recently at the World Summit on Sustainable Development (WSSD) in Johannesburg 2002, the Heads of State agreed on eight main “Millennium Development Goals” to tackle poverty. Energy services play an important role in achieving these goals.

Following the WSSD, the European Union has underlined that “energy is a key component of any poverty eradication and sustainable development strategy, and is critical to the achievement of the Millennium Development Goals”. Based on this, the EU has launched with the European Commission the European Energy Initiative to aggressively promote access to modern energy services.

The Dutch General Directorate for International Development Cooperation aims at providing modern energy services to a number of 10 million people in developing countries before the year 2015. For that, it stresses the need for intensive cooperation between the public sector and the private sector.

2. PUTTING POLICY INTO PRACTICE

Translating the high level calls for action to practical results for the rural population can be much more than an academic effort, when starting from renewable energy technologies that have already reached a proven status in the field.

There are three main groups of technology solutions that can be discerned. Over the past decades, donors, governments and project developers have seen that each type of technology solutions has the best chance of success with their own typical delivery model:

1. **large scale centralised technologies** (such as wind parks, hydro power, geothermal, etc.), that can be connected to the existing large conventional energy networks (mainly conventional distribution networks for electricity and fuels). These installations can well be built and managed by conventional utility companies.

2. **decentralised independent technologies** (such as solar lighting systems, biogas, etc.), that can function independently from “the rest of the world” even on the highly dispersed household scale. Experience in the past decade has proven that these systems function best when owned and managed by the end-user. The most effective way to reach the highly dispersed rural end-users has proved to be through the wide reaching networks of the commercial market. The commercial availability of e.g. solar home system components “in the local shop”, can make these technologies accessible for a larger share of the rural population, also for “social applications” in for instance schools and health centres.

3. **“systems”**, a group of energy supply options that can best be characterised as networks of technologies (such as various biomass technologies, etc). Many initiatives have focused on for instance making the cooking fuel chain more sustainable. Because this generally demands changes on a wide variety of interrelated activities (such as gathering of wood, conversion into charcoal, distribution to end-users, modification of the end-user’s stove, etc), the promotion of this kind of sustainable energy solutions is generally most effective in a well-coordinated project structure and involving NGO’s and CBO’s.

The current paper focuses on the second category. The paper builds on the experience of Free Energy Europe, manufacturer of low power solar home systems that has developed a number of success stories with distribution through commercial market networks in developing countries

3. COMMERCIAL MARKETS

The experience of Free Energy Europe in the past 5 years has shown that the unserved demand of population groups for modern energy (often indicated as over 2 billion people without electricity) can indeed be interpreted as a market potential for solar home systems.

Marketing small solar energy systems through commercial distribution networks has proven to be highly effective in getting these technologies to those rural target groups, that are not reached by formal (utility) electrification programmes. Penetration rates from 20% up to 40% of households have already been reached in mature market areas for solar home systems in for example Kenya and on the Tibetan plateau. Well over 1 Million SHS have been sold, mainly in the power range of 10-20 W_p. With the existing price range of such solar home systems (starting as low as 50 USD) in these markets, subsidies and financing mechanisms have not played an important role.

The success of these market models demonstrates an **effectiveness and efficiency of commercial distribution and service networks that has not yet been matched by any utility or donor programme** to disseminate SHS. It is important to observe that these commercial networks function in a sustainable way without any subsidy, without any donor or project support, by unleashing the full power of local competitive entrepreneurship.

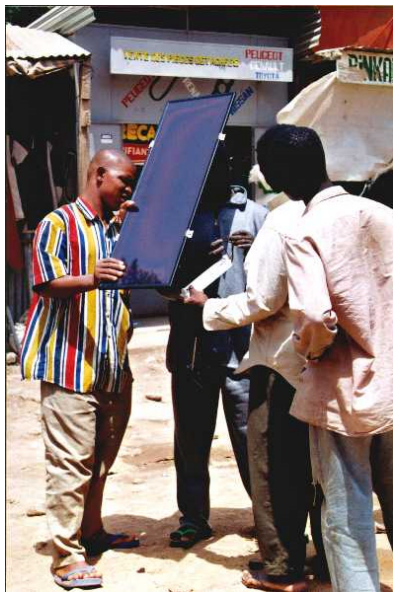


Fig. 1 How to sell a solar system

4. CASE STUDY: ROLE OF ENTREPRENEURS

4.1 Theoretical background

A closer analysis of the success of commercial markets for SHS needs to focus on the role that entrepreneurs play in developing the market and dealing with market failures and imperfections. A 3 month sociologically oriented field study in Kenya in late 2002 has shown that this role is indeed crucial.

In earlier – technically oriented - research, it has been stated that non-specialist shopkeepers could be a threat to the market. By misinforming buyers, unrealistic expectations would be raised with respect to the power output of a solar panel.

In such worst-case scenario, the shops would be *agents of stagnation*. In market situations in which the price is determined by bargaining and there is little information available to the end-user, traders go for the easy money. Increasing sales numbers could be based on lies. Shops that are agents of stagnation or exploiters will in the long run undermine their own market.

Traders can however also fulfil a role as *agents of development*. In this best-case scenario, the shops are the *innovators*. They bring new technologies or products to people, mobilise scarce resources, and are a source of information. This type of trader will be more likely to survive in a competitive market where buyers are well informed.

4.2 What we found

There are many rural shops in Kenya that sell solar panels. Almost all of these stores are **non-specialist stores**, meaning that solar equipment is just one of the many products they sell.

According to our recent research, end users ask their friends and relatives for information on quality and prices before investing in components for a SHS. They do not turn to a shopkeeper or technician, because they do not trust these institutions to supply them with the correct information.

Still, end users prefer to buy with local shops, because they do trust these shops to give them the best price. They know the shop, and have friends and relatives who also buy there.

4.3 Different types of shops

The different shop-types that could be identified each have a different way of doing business.

- **Strategic shops**

These shops sell an average or above average number of solar panels a month, and they have been selling solar for a considerable period of time. The shopkeeper takes the solar business serious and is knowledgeable about the products he sells.

The strategic shops have been receiving the necessary assistance in marketing and have been offered technical training. Mostly, this support of training was offered by a distributor, like Chloride Exide Kenya.

▪ **Opportunity shops**

These smaller shops sell less solar panels a month than what is average. The shop owners would not always be present in these shops. The staff interviewed were not very knowledgeable on the products they were selling. Typically, the shop had been in the solar business for a short period.

The owners had in most cases not been invited to any marketing and/or technical training. A number of shopkeepers regretted this fact, and indicated that with some training and marketing support, they would be able to improve their business and inform their clients better. These businessmen are open for and interested in new initiatives that can be taken to improve sales or services and look for new opportunities.

There was a limited number of opportunity shops that would sell anything that sells.

▪ **Chains of shops**

The shop would be one of many outlets of the company, while the headquarters would be based in either Mombassa or Nairobi. The Chloride Exide depot stores and the service centres were all very knowledgeable on PV technology. The managers demonstrated a clear commitment to providing proper information and raising clear and honest expectations. These shops were clearly committed to sustainably developing the market for solar products in rural Kenya.

4.4 Conclusions from the case study

The Kenyan market for solar panels is active and functions in a self sustaining way. Customer choice is high, yet the quality of related services is somewhat limited. Both shops and technicians are not specialised in solar.

For further development of the commercial market, there is space to further build on the existing market infrastructure, and improve especially the services level available. Distributors and manufacturers will have to continue to invest in training shops to provide honest and correct technical and product information to the end user.

To secure sales in the future, more trust has to develop between distributors and shops, and between shops and end-users. **Honesty in sales techniques thereby is of key importance.**

One initiative that Free Energy Europe as international supplier has taken to prove that there are better ways of selling our product than raising unrealistic expectations, is to start distributing an e-mail newsletter to all shops and technicians that have subscribed. Free Energy also provides marketing and sales tips for these Kenyan entrepreneurs.

4. REPLICATION OF MARKET SUCCESSES

Many entrepreneurs in developing countries have recognized the market potential of solar energy in their country or region. In some countries like Kenya the solar business has really taken off, giving access to electricity to people in remote rural areas and providing jobs to both the urban and the rural population.

Additionally, the market for solar panels and supplementary products, such as charge regulators, batteries, lamps and inverters, contributes significantly to job creation in both urban and rural areas. For example in Kenya, where over 800 rural shops and technicians are able to supplement their income by selling, sizing and installing solar home systems.

So why has this highly effective method to combine promotion of modern energy with economic development been limited to just a few countries thus far ?

According to our analysis, this is at least partly due to a lack of interest with indigenous entrepreneurs to focus on market development for rural energy systems. Not only because they fail to recognize the potential market, but mainly because of the difficulties and risks that they expect to encounter on the long road of developing a “new market” for a “new product”.

Entrepreneurs in developing countries run into different barriers than similar businesses in the western world. Factors in the business environment, such as a malfunctioning legal system, insufficient and unreliable physical infrastructure, corruption, lack of well trained staff, social inequalities and political instability can all form thresholds in stepping up to serve high volume markets. Companies generally have to work in a situation of high risk, a long period before investments start to pay off, and have limited access to finance.

5. DONOR EFFORTS

Many donors have recognized the importance of the private sector as a driving force behind development. Already for more than a decade, donors have been attempting to stimulate market forces to promote solar home systems primarily by focussing on the “enabling environment”, in which access to financing mechanisms were considered a key element. After more than a decade of serious attempts, we can conclude that this intervention model has not been very successful.

In practice, donor instruments often do not fit the situation local entrepreneurs find themselves in. Instead of contributing to local market development efforts, policy instruments confuse or even compete with the entrepreneurs by imposing certain products or certain delivery models, irrespective of their sustainability, suitability, or appropriateness in the local situation.

Illustrative in this are the few financing mechanisms with intended low participation thresholds, such as AREED and SDG that have been designed to support entrepreneurs in developing countries. We have found that without our interference, well established and highly professional local solar distributors are generally not able to benefit from these mechanisms.

Our conclusion is that the efforts to improve the “enabling environment” of the solar market have proven to be **incompatible** with the actual level of entrepreneurship found in most indigenous commercial solar companies.

Different instruments or ways of support and stimulation are needed to allow the effective and efficient market forces to get renewable energy to the people.

6. PARTNERSHIP WITH ENTREPRENEURS

The focus for promotion of SHS has traditionally been on disseminating technology through financing schemes and awareness raising on the side of the end user and training solar technicians. However, in our experience it is not the technology or the financing that is the bottleneck, but the people who are involved in spreading the product. In order to have sustainable impact, a private sector infrastructure is needed to provide the end user with hardware, information and services. The products need to be delivered from capital cities to remote customers, preferably at competitive prices.

This requires a **network of local entrepreneurs**, including importers, distributors, technicians and shopkeepers - none of who will get involved if they do not understand the market and the potential demand.

Developing this kind of infrastructure requires substantial investments, and will take a considerable amount of time. The success of building such infrastructure critically depends on the involvement and commitment of the right local entrepreneurs - who are the only ones who have proven to be capable to manage a dissemination network on the long term.

In our experience, the way to get the right entrepreneurs on their feet and running is to enter into **close and long term relations** with these entrepreneurs, have frequent face to face contact and support them continuously on the road to market development. This approach has been crucial in the development of our trade network. And with result. Every year Free Energy distributors disseminate tens of thousands of 14 and 20 Watt solar home systems on a commercial basis, without any donor support.

Still, the market potential of solar home systems is far bigger than the one currently served by our distributors. With the right support tools, our importers in developing countries could open new rural markets and thereby reach impressive growth rates.

7. SMART DONOR SUPPORT

Donors and support projects can play an effective role to support and accelerate market development, if they succeed in carefully translating the above mentioned insights and experiences in smart market support instruments.

The “smartness” of the donor instruments is especially needed to (a) find a connection to local entrepreneurs, often SME companies, and (b) support these local entrepreneurs without taking away their entrepreneurial creativity and effectiveness, i.e. without dictating what the entrepreneurs should do.

As a first indication of what donors can do in this respect, we can propose:

- limit the expectations of the impact of donor programmes to a realistic level to prevent market distortion from donor presence.
- involve local **entrepreneurs in their own way**; use supporting mechanisms to support local

entrepreneurs without dictating their business or investment direction.

- introduction of a **"non-disturbance principle"** in donor projects, meaning that at the minimum donors should not limit market access or compete against other market players. This should consist of:
 - a. a **ban on subsidies** to lower prices of for instance only certain solar systems that comply with certain project standards
 - b. a **ban on discriminating technical standards** such as by the World Bank, especially where such standards are introduced as virtual national market access standards (which seems to be at odds with WTO regulations).
- to be **patient**. Markets need time to develop and can only successfully accept support that is in line with their state of development. When a basic delivery and technical infrastructure does not yet exist in a market, it does not make sense to launch advanced concepts like regional concessions for fee for service models.

8. CONCLUSIONS

The commercial market has an important role to play to get decentralised energy systems to dispersed groups of rural end-users. Such a market consists of a network of mostly “non specialist” actors, among which local entrepreneurs play a crucial role.

The key to success lies in involvement and commitment of these local entrepreneurs. This calls for a partnership approach “to develop the market together”.

If donors are committed to really use market mechanisms as an instrument to reach their ambitious energy access goals, it will be possible to drastically speed up market development mechanisms.

What is needed is “smart donor support”, for which we have given a number of suggestions in this paper. Key is to leave the ownership and initiative for the development efforts with the local entrepreneurs.

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