

SYSTEMATIC APPROACHES TO SECTOR INFRASTRUCTURE DEVELOPMENT FOR PV IN DEVELOPING COUNTRIES

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ABSTRACT: Most analyses of the dissemination of solar home systems in developing countries, including that of the G8, focus primarily on government based actions. However, a conducive government policy will have negligible impact in the absence of a large and diverse renewable energy sector in the target countries. The paper focuses on sector development, and shows how in a systematic way, private sector players can develop the sector infrastructure needed for a significant market impact. From these pragmatic actions in the domain of the private sector, the paper refocuses on the impact of government and donor interventions: how these interventions may play a role to support the market development dynamics, but also how these interventions so often have frustrated these dynamics. Finally the paper addresses the consequences of a private sector focus for the structural design of finance mechanisms, elaborated based on the CDM.

Keywords: Rural Electrification; Developing Countries; Marketing

1 THE LIMITS TO PROJECT THINKING

To date, most actors shaping governmental and donor initiatives on solar electrification in developing countries have had a narrow vision on dissemination, best characterized by inventing new financing mechanisms for standardized solar home system designs [1].

The main problem of this narrow project thinking is that it has shown to lack the willingness and flexibility to incorporate the (dynamic) limitations and opportunities that exist in a target region [2], among others in terms of:

- diversity of actors in the supply chain (what are their real limitations, where do they see the best chances to promote solar),
- diversity of end-user wishes (some people want big or professional quality systems, others prefer to afford only smaller or consumer quality systems),
- specific financial culture (e.g. some people are used to pay back loans, others interpret loans as grants),
- technical culture and know how (e.g. many people have experience in managing car batteries for 12V electricity supply, others do not),

In addition, the push for standardisation – under the pretext of protecting the end-user - has almost always lead to a limitation of market forces and failure to utilize the full potential of existing technological options.

For instance, the biggest cost reductions in solar systems come from downsizing systems. While for this reason free market customers around the world massively opt for 10-20 Watt amorphous silicon based systems (selected based on “learning by doing”), most donor projects still try to push the standardized SHS with 50+Watt crystalline silicon panels, that are often over 4 times more expensive for the end-user.

While forbidden in both in the WTO agreements and the EU Convention, a major donor like the World Bank even actively uses its attractive dollars and influence on

host country governments and solar companies to apply strict technical standards, which complicates access to the markets for suppliers of “non-standard” systems [3].

In short, it is not surprising that many projects to support solar home systems have failed on the very points where the existing commercial markets for solar systems in for instance Kenya and China have been so successful [4], i.e. sector infrastructure in terms of:

- a) involving a wide variety of actors, products and marketing approaches (including payment modalities) in the supply chain
- b) leave decisions on price, energy service level, and quality to the end-user.
- c) start small, learn by doing and accelerate growth as the supply chain develops and builds up experience with successes and failures.
- d) develop self-sustaining dynamics, independent of donor funding

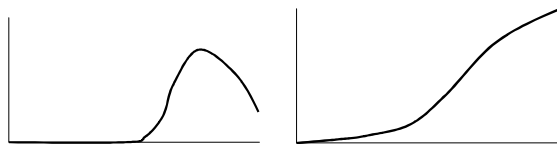


Figure 1: Typical development of projects(left) versus typical development of commercial markets (right)

While the G8 Renewable Energy Task Force in its end report [5] recognizes the need “to develop market-based mechanisms to reach a step-change in the use of renewable energy in developing countries”, it seems to limit itself to promoting a conducive policy environment. The issue of how to develop the crucial sector infrastructure lacks due attention and priority.

This paper focuses on systematic sector development

through private sector activities, using practical experiences in Tanzania.

2 PRINCIPLES OF SECTOR DEVELOPMENT

The use of solar energy in rural households in developing countries is characterised by the decentralized and dispersed application of one system for one household. The most important step to effectively serve these dispersed masses of potential end-users, is therefore to develop a supply chain that can reach them.

Principle 1: Main Challenge Is Distribution

Whereas in most countries an interested end-user can only find solar products in the capital, it is very important to develop a distribution network that reaches those secondary towns and rural centres that fall within the mobility range of the majority of the target group.

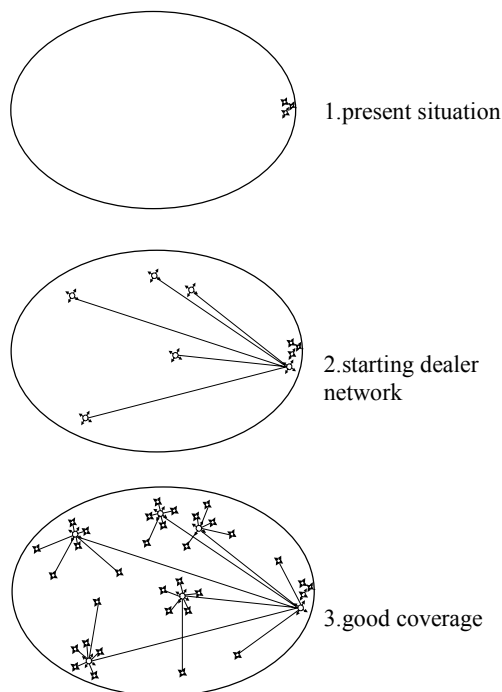


Figure 2: Developing a distribution network in a country to be able to reach the target group.

A distribution network with a good coverage is needed not only to be able to supply a solar system to a rural client, but also to get the needed competition and information exchange to allow markets to learn by doing.

Figure 2 shows that a good coverage almost automatically leads to specialized functions (import into the country, distribution to the regions, regional distribution to outlets, delivery from outlets to end-users).

Figure 3 indicates two typical examples of such a supply chain. In the concession model that has been opted for by South Africa, a limited number of organizations takes on the responsibility to organize the supply chain themselves. Often this means that a single supplier has to deal with 20 000 clients, creating a

massive mismatch between the organization of supply and demand. On the contrary in a free market like Kenya, a similar number of end-users is reached through a large variety of independent suppliers, with each supplier in the chain dealing with just 10 to 30 clients.

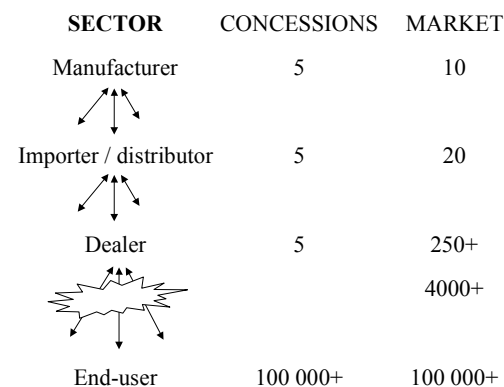


Figure 3: Comparing the supply chain in a typical concession approach to that of a typical free market

This organizational matching of the scale of supply and demand has two immediate advantages:

1. Dealers, and certainly the sales agent are more flexible and better tuned to address the desires of the end-user in a personal and tailored way.
2. Due to competition among each other, all suppliers in the chain have inherent incentives to find ways to better serve their clients, in terms of product, price, financing, etc.

The main disadvantages of the market model as compared to the project model are:

1. the lower level of control over the independent market players, to realise the desired realities of third parties (such as donors or corporate standards of multinationals), or keep supplying the products and services that market developers want to sell.
2. lack of willingness or capacity to spend resources on financially non-feasible services.

Principle 2: Marketing in Local Business Culture

When opting for a market based distribution of PV systems, a direct consequence is that the decision power is to some extent given back to the end-user. The buying decision is the responsibility of the client after a process of negotiation between demand and supply. Marketing is the process of finding out what an end-user really wants and offering this to him.

In this process of negotiation, with the end-user, technical criteria will be important as well as financial, social and cultural criteria. Contrary to most current donor projects, the end-user will make a balance between price and product quality in the wide sense of the word (for instance including the colour and the size of a solar panel).

A good example of the effect of this is the well studied market in Kenya. While donors continue to try and push Indonesian style complete SHS, the end-users have massively opted for systems based on small solar

panels directly connected to a battery - without charge controller. Although the small PV systems without a charge controller are not technically optimal, they appear to function in a satisfactory way for the end user. If the same end-user would have to buy a charge controller, the system would no longer be affordable. Therefore, from a marketing perspective, it can be concluded that such a choice may be an optimised choice for the actors in the specific supply chain, including the end-user.

Principle 3. Gradual Development

Building up a market takes time. All actors in the supply chain should be allowed the time to learn by doing. Also it is very important to allow market information exchange mechanisms the needed time to develop. In the end, it these mechanisms that define the capacity of a market to learn and to self-optimise.

Most disruptions by donor projects have been caused by wanting to get too many results in too little time. Because of this hurry, projects have opted for a rigid blueprint solution on a technical and organizational level. Even when on the short term this brings results, on the longer term it causes a collapse of the artificial structures that have not learned to survive in real market conditions.

3 5-STEP DEVELOPMENT STRATEGY

Based on the mentioned principles of sector development, we have developed a 5-step strategy to develop a solar sector in a developing country. We are currently testing this strategy in the Umeme Jua market development initiative in Tanzania.

Step I Market studies

In a structured approach, the most interesting market regions are investigated. Our market studies have two main objectives:

- a) identify actors that are playing / can play a role in the supply chain, as potential wholesalers, dealers or sales agents.
- b) identify market potential and market chances for various products through various sales models in various regions

For our targeted approach to market development, most project funded market studies have proven useless, because they only focused on end-user demands and market potential in terms of MWp. We therefore have had to redevelop a more targeted methodology in the Tanzania initiative.

Step II Building dealer networks

In the identified priority regions, dealers are appointed who are responsible for maintaining a local stock. This means that dealers are selected on two basic criteria:

- a) business and financing capacity: the dealer has to be good in making available a stock of solar equipment near the end-user, and sell this stock at a low margin and high volume.
- b) sales network: the dealer should already reach a significant part of the targeted end-users through his selling channels.

The approach to select dealers based on the mentioned business criteria reveals that the wanted solar

dealers are local businessmen. In general they are *not* specialised solar specialists !

While in the start-up of the market, specialised dealers have played some role, experience in Kenya shows that in an established market it is very hard for specialised solar dealers and sales agents to survive. For most successful dealers and sales agents, solar is one of many sectors while specialised solar dealers generally limit their focus on the NGO/project market for bigger tailor made systems [6].

Step III Building capacity of sales agents and installers

In our definition, we see as a sales agent whoever sells the solar system to the end-user. This may be a person in the shop of the dealer, this may be a travelling free lance salesperson, this may an electrical installer.

The capacity building is target to teach these people:

- a) basic skills of solar system design
- b) skills of selling solar systems
- c) (for installers) skills of installing a solar system

We have experienced that most existing donor supported training programmes are geared toward creating solar specialists, and have a focus that is too much oriented towards technical details and too little towards the crucial activity of selling the system that satisfies customer demand.

Step IV Marketing support and campaigns

Once a basic distribution network with basic sales capacity is in place, the next priority is to start looking *actively* for customers.

All too often sales agents seem to be passive in looking of new clients and need marketing and sales support, for instance by their supplier.

Depending on the level of market development, marketing campaigns can be designed for two subsequent goals:

- a) create *awareness* on the services that solar energy can give. Because in most developing countries, a large part of the potential customers (people without access to electricity from a grid) are already familiar with the use of car batteries to get electric lighting and a black and white TV, this would be the first group to explain to that a solar panel is basically a battery charger.

- b) create *desire* and the *opportunity* to buy a solar system. The solar system has to be sold to the end-user. This means discovering why the end-user wants the solar system, and at the same time being in a position to offer the system. For instance, marketing campaigns using promotion in shops supported by newspaper/television during the World Cup football have been very effective.

V Scaling up & innovation

Only when the dealer network has been well established and has gained experience with offering, selling, supplying, installing and servicing solar systems, we think the basic infrastructure is ready to accept investments directed towards accelerated market expansion.

Such market innovation investments could include financing models such as selling on credit, developing co-operations with hire-purchase companies, micro credit banks, rural renewable energy utilities (for fee for service

programmes), etc. Conversely, developing such financing models *without* having a basic experienced dealer network has proven very difficult.

4 SUGGESTIONS FOR DONORS

Most cost of the described sector development strategy can be self-financed by the companies that have a commercial interest to develop the market. However, for most companies the returns in terms of market development may appear too distant and insecure to take this risk.

Therefore if donors want to support the development of the solar sector in developing countries, we propose to set up a *generic* subsidy programme to “cost-share” such costs as market study, promotion and training expenditures.

The principle of cost-sharing should serve to avoid the donors and their consultants as well as host governments from “taking over the steering wheel” in market development.

We believe that by leaving the initiative and investment decisions with the private sector, the donors can make sure that all money spent on market development is spent as well directed as possible, in terms of:

- not disturbing the functioning and learning process of the market
- not promoting the wrong products or limiting competition through standardisation
- not introducing the artificial companies as dealers
- avoiding unfair competition for existing market players
- not training the wrong people the wrong things.

Although little experience exists on this topic, a second important role for donors may be to support the development of information exchange mechanisms in the market, aimed to support the learning capacity of a market. This could for instance include newsletters, agent feedback workshops, publishing independent technical evaluations, etc.

We do not support the often quoted need for donor involvement to provide the means for end-user financing of expensive solar home systems. Once a market can be proven to exist on a limited scale, funding for financing systems to expand the market will be available from commercial sources.

5 HOW TO DESIGN THE “SOLAR-CDM”

The Clean Development Mechanism (CDM) that is defined in the Kyoto climate treaty is often seen as a potentially attractive way to arrange such a generic subsidy scheme for solar market development.

However, in spite of the fact that solar market development is an excellent match for the CDM objectives, it will only work for solar sector development, if the design of the “solar-CDM” takes into account the principles of the solar sector development described above. Translated to climate language, this means::

1. a generic emission reduction value per SHS to avoid the need for extensive emissions measurements and monitoring
2. upfront crediting to contribute to the cost of solar market development *before* the solar market has been developed.
3. base validation, monitoring and verification procedures as much as possible on existing local business practice and sales administration.

6. CONCLUSION

If the political will exists within the G8 countries – and others- to really develop market based mechanisms to support the deployment of solar systems in rural areas in developing countries in a successful way, they will need to give more priority to development of the infrastructure of the solar sector in the target countries.

This means working with non-traditional development partners (companies instead of NGOs and consultants) in non traditional development projects (supporting markets instead of “centrally planned energy economies”).

Perhaps the design of a “Solar CDM” can be the first realistic occasion for donors to demonstrate their renewed intentions ?

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