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ENERGY ACCESS IN RURAL TOGO: THE RELEVANCE OF THE ENERGY KIOSK SOLUTION

March 2017

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ENEA combines economic performance with social engagement in a hybrid model creating new values: advising public and private leaders worldwide about energy transition while doing volunteer work with social entrepreneurs and NGOs.

This publication is the result of the collaboration between ENEA and Benoo. Benoo was one of the granted organizations of ENEA's call for project 2016.

This publication is part of ENEA's policy to share essential knowledge, with the aim to propose keys to understanding the main challenges of energy transition and sustainable development at the global scale.

EXECUTIVE SUMMARY

Solar home systems (SHS) represent today a viable and scalable solution to meet basic energy needs (lighting, mobile phone charging) – the first step of the energy ladder – but are much more limited when it comes to offering productive use of energy. Productive use of energy is however crucial to develop valuable economic activities in off-grid villages.

Solar kiosk and mini-grids are two potential solutions to meet these productive energy needs. The main difference lies in the distribution network, which requires both investment and maintenance and thus is expensive. As an example, a $500/customer connection translates into a monthly grid fee equivalent to the monthly cost of a standard solar home system (which includes energy). It is likely that households consumption alone won't be sufficient to ensure the economic profitability of a mini-grid, if the mini-grid developer does not benefit from any public subsidy. Moreover, though mini-grids are usually developed for larger systems, in some cases solar kiosks have the same order of magnitude of installed power capacity as mini-grids (i.e. Ekocenter vs. Powergen RE).

In the context of off-grid rural village with very limited energy consumption, startups or entrepreneurial projects might prefer to bet on the least capital intensive concept. With a lower nominal CAPEX and more diverse sources of revenues compared to mini-grids, solar kiosks appear as an easier solution to provide access to productive use of energy in the short term. The flexibility of their revenue sources is today a massive advantage of the model. Yet flexibility might also be a weakness as it hinders the firm from choosing a long term position, which is necessary to build a scaled up business model and company.

Solar kiosks can progressively evolve in the mid-term towards an independent power producer model; but it can also leverage its last-mile customer proximity to offer a larger array of non-energy products and services. For example, a kiosk can thus become a formal distributor of consumer goods partnering with local and/or international food brands for example (Solarkiosk and Coke for instance). Alternatively, a solar kiosk can offer financial and credit services to supporting final customers in acquiring electric appliances and processing equipment. These two business models imply very different types of back office organization and if flexibility can exist at first, it cannot last too long. Choosing the most appropriate long term activity for a kiosk firm needs to be anticipated and thought through well in advance.

The mini-grid model, implying a long term local utility position, is usually the preferred one as most projects' DNA revolves around bringing energy to the population. Solar production can be easily extended through new power generation plants located outside of the village. Such an extension can create the backbone of a mini-grid on which households and businesses can be connected in the future.

Hence, over the long term, energy kiosks can be considered as a real option to develop an independent utility. These sale points network can also easily turn into a lot of different businesses if the energy option is not the best one in the end, provided that aligning the whole business model of the kiosk company is reachable. This model is consequently very fit for startup developing a bottom up approach with scarce funds[1].

[1] Mini-grids might on the other hand be a very appropriate choice for a top down approach led by a governmental agency with large funding. See our report on *Developing Mini-grids in Zambia* [2].

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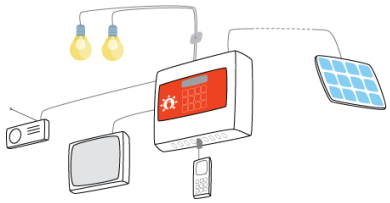
1 INTRODUCTION

In rural Togo, as in numerous Sub-Saharan African countries, less than 10% of households have access to electricity. Increasing this ratio is critical for the economic development of these populations. Different concepts are today developed with complementary capabilities to address these issues and bring electricity inside the households: solar lamp, solar home system, mini-grid or grid extension (see *Figure 1* below).

Example of Solar lamp
Awango by Total

< 10 Wp



Example of SHS
Solaris by Eternum energy

< 100 Wp

Example of solar minigrid
by Powergen RE

< 100 kWp

Figure 1 – Three different concepts to develop energy access in off-grid zone (solar lamp, solar home system, mini-grid)

Energy kiosk is a concept put forward by several actors – private companies, NGOs – to bring energy services to a village or a neighbourhood rather than focusing on the energy at the premises of the households.

In this context, Benoo (see box below) asked ENEA *pro bono* support to develop its solution in Togo and implement it into its strategy. Benoo's goal is to bring electricity to 85 villages of the Prefecture of Haho with the help of tontines (informal groups aimed at agricultural production). The objective of the joint project between Benoo and ENEA is thus to identify the individual and collective energy needs of rural population in Togo and their capacity / willingness-to-pay; and build the best solution for these needs.

Benoo

Benoo is a French startup whose goal is to bring companies, institutions and individuals to co-invest in access to energy though off-grid renewable energy projects. Its first project is being implemented in Togo with its local partner Entreprises Territoires et Développement (ETD).

Benoo has been created to address the funding issue of energy access. Its founders strive to develop, design, distribute and operate energy access solutions in off-grid rural areas that fit with local energy needs and capacity to pay, and anticipate the future growing energy demand. Energy kiosk and mini-grids are options considered by Benoo for this economically viable energy access solution.

Benoo's model relies in assembling different bricks to offer a comprehensive and upgradable energy access solution:

- Strong local anchorage through local partner and agricultural cooperatives
- Mobile banking technologies to secure financial transactions
- Large services offer, beyond strictly energy products and services
- Data intelligence technologies to monitor and evaluate the evolution of the energy demand

Figure 2 - Benoo's first solar kiosk installed in Djékloué in early 2017

The project was carried out in several phases. After an initial literature analysis, the project team organized field visits in Togo with ETD, an NGO working on local governance and rural economic development, mainly based on the "ESOP" model (*Entreprises de Services et Organisation de Producteurs* -local agro-processing cooperatives). Finally, the project team focused on Benoo solution and business model.

This document outlines some of the main findings of this work including key learnings of the field survey and focuses on the energy kiosk business model.

2 UNDERSTANDING LOCAL ENERGY NEEDS

The first part of this report will present the empirical results of the field survey in Togo. These results have been used to better understand the needs of these villages and size the first solution of Benoo. They are shared here to illustrate the approach carried out by Benoo, and provide field data to the interested stakeholders. A first analysis is carried out at a village level on the current perception and use of energy. It helps comparing the different types of villages surveyed in the study. The second step of the analysis focuses on the potential use and desired energy services.

2.1 Low energy usage in rural Togolese villages

2.1.1 A diversity of rural villages in Togo

Our field survey covered 4 villages with very different profiles (see *Figure 3*).

- Kpélé is connected to the grid and located on the main road of the country. The village displays a variety of activities, from shops to leisure businesses (movie theater, etc.).
- Djékloué and Avédzé are off-grid villages with a strong connection with Notsé (the closest city). Teachers usually go to the city to print materials for the pupils for instance.

- Agoto is the most remote village. The village has thus fewer links with Notsé. One practical example of this concerns corpse conservation. In Djékloué or Avédzé, people go to the city looking for ice to cool the body down. In Agoto, they use traditional methods, with local alcohol and herbs.

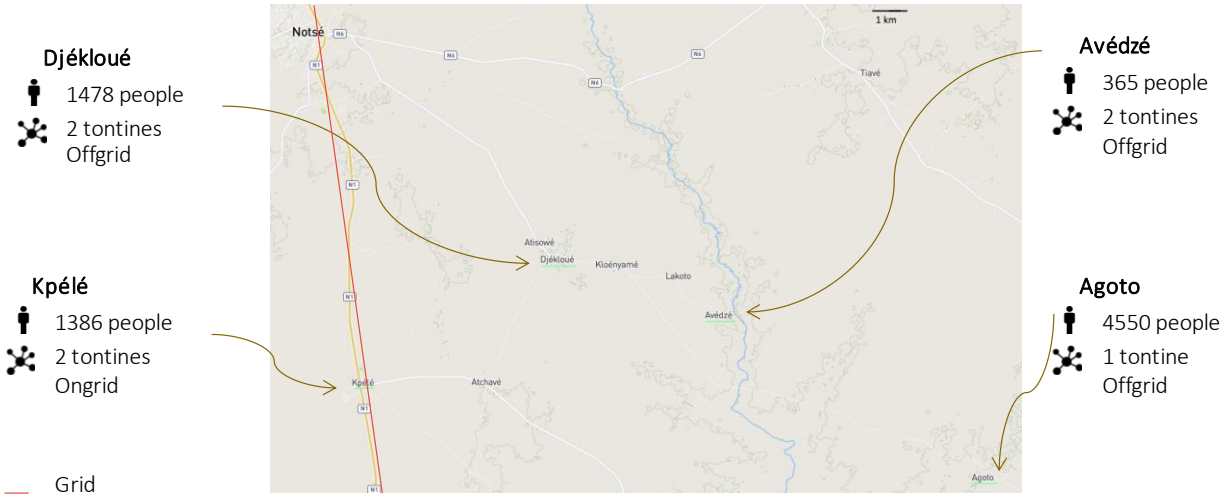


Figure 3 – Maps of the 4 villages visited during the survey

This diversity is critical to understand the different energy needs of the populations and design a solution that can fit to specific locations.

2.1.2 Highly constrained economic activities in off-grid villages by a poorly effective access to energy

All the villages mostly rely on agriculture, and indeed, most of the villagers interviewed were farmers. **Product transformation in these villages is usually limited to milling local crops as energy (mechanical and thermal) is expensive and road access limited**. Among the non agricultural economic activities identified in the villages, most were around craftsmanship (tailor, hair dresser) or local services (shop keeper, bar tender, medical centers).

Two different activities were always present and proposing energy related services: solar PV based phone charging services and mills.

Phone charging service is today widespread in rural Togolese villages. The service cost 200 F CFA, implying a high margin[2]. It is however important to note that the perceived quality of the phone charging business is important, as some villagers reported to go to another nearby village to charge their phone with better quality electricity (both options implied PV + lead acid battery solar home system)..

Milling (maize, soybean etc.) is also a very important energy service in the villages. All villages were equipped with at least one mill, running on fossil fuel to produce flour. The mills capacity typically ranged from 3 to 10

[2] It is quite curious to notice that the phone charging model succeeds while the battery charge or swap model seems to have failed. This latter model addressed household customers who could charge or swap their empty battery for a charged one to be then used to provide light to the house. It has now been replaced by solar home systems. Phone charging and battery swap activities are yet very similar

kW and mills usually face a very high demand. Milling seemed a very competitive activity with quite low margins.

2.1.3 In on-grid villages, only some activities are electrified

In Kpélé, the only electrified village we surveyed, several **other economic activities were electrified, mostly retail and leisure businesses**. Nevertheless, the perceived value of electricity was quite low as the power grid is very unreliable (recurring power outages). Economic activities willingness to be electrified is thus quite hard to assess at first as the perception of productivity increase lead by the electrification of some activities is quite low; particularly if efficient and convenient mechanical solutions already exist. As an example, tailors in on-grid zone only use power for light but not for electrical sewing machines, and keep their pedal sewing machine even if they have access to the grid. Similarly, a small medical center visited in Kpélé only had a few lights (and no fridge for medicine). The willingness to electrify their activity beyond lighting might be quite low. Energy access initiatives have thus an important role to identify the most relevant productive use of energy and promote them.

2.1.4 All households commit high expenditure for their energy services

The first step of the analysis relied on quantitative data collected in the villages. The samples are too small (around 30 ppl/village) to provide statistical evidence and do not analyze precisely the rich sociology of the villages (men/women, young/senior etc.).

Nevertheless, they are still informative of the situations in the villages (see Table 1 below) regarding households' incomes, their expenses in lighting and mobile phone (credit and charging), and their willingness to pay for additional energy services.

It is worth noting that **households in the villages spend a large amount of money on energy expenses[3] and phone credit.** Yet, SHS were not widespread in the village; the few systems which were to be seen were used for a phone charging business and were usually integrated in a grocery shop. The large amount of money spent on phone credit is also a sign of the relative wealth of the villagers interviewed. When asked, most of the villagers also confirmed their willingness to pay more for better energy services.

	Size of HH	**Monthly HH income**	**Monthly HH phone credit expenses**	**Monthly HH energy expenses (lighting + phone charging)**	
	Avg persons	*FCFA/month*	*FCFA/month*	*FCFA/month*	*EUR/month*
Agoto	7,1	25 875	4 083	2 525	3,8
Djékloe	7,2	34 353	N/A	2 712	4,13
Avedzé	6,7	42 273	7 150	3 836	5,8
Kpélé	8,2	47 432	5 375	2 900	4,4
Average	**7,3**	**37 483**	**5 536**	**2 993**	**4,5**

Table 1 – Households income and energy expenses in the different villages visited in Togo

[3] Milling was not included in the energy expenses. It only includes home lighting and phone charging.

We also notice that households in the electrified village (Kpélé) spend as much as the households in other villages for their energy use, although they earn more on average. This level of consumption might thus not be strongly dependent on the income.

2.2 A strong desire for individual, productive and collective energy services

Villagers needs have been surveyed to identify two types of energy usages: their potential energy use at home and for their businesses; and the potential collective energy uses.

2.2.1 A strong desire for improved services from Households

Villagers have been asked about their willingness to pay for additional services. The figures strongly vary from villages and might not be very reliable. Table 2 shows that this value can exceed 10 000 FCFA in Avédzé, but is limited at less than 4 000 in Agoto.

	Monthly WTP for additional energy services[4] *FCFA/month*
Agoto	3 850
Djékloe	5 806
Avedzé	11 927
Kpélé	N/A
Average	**7 194**

Table 2 – *Households willingness to pay for additional services in the different villages visited in Togo*

It confirms however that households are willing to pay more for a better quality energy services. Independent workers and craftsmen were especially interested by an improved electric service to increase their revenue. The difference between a kiosk and a mini-grid was not mentioned at this stage.

2.2.2 Potentially diverging desires on collective needs among the villages

Collective energy needs were also surveyed. The methodology involved ranking different types of services to understand the intensity of the need in the village, using the materials displayed in *Figure 4*.

[4] Additional energy services: light in each room; brighter lighting; night-lighting; safe lighting; possibility to have a TV, a radio, an iron, a fridge, a fan; possibility to charge its mobile phone at home

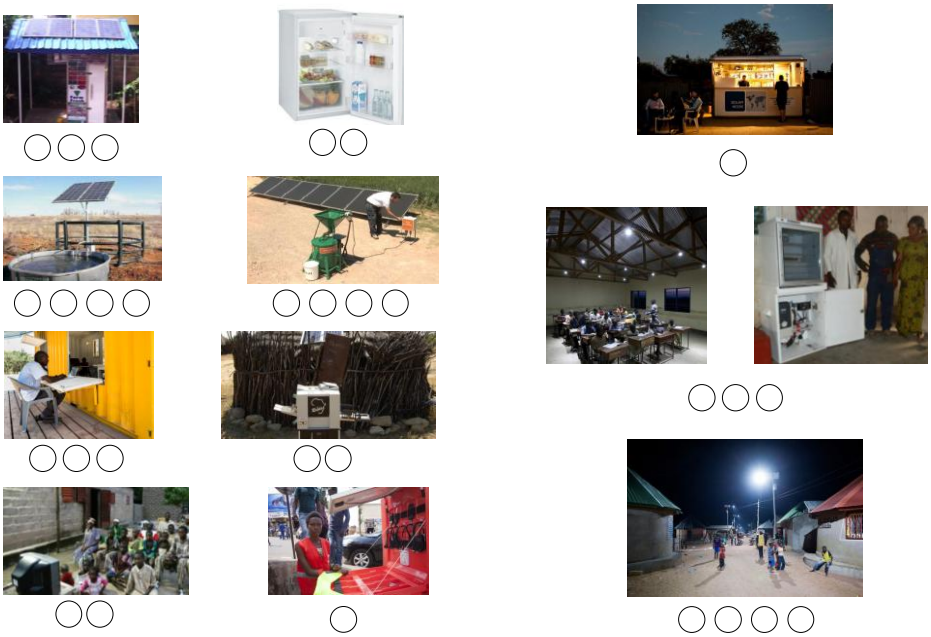


Figure 4 – Materials used to illustrate the propositions of collective energy services during focus groups

The result of this survey is displayed in *Figure 5*. Public lighting, water pump, TV and a large fridge ranked first among the services proposed. Young people or women chose quite different services than the men, preferring IT service or education to TV for instance. This method did however not allow assessing the willingness to pay of the population and had to be challenged with qualitative interviews with local actors to single out the services matching both a strong need from the population and a potential willingness to pay.

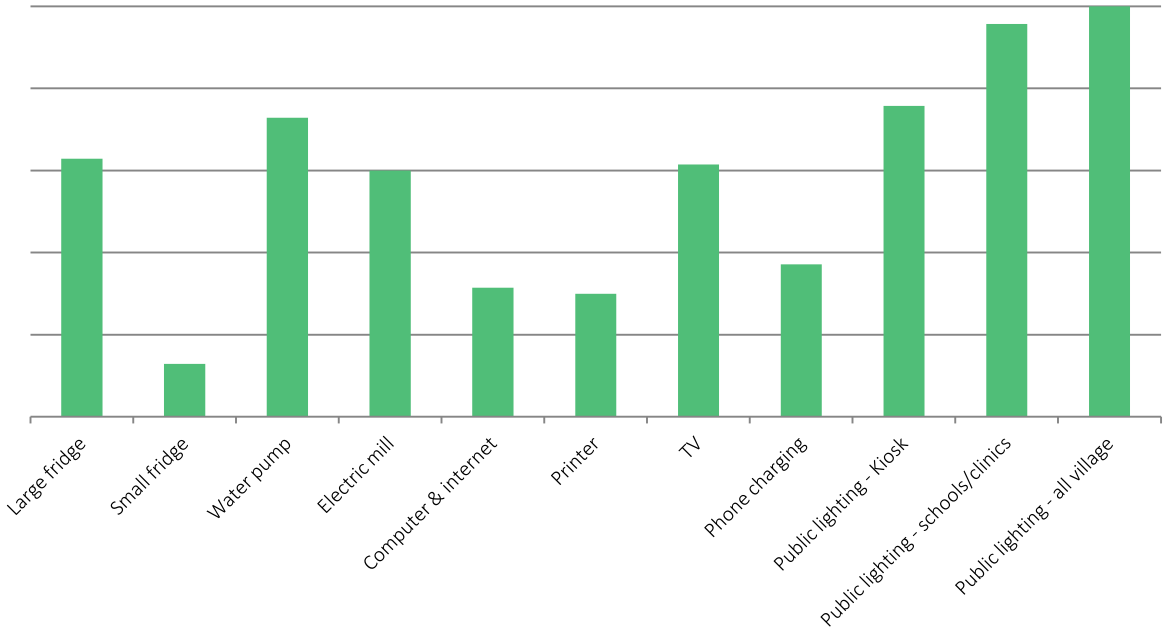


Figure 5 – Result of the surveys on collecting energy services

Services like solar water pumping or public lighting were for instance not considered as bankable by local stakeholders. The final services will thus result from trial and errors and further analysis of the willingness to pay of the villagers in order to assess the economic viability of offering such services.

If the lighting in schools is among the most requested collective services, it has not been directly expressed as an energy need but more as a social one. Actually, in the three off-grid villages, the women strongly expressed their willingness to have literacy classes in the evening, which requires the electrification of the schools. Beyond social impacts, literacy classes could be a source of additional income for teachers.

Surveying collective needs thus raised numerous requests. Careful work is necessary to process these requests, their willingness to pay and potential profitability. A comparison with other projects can also be helpful to understand the dynamics in the villages.

3 BUILDING A CONSISTENT OFFER – THE ENERGY KIOSK MODEL

Based on the field visit, literature reviews and shared knowledge of the energy access business among Benoo and ENEA, a strategic thinking process around energy kiosk was carried out. This part of the report shares most of the finding of this process. It stems from the analysis of the needs of rural villages, to then define the kiosk concept and to compare it to the other similar concept of mini-grid. At last, we investigate the possibilities of developing the model on the long term.

3.1 Going beyond the individual energy needs to develop economic activities in the villages

The **energy ladder** is a common concept used to present the different steps of energy access in a development perspective. The Global Lighting and Energy Access Partnership (Global LEAP) singles out three phases in this energy access (*Figure 6*).

- The first step is called **"Maturing needs"**, with two pillars, cooking and efficient lighting. They can be brought through improved cookstoves for more efficient/healthier cooking methods or rechargeable LED phone charging and lighting, for instance with a solar home system with embedded batteries.
- The second step, **"Emerging needs"**, focuses on cooling and entertainment.
- The third one, **"Horizon needs"**, includes comfort usage such as A/C or washing machine. These needs require much more energy than a solar home system which is mostly designed for lighting, phone and radio charging, up to a TV or tablet.

Yet **"Emerging" and "Horizon" needs are today are rarely met due to the limited capacity to pay of the off-grid population**. In short, these customers cannot afford these solutions.. Consequently, **it is necessary to reach significant economies of scale and decrease the LCOE so as to provide services with higher energy demand.**

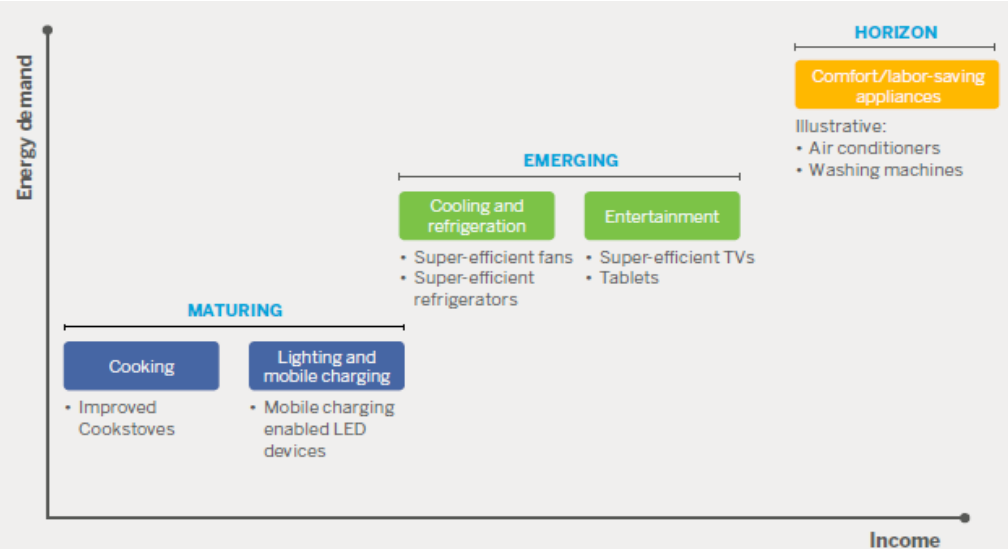


Figure 6 - Energy ladder for Base of the Pyramid off-grid households [1]

This energy ladder vision usually focuses on the demand of the households. But the energy available in the village or the surroundings is also important to promote local economic growth and development. It indeed sizes the available **energy services and productive industries**. As previously discussed, agro-processing is usually the first level of energy service. Milling (maize, soy…) is a pillar of population nutrition and can be found in most, if not all, villages. But numerous other agro-processing activities are not fulfilled in the villages, for lack of energy. Milk cooling systems or cold rooms (for meat, fish or fresh crops) are indeed scarcely found in rural areas. **Promoting the economic development of the population in off-grid zones necessarily involves productive use of energy and cannot be limited to households needs.**

With both types of energy needs in mind (individual and collective uses), each solution (and the subsequent generation plant) must be sized to fulfill the most relevant services to the population. This relevance can be assessed based on several parameters aligning the economic profitability and technical feasibility:

- the expected margin
- the long term market potential
- the amount of energy required from this service or the flexibility of the load

The lower-level energy services usually have a very high energy value, up to several dozen thousand Euros per MWh[5] for a phone charge for instance. However their total consumption will not be enough to justify the investment of a kW-scale generation plant and the complex organization behind it. Heavier loads, like a freezer or even a mill, usually present smaller margins. They are however necessary to create an efficient balance for the system between high margin-low volume application (phone charging etc.) and lower margin-high volume ones (mills, freezer). This balance is very site, region and country specific and will have to be achieved by each project developer.

Economic development will come from new economic activities in the villages, which often require productive use of energy. Solar Home Systems are not fit for this and new models need to emerge to foster these activities in remote places. Their design needs to be based on a precise assessment of the value of these activities and their capacity to pay for a new source of electricity, more expensive than the (absent) grid.

[5] Currently sold as a service, phone charging energy induced price ranges from 50 000 € to 100 000 €/MWh, from a service price of 200 FCFA/charge.

3.2 The energy kiosk concept, a modular solution to offer diverse energy services

The concept of the energy kiosk is to **develop a profitable business based on private and collective energy services**. Supplying energy is a strictly regulated business in most countries. Private companies willing to provide electricity directly to households and industry must usually speak with the national regulator to ask for licenses and abide by given electricity codes. Moreover, developing a grid distribution network is a very capital intensive activity.

The energy kiosk concept tackles the issues of advanced energy services, without the regulatory constraints and CAPEX of a distribution grid.

The idea is thus to create an energy hub in a village. Energy, usually solar PV, is generated locally, energy services are provided from that hub. The kiosk usually does not sell energy by itself (on a kWh basis) but the services around it. These services can be grouped in 4 categories:

- **Household energy access services** : phone charging, battery charging and swapping, portable light charging
- **Information and communication services** : Internet, printing, TV, phone, banking
- **Health and hygiene services**: local health clinics, refrigeration, water
- **Retail** : solar product, grocery product or cold beverage

Figure 7 – An Ekocenter kiosk (Credit – EkoCenter [2]*)*

The diversity of services offered is at first a strength of the model. The kiosk can lower its risk by adapting the distribution of its services to the local situation. It also helps reaching economies of scale with a large number of services with only one energy generation unit and one kiosk manager required for each kiosk. Two categories of potential services are interesting and worth deeper explanations, Household energy access services and retail services (see Box 1), as their implication to the long term strategy of the kiosk requires to be thought in advance.

Household energy access services should be considered as short term services for an energy kiosk.

These services can be conveniently provided by SHS and are very close to the essence of an electricity access project. Yet as the diffusion of the SHS increases in a village, the need for these services will decrease which can be a risk for the kiosk economic profitability. Indeed these services can represent a high percentage of the income at the beginning of the kiosk. Relying on these services without strongly promoting other services is a short sighted strategy which can lead to the failure of the initiative after an apparent boom. It is also worth noting that centralized energy access models have usually failed to manage in the long term. Battery swapping models for instance, as promoted by Egg Energy in Tanzania, did not scale well and these companies have mostly given up theses models to opt for SHS distribution.

Retail services are valuable for kiosk as it seems at first quite far from the energy access business.

Yet the retail business has two interesting characteristics for an energy kiosk. First, the retail business can easily use the value added of energy, for instance to sell cold or frozen items. Then energy kiosks can build a first formal retail network in countries where most of the retail in rural areas is informal. Formal retail is important for a lot of brands which want to know and control the shops where their products are available.
One of the examples of recent development of energy kiosk is the Ekocenter initiative in Rwanda. Promoted by Coca-Cola, and using SolarKiosk technologies, more than 100 kiosks have been installed. The concept revolves around energy but the identity of the promoter, Coca-Cola, underlines that it might seek several targets, including a strong retail action (see Figure 7). Coca-cola and SolarKiosk are not expanding into other East Africa countries.

Box 1 – Two categories of service to take into account to develop a kiosk

The capacity of providing both phone charging services, as well as retail or banking services embodies the versatility of the kiosk model. With quite a limited CAPEX, it is adaptable to several configurations to provide and charge different services to customers.

3.3 From a kiosk to a solar mini-grid, a blurry difference

The mini-grid concept is another model that is often put forward to go beyond SHS energy access. **The first difference with an energy kiosk is that a mini-grid is built around an electricity network which distributes the electricity to consumers on their premises**.

This concept has significant consequences on the **amount of CAPEX (and risk) required to install a high capacity mini-grid**. The economic profitability of such a CAPEX heavy mini-grid is indeed hard to achieve. For instance the cost of a connection ranges from 400 to 700 $/customer (several sources including [3]). Depending on the expected return on investment of the grid CAPEX, this translates into a fixed cost for customers ranging from around 10 to 15$/month (grid fee only)[6]. This cost is relatively high and is reasonable only if the consumer consumption is also high. Without subsidies, mini-grids would thus best suit large customers, with established demand rather than emerging needs. When the mini-grid investment is not backed by an external funding or an off-taker, developers might prefer to adopt a CAPEX light solution (like the kiosk).

[6] 15 $/month could be the monthly payment of a CAPEX of 490 $, for a 60 month period (5 years) at a discount of 20 %/year; 10 $/month could be the monthly down payment of a CAPEX of 490 $ for a 120 month period (10 years) at a discount rate of 15 %/year. CAPEX, period and discount rates will vary for each project.

Of course, some mini-grids benefit from such secure funding or off-takers and can invest in large scale systems. Yet, this is highly dependent on a very limited number of funders (large private companies for off-takers, government or international aid for funding), which increases the development risk for startup entering the market.

Mini-grids were first designed at large scales, for instance around mini hydro schemes of several hundred of kW. At such scale, their main focus is on productive use of energy. For instance, one of the most famous business models for mini-grids is called "Anchor – Business - Community" or ABC. It involves supplying energy for a large and reliable off-taker to then build a grid to supply businesses and at last the community of households.

Yet today, **there is often little difference in the effective services fulfilled by an energy kiosk or mini-grids, especially when applied to solar mini-grids**. The size of the generation unit is a very good indicator of the services an installation can fulfill. Figure 8 below shows that several mini-grids solutions have installed capacities which are lower than other kiosk solutions. Such systems are thus limited to basic energy access needs.

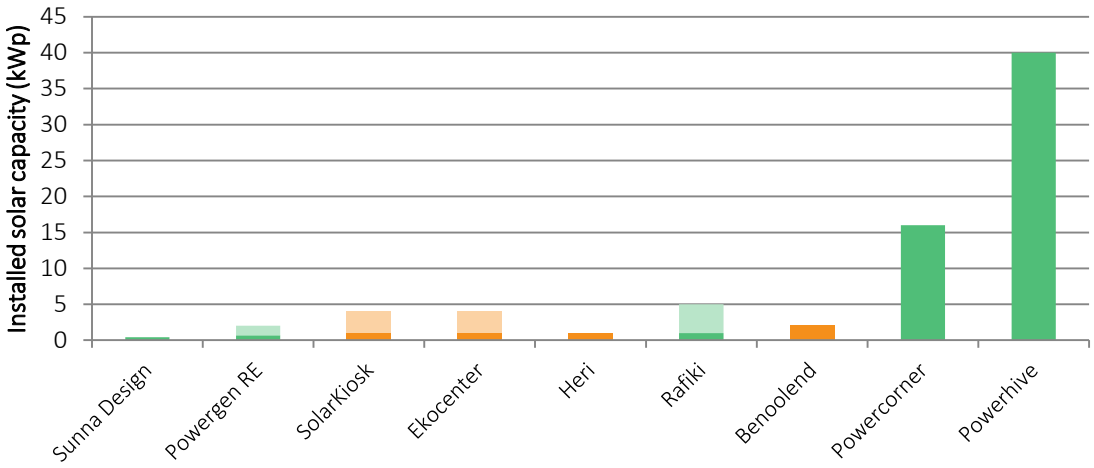


Figure 8 – Installed solar capacity of various energy kiosks (orange) and mini-grids (green) solutions (darker color: lower end of range, lighter color: higher end of the range)

Solar mini-grids targeting households customers involve a much larger CAPEX per beneficiary than a kiosk, mainly because of the CAPEX of the grid. For similar installed capacities, the kiosk might be an easier solution to investigate the willingness to pay of villages for new types of electrified activities.

3.4 Which business model for a kiosk in the long term?

As previously stated, one of the main characteristics of the kiosk is its versatility. However this versatility can be a major risk for the companies of the sector. A company should indeed define its core activities and build the core competences around it based on a shared long term vision of the service which it can efficiently bring to a village. Moreover as the model grows, it might be necessary to reduce the scope of services provided by the kiosk and become more specialized. This long term vision might be hard to define for kiosk as many opportunities are opened.

3.4.1 Energy business vs. Formal retail business?

A **first issue lies in defining the services of the kiosk with the highest value/margin and the service with the best perspective for the kiosk** considering current and potential future regulatory stakes and the type of the

organization developed to manage a broader network of kiosks. As we described it, the kiosk can offer very different types of services. **At both ends of the spectrum, it can either be an energy business or a formal retail business.** The choice of reducing services (between energy, retail, banking etc.) will thus depends on a lot of parameters and be a case by case analysis. It is however important to highlight that developing an energy business might not be the easiest solution for all kiosks.

3.4.2 Towards developing independent energy providers

Since the kiosk usually sells solar home systems or solar lamps to the local households, the kiosk village is progressively equipped with products covering basic needs. As a consequence a large share of the roofs is effectively turned into micro PV plants, owned by each household. **The kiosk solution must find a model to efficiently bring more value to the village**. Going further in the energy access will often go through **building a mini-grid in the village.**

The Household segment might be a very specific segment to address given that they progressively own their SHS and have a decreasing energy cost once the first system is fully paid for. Most SHS solutions are priced as a leasing scheme, customer becoming owner of the system at the end of a given period. Due to battery replacement requirements, the solution is unlikely to be free at the end of the period for the customer. The long term cost of the solution is the battery cost, which is however usually less than half of the cost of the system (for Lead Acid system), decreasing the energy cost for the household (considering constant consumption). **Most households will benefit from the added value of the mini-grid only if it can offer a better price than their SHS, and if their energy consumption truly requires a higher capacity**. It might therefore only address the wealthiest of the community.

However a kiosk is likely to able to be used for other business opportunities:

- Creating a second energy hub with only one generation plant
- Supplying a nearby new economic activity
- Offering competitive supply to telecom towers, based on an existing infrastructure and known quality of supply

A mini-grid might be built step by step, without any strategic perspectives except to better serve the local economic development and actions to support the energy demand would be required. Government might also partner with the energy kiosk network to serve the state policy regarding energy access. Subsidies can be granted to companies proving their efficiency to reach remote village to connect households. Households' connection is the main KPI of energy access, both for national politics and for international agencies. If connection costs are fully covered by a national electrification agency, serving households with a mini-grid competes much more easily with mostly paid SHS.

On the long term, an energy kiosk can thus be considered as a real option to develop an independent utility. These sale points network can easily turn into a lot of different businesses if the mini-grid option is not the best one in the end, provided that aligning the whole business model of the kiosk company is reachable.

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