

Green Business Area

A model for supplying solar off-grid electricity to local rural businesses while supporting their growth

The Green Business Area (GBA) is an integrated concept where rural micro and small enterprises and co-operatives gain access to affordable electricity – primarily off-grid solar – and receive support to develop their business. The first GBA was launched by Geres in 2015 in a rural community in Southern Mali, and since then the concept has been replicated in 7 other communities. Each GBA is centred around a solar PV microgrid that is dedicated to the electrification of small businesses and sized according to present and future demand of the businesses. The concept is explicitly geared towards ensuring that the various benefits of energy access (increased productivity, food security, inclusion) are realised and are sustained in the long term. The present case study focuses on the approach to demand estimation and stimulation while also discussing key lessons learnt from the operational and governance perspective, the socio-economic impacts and the potential for replication in similar contexts in the Sahel and beyond.



Figure 1. Businesses present in the Konséguéla GBA (Source: Geres)

General information

Project name	Access to sustainable energy for all in Mali
Developer	GERES, www.geres.eu
Location	8 communities in Sikasso, Ségou and Kayes regions, Southern Mali
Focus dimension	Estimating and stimulating demand
Type of action	Rural electrification intervention
Financing sources	Grants (feasibility studies, design, construction), equity (local operator)
Technology	Solar PV micro grids for productive use

Introduction

The Sikasso region, like other regions in Southern Mali, faces various challenges such as insufficient infrastructure and lack of agricultural diversification and financing (GIZ, 2021). Despite the great potential of solar energy, electricity access rates in these areas rarely exceed 20% (IRENA, 2022).

Geres is an international not-for-profit organisation that has been active in Mali since 2007, with a focus on rural energy access, renewable energy and energy efficiency, agroforestry and economic development. Based on its experience and knowledge of the local context, the organisation launched the concept of the Green Business Area (or “**Zone d’Activités Electrifiée**”) in the Sikasso region in 2015. Its aim is to provide affordable electricity to micro and small businesses, cooperatives and other service providers while also acting as a business incubator and accelerator.

The first GBA was launched in 2015 in Konséguéla, a village of 5,000 inhabitants. Since then, a further 7 GBAs have been initiated in other locations in Southern Mali. Geres aims to implement a total of 20 GBAs by 2025.

Technology and operational model

The electricity supply component of the GBA concept consists of a hybrid solar PV/diesel microgrid. The system in Konséguéla has a capacity of 12.5 kWp Solar PV and 20 kVA diesel genset, which can also operate on jatropha oil. The genset covers for demand peaks. In other GBAs, the system size is planned to be slightly higher with around 20 kWp of PV and a 30 kVA genset. OPzV batteries ranging from 40 to 90 kWh are used for energy storage.

The system supplies small businesses which are housed within an area of 700 m². The premises are designed with bioclimatic principles and are sized and designed for specific activities, in order to increase energy efficiency and comfort. The Konséguéla GBA has gradually grown to host almost 12 businesses, with a mix of activities that ranges from a bakery, carpentry workshop, a digital and radio communication centre, a room for cold storage of agricultural produce, and mechanical processing activities (oil pressing, milling).

In the early stages of the development of the first GBA, the technical maintenance and operation was carried out directly by Geres. Gradually, a private local operator was engaged, in partnership with a local NGO (Association Malienne pour l’Eveil au Développement Durable (AMEDD)) and other local stakeholders. Capacity building was provided to a technician. Over time, it became clear that it would be more efficient to operate all GBAs via a single private entity, rather than have a different operator for each GBA (see “Lessons learnt” below for more details). Still, every GBA has one technician who is locally based and able to do day-to-day maintenance and who is in direct contact with the Technical Manager of the private entity [Green Biz Africa](#).



Figure 2. Air view of GBA electricity supply system and premises (Source: GERES)



Figure 3. The GBA in Konséguéla (Source: Geres)

Demand assessment and stimulation

Sizing the system appropriately is fundamental to the viability of the GBAs, which are designed to not only meet electricity demand, but stimulate its growth. The key challenge lies in the uncertainty on the future pace of business growth and electricity consumption.

Geres started [analysing demand for productive uses of electricity](#) in rural Southern Mali in 2008 (Geres, 2019). The study observed the consumption of artisans, traders and micro-businesses as well as their ability to pay (ATP) and willingness to pay (WTP) via surveys and measurements in three rural communities. To assess demand, load curves were measured in the field with a power analyser. ATP was assessed regarding the previous energy expenses of the businesses when they used a diesel genset, and WTP was assessed by considering that the energy service would be considerably improved by a GBA. Some of the lessons learnt included a high WTP for reliable and good quality electricity supply, and the potential for concentrating businesses and offering specific time slots as tools to increase the viability of solar microgrids.

A first energy demand assessment in Konséguéla was carried out by Geres in 2014. This revealed that existing demand was insufficient for the viability of the system, and led to the integration of business support activities within the GBA concept. During the project design, local stakeholders and other relevant partners were consulted for the development of appropriately sized but flexible energy packages for different rural businesses. This assessment gradually improved in accuracy over the course of the first GBA project in Konséguéla. Moreover, demand increased over time due to the new business activities and increased productivity.

After 7 years of operation and with close to 30 businesses connected in the two first GBAs, Geres has been able to capitalise on the experiences in Konséguéla and other locations to better predict growth in electricity consumption, evaluate monthly and seasonal patterns, and measure the energy intensity of the businesses (i.e., electricity consumed per unit of turnover). This has enabled an improved sizing of the new GBAs, and the development of plans for future years. Moreover, it has helped to improve the tariff design. For example, it became clear that willingness to pay was higher during the night (see more details in the Financing model section below).

Business model design

The GBA concept revolves around the provision of support to the participating businesses. Geres plays a key role in this: first, it identifies the suitable locations and businesses for the GBAs, based on an assessment of existing and potential economic activities. It then facilitates access to business development support and to finance through partner microfinance institutions. This includes financing for the purchase of productive use appliances. Geres also provides capacity building and entrepreneurship and technological support to the businesses and local authorities to ensure the long-term viability of the GBAs, and engages and communicates with the local actors. The experience reveals that the strong and long-term commitment of Geres in implementation and facilitation was crucial for the concept to reach maturity.

Eventually, Geres seeks to hand this role over to local organisations that are able to operate the GBAs independently. For this, a search for a single private operator began in 2019. In 2022, the social enterprise Green Biz Africa was finally founded and will now operate all GBAs developed by Geres, providing technical services, business support and adapted financial solutions to the participating rural businesses.

As an additional business activity, it will supply solar home systems (SHS) to households and solar-powered water pumping systems (SPS) to farmers on a pay-as-you-go model. The founding shareholders in Green Biz Africa are Geres and two experienced private Malian entrepreneurs. In this way, Geres is able to pass on crucial knowhow gained in the last years. The incubation of the company has been supported financially by the Swedish and French cooperation agencies. The initial capital of the Green Biz Africa company was provided by the Malian entrepreneurs.

The local monitoring of the GBAs includes the three entities and a Local Monitoring Committee (LMC) that allow a more effective dissemination of information between parties (Figure 3).

Financing model

The financing needed for the studies, set up and operation of the GBAs (around EUR 500,000 per GBA), the support to rural businesses, and the monitoring and evaluation, originated from a combination of grants from various organisations: Swedish Development Cooperation with Mali, French Development Agency (AFD), Prince Albert II de Monaco Foundation, Nexans

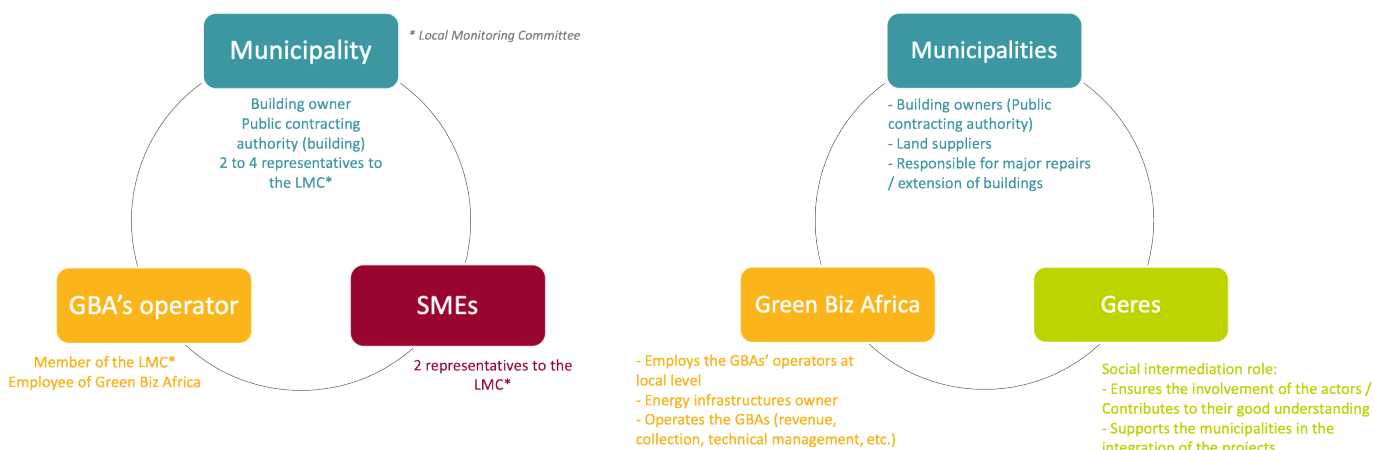


Figure 4. The model for local operation of the GBAs (Source: Geres)

Foundation and the foundation Synergie Solaire. All other investments are financed by the businesses with their own funds or loans. Equity from investors is used to finance Green Biz Africa, who operates the GBAs.

Businesses housed in the GBA pay for the rental of the bioclimatic spaces, for the sale of the electricity, for the capacity building program and other services (e.g., security). Each business pays rent for a “package” including a certain area of the building (in m²) and a certain kWh per month. If a business needs more electricity within a month, a price per additional kWh is added. The electricity consumption is measured by three-phase meters. Default rates are currently low, but experience showed that the businesses pay on average two months later than what was initially planned in the design stage.

The customer pricing model has been designed to cover the operational expenditures of the GBA and to be able to replace any faulty equipment (e.g. batteries), but not to recover the capital expenditures.

Social and environmental impacts

The GBAs are explicitly aiming at creating employment and economic opportunities for the rural communities. In the last years, the model has shown to be successful at this, and has created new jobs, increased incomes, and improved services for the communities. In its first two years of operation, the Konséguéla GBA saw the creation of 34 jobs. It is estimated that each GBA can create 35 to 50 direct jobs.

An explicit focus on electricity use for cold storage and agricultural processing helps to strengthen local agricultural value chains. For example, it aims to allow farmers to sell outside of harvesting season and hence obtain higher prices for their produce. It is important to note, however, that the full transformation of agricultural chains is a very long-term and complex process for which many different factors beyond electricity access are at play.

Key figures

8 GBAs currently in operation:

GBA of Konséguéla (in operation since 2015)

- 8 micro and small businesses hosted – 650 m² of workshops
- 25 direct jobs created; 80 existing jobs consolidated
- EUR 50,000 annual turnover for businesses
- 10 MWh produced per year

GBA of Koury (in operation since end of 2019)

- 12 micro and small businesses hosted – 780 m² of workshops
- 45 direct jobs created; 140 existing jobs consolidated
- EUR 80,000 annual turnover for businesses

To promote inclusion, gender-specific measures are implemented in the GBA concept. For example, the call for participating businesses favours women-owned businesses, and a radio program specifically addressing women broadcasts testimonies of women entrepreneurs in the GBA. Strong partnerships with gender-sensitive microfinance institutions were created and a training program that strengthens women's reading and writing skills was established. Besides, a „gender and conflict management“ officer within the business selection committee was set up.

The GBA's path towards impact hinges on the availability of electricity, but also on the access to finance and on the lowering of the cost of running a business (through, for example, business development support, and tailored electricity tariffs).

Replicability

The GBA concept has shown great potential for replication and has attracted the interest of different actors in comparable contexts. In Mali, Geres is already replicating the model, securing the necessary initial investment capital, and discussing with national authorities and rural electrification operators on how to integrate the concept into their programmes. In Senegal, Burkina Faso and Benin, Geres is supporting other actors and transferring their knowhow. Other rural regions in the Sahel (including northern Nigeria) share similar agricultural value chains, challenges and opportunities. GBAs are thus a promising model for other comparable regions.

Future outlook

- 6 GBAs expected to open in 2023/24
- 3 GBAs in discussion with funders for launch in 2024/25
- Launch of the sale of SHS and SPS in 2023 in all the GBAs by Green Biz Africa
- Implementation of a call centre to manage the sales and after-sales service of the GBAs
- Development of the concept in other countries of West Africa from 2023

Lessons learnt

The first GBA started operating in 2015, a second opened in 2019, and a further 6 opened in 2022. Some of the key lessons learnt during this period include:

- Close observation of the demand patterns allows operators to predict growth in electricity consumption and better tailor the tariffs to the situation of each business.
- Finding and retaining a skilled operator that is based in the community and has the necessary combination of technical and business skills is a challenge. A solution is to appoint a private entity to manage and operate multiple GBAs, and employing operators locally based in each GBA.
- A mix of enterprise types including agricultural processing and services has proven to be effective.
- Providing electricity and access to important markets to businesses is not enough. There is a high need for capacity building, especially in terms of business management skills, as well as for facilitating access to finance.
- Engaging the community and maintaining partnerships with local organisations and government is essential for the longevity of a GBA, but requires significant resources and commitment.
- Energy efficiency is an element of the GBA concept: bioclimatic buildings improve the comfort of the tenants, reduce energy consumption and protect the appliances. Besides, the capacity building of the businesses includes training on the energy efficiency of the productive use appliances. However, skilled construction workers in this area are lacking, and value chains are underdeveloped.
- The availability of raw materials influences the GBAs. For example, lack of production of jatropha in Mali complicates the implementation of biofuel generators.

Further resources

Check out these videos and testimonials about the business activities in the GBA in Kongséguéla.

- In English:
<https://www.youtube.com/watch?v=xp8idu2EyDI>
<https://www.dw.com/en/providing-green-energy-for-malis-small-businesses/video-57307356>
- In French:
<https://www.youtube.com/watch?v=Sp2PNnoFNpc>
<https://www.youtube.com/watch?v=8CQcZ-8ed7A>
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