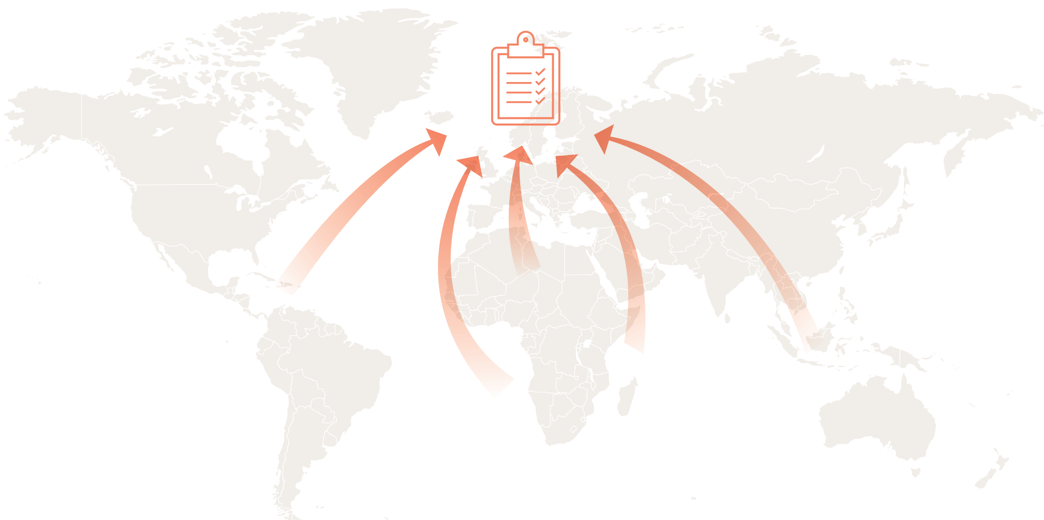
FEEDBACKS AND BEST PRACTICES ON ENERGY ACCESS PROJECTS



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Introduction of the collection

Since 2018, the French Renewable Energy Trade Association (SER) and the French Agency for Ecological Transition (ADEME) have been leading a working group (WG) bringing together all French stakeholders involved in access to off-grid energy. These include NGOs, businesses, donors, research laboratories, public bodies operating in the sector, coalitions of stakeholders and local authorities. Within this framework, a sub-working group was set up to share best practices and capitalize on past projects. Its activities were entrusted to Lianes cooperation and the CICLE network, with support from ADEME and SER.

Between 01/07/2021 and 10/05/2022, this team organized a series of workshops for all the stakeholders operating in the field of off-grid energy access. These workshops aimed at transforming past experiences of committed stakeholders into shareable knowledge. The aim: increase the French expertise in the field of off-grid energy projects, share return of experiences to facilitate the implementation of projets and increase their sustainability.

The workshops were open to members of the working group, as well as to foreign partners operating in the sector. They addressed specific themes through narrative work based on the experiences of stakeholders and collective discussions. Each of these meetings has been detailed in this document.

1. Off-grid rural electrification projects: what risks for different business models?

Introduction

This document is the result of a workshop held in July 2021[1] and its purpose is to present a risk analysis of three off-grid business models, as well as mitigation options for each one. This document is addressed first and foremost to project leaders who wish to build their business model by anticipating difficulties as best as they can. It will also be of interest to donors who wish to expand their knowledge of the various business models in order to be able to put in place the financing tools best suited to their action strategy.

CAUTIONARY NOTE:
this document presents three different business models. It does not claim to be representative of all existing models. The following projects have different levels of maturity. The recommendations must be seen with hindsight and taking into account the context of each project.

1 https://www.youtube.com/watch?v=9SJAYL3qLtM

Presentation of case studies

Qotto is a French company specialising in Solar Home Systems that designs and distributes stand-alone solar kits in Benin and Burkina Faso to meet the domestic requirements of rural households.

The **GERES** is a French international aid NGO working to improve living conditions and fight climate change and its impacts. In Mali, the organisation has created a service platform concept called "Zone d'Activités Electrifiées" (electrified activities zone), which combines installing renewable energy sources and providing support to enable local economic development.

Sunkofa Energy is a French company that provides energy services through smart mini-grids powered by renewable energies. Sunkofa's goal is to provide communities in sub-Saharan Africa with the means to develop their energy use through innovative electricity-related solutions (refrigeration, milling, Internet, etc.).

Rp Global (Renewable Power Global) is an international group based in Austria. Rp Globa is an independent electricity producer specialising in renewable energies (hydroelectric, wind and solar) and is developing a C&I (Commercial & Industrial) solar offering in Senegal and Nigeria.

Background information - Methodological note

The three technologies discussed in this capitalisation document (Solar Home System, Service Platform, Mini-grid) are subject to a specific risk analysis. In order to provide the best possible overview of the risks, all the sections begin with a quick presentation of the technology followed by a criticality table obtained by cross-referencing the severity and frequency indices for all the issues that were identified. The detailed analyses of the various risks are coupled with mitigating actions proposals.

C&I technology – which aims at providing a customised off-grid energy access solution to meet a defined productive use – has deliberately not been detailed. Yet, the risks presented for service platforms may refer to it as well.

		Severity			
		1	2	3	4
Frequency	4	4	8	12	16
	3	3	6	9	12
	2	2	4	6	8
	1	1	2	3	4

Table 1 - Presentation of criticality indices according to frequency and severity

Frequency	Definition
1	Very uncommon in a project
2	Uncommon, can happen once in the project
3	Happens regularly, several times in the project
4	Very common, recurrent risk

Severity	Definition
1	Low impact, which does not prevent the project's proper operation
2	Risk that leads to a problem that may prevent the project from operating properly
3	Risk that disrupts the project or has a major impact on its execution
4	Risk that causes an insuperable problem

A. Solar Home System (SHS)

The term Solar Home System refers to an autonomous power generation system suitable for domestic use. SHS generally consist of a photovoltaic module, a charge controller and an inverter and can incorporate an energy storage system (battery). Most systems are under 100 W and the installed capacity can power electrical equipment – household appliances, lamps, computers, water pumps, etc. – with direct current and alternating current.

Risks	Severity	Frequency	Criticality
FINANCIAL RISKS			
Non-recovery	3	3	**9**
Unbalanced cash flows	3	2	**6**
Mismatch between duration of funding and project lifetime	2	2	**4**
RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT			
Poor data quality	2	4	**8**
ENTREPRENEURIAL RISKS			
Competition from the informal sector	2	4	**8**
TECHNICAL AND OPERATIONAL RISKS			
Wear and damage	2	3	**6**
CONSUMPTION RISKS			
Changing needs and behaviours	1	3	**3**
INSTITUTIONAL AND REGULATORY RISKS			
Regulatory changes	3	1	**3**
POLITICAL RISKS			
Political instability and insecurity	3	2	**6**

I. FINANCIAL RISKS

Non-recovery

When households are unable to purchase their SHS in cash, operators can provide them with several options, including buying on credit. However, this acquisition method exposes the project leader to the risk of being unable to recover the money should the borrower become insolvent and/or should external factors intervene (economic crisis, security situation, climate event, etc.). This credit risk can reduce the profitability of SHS and in a worst-case scenario can result in the business folding.

RECOMMENDATIONS

→ Introduce credit risk assessment and management systems. If the system is sold on credit, in order to manage the risk of irregular payments, use the collection rate, which is the number of days paid by a customer divided by the number of days that have passed since the installation of the system, rather than the number of unpaid days before the energy supplier's intervention (PAR 30, 60, 90…), an indicator often used by microfinance institutions and SHS distributors.

→ Pay particular attention to the quality of the client portfolio.

→ Implement digital solutions to facilitate recoveries: mobile payments, offline applications, prepaid counters.

→ Consider alternative solutions such as leasing, whereby the system can be financed based on the beneficiaries' income.

→ Provide remote power cut-off solutions.

Unbalanced cash flows

SHS project owners may face difficulties in anticipating cash inflows and outflows due to logistics, after-sales service (ASS), clients' profile and their ability to pay.

Many implement "Pay As You Go" (PAYG) systems. Customers are charged based on how much they use the service, which they can adjust progressively. The PAYG model has specific features that need to be taken into account, starting with particularly large working capital requirements. So, as illustrated in the diagram below, the disbursement and collection process of a PAYG model requires one and a half to two years before full recovery.

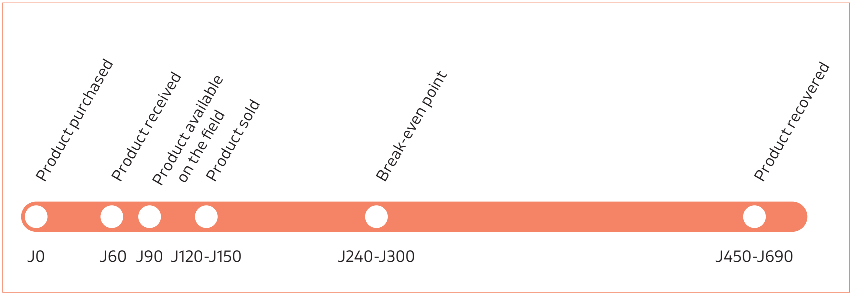

Figure 1 - Source : GERES (2018-2019)

Associated potential late payments must also be taken into account – delays that do not necessarily entail financial penalties, but prevent the customer from using the product, thereby causing a loss of profit for the operator. These delays need to be integrated into developments in logistics and after-sales service.

In addition, after-sales service and operating costs are often underestimated. Various factors can be behind these costs: poor use of equipment, poor understanding of how energy works by local stakeholders, difficulty in obtaining spare parts and undertaking operations in isolated areas, lack of maintenance skills, etc.

RECOMMENDATIONS

- → Improve the forecasting and estimation of after-sales service costs, do not overestimate the lifespan of the products (especially in rural areas) and factor in possible periods of disruption that can result from a poor after-sales service.

- → Invest in training and encourage local maintenance. It is important to develop a network of technicians who can be called upon at any time. This initial investment generates long-term savings, but can also lead to challenges: most of the people who receive training often end up leaving rural areas. It is therefore necessary to work alongside local authorities to build up a model that motivates skilled people to stay.

Mismatch between duration of funding and project lifetime

The funding often covers a fixed period of time of about 12 to 36 months, which does not correspond to the actual duration of the SHS facilities. Therefore, the funding does not include the cost of maintenance and upkeep that will need to be performed over a longer term (replacement of lithium batteries, for example).

It can be noted that this risk is less acute for SHS than for mini-grids.

RECOMMENDATIONS

- → Integrate the service and maintenance phases into specific funding to cover all project stages. It is also advisable that funding for the preliminary and diagnostic study phases are included in the project business model as they are essential.
- → Favour multi-stakeholder consortia in order to mobilise a wider range of funding, as well as expertise and field approaches. This makes it easier to implement the project.

II. RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT

Poor data quality

During the project's preparatory phase, data about the consumption of systems' end-users, demography, the composition of households' incomes and the means already in place to facilitate access to energy needs to be collected. This data is crucial for project sizing and is often fragmented, unrepresentative or biased. Project leaders may also have difficulties in gathering the necessary analytical evidence for donors and investors, particularly about expected consumption and the project's economic and social leverage. For example, a high number of beneficiaries does not necessarily imply strong economic development. This is particularly the case for SHSs, which are used more for domestic purposes than for productive uses.

RECOMMENDATIONS

→ Ensure a high quality of consumption data (projected load curves, specific needs, etc.). This can be done by an independent agency.

→ Integrate data and long-term monitoring into a digital system to improve the traceability and reliability of the provided information.

III. ENTREPRENEURIAL RISKS

Competition from the informal sector

The development of the informal energy access sector has resulted in the spread of several low-quality but cheaper products. Competition from these products can lead to the depreciation of solutions such as SHSs. As a result, project leaders may have difficulties finding customers who are confident enough in the quality and sustainability of products to invest in them.

RECOMMENDATIONS

- Take into account the impact of the informal sector in market as well as technical and financial risk studies.
- Conduct awareness-raising, education and information campaigns about the informal sector among the population.
- Favour quality-certified products and equipment, meeting international standards such as “Lighting Global Quality Standards” or “VeraSol”.
- Train stakeholders from the informal sector so as to turn them into allies in the distribution of certified products.

IV. TECHNICAL AND OPERATIONAL RISKS

Wear and damage

With harsh weather conditions, especially in sub-Saharan Africa, the electrical components of SHSs tend to wear out faster. This can lead to loss of user confidence, commercial damage and increased maintenance costs. This risk can lead to the project failing if maintenance is not properly managed or if spare parts are in short supply. This proved to be the case at the height of the pandemic.

RECOMMENDATIONS

- → Establish training programmes for local technicians and contractors to ensure after-sales service and maintenance (at least first level).
- → Rely on an easy-to-activate maintenance network.
- → Develop predictive maintenance.
- → Favour quality-certified products and equipment, meeting international standards such as “Lighting Global Quality Standards” or “VeraSol”.
- → Support local production and build buffer stocks close to operation areas, so that the equipment needed to maintain facilities can be rapidly provided.

V. CONSUMER RISKS

Changing needs and behaviours

Over time, household needs and behaviours change. This can lead to an overuse of SHS. Thus, a 100W SHS meant for lighting and recharging mobile phones will not necessarily be able to power several household appliances, exposing beneficiaries to the risk of premature equipment wear or even of equipment failures.

RECOMMENDATIONS

→ Train beneficiaries to use equipment properly.

→ Establish a close and high-performance maintenance network.

→ Anticipate use changes, for example by increasing power, by looking into opportunities to interconnect SHSs so as to move on to mini-grids.

VI. INSTITUTIONAL AND REGULATORY RISKS

Regulatory changes

Regulatory and/or legislative changes may pose a risk to an electrification project. SHSs are less exposed to this risk than mini-grids or service platforms but can still be impacted. This is particularly the case when countries decide to "centralise" the distribution of SHSs by designating a unique operator in charge of this type of equipment, or when public authorities adopt regulations imposing new constraints on pricing (when SHSs are distributed under PAYG models or on the basis of other payment systems over the long-term).

RECOMMENDATIONS

- Set up monitoring systems focused on the political trends in the area of intervention.
- Encourage the authorities to introduce customs duties exemption protocols and a classification system for the equipment that can benefit from those latter.

NOTE:
Technical assistance can support governments in developing supportive and robust policy and regulatory frameworks, as well as in implementing capacity building activities.

VII. POLITICAL RISKS

Political instability and insecurity

In some areas, political instability may result in a sudden interruption of field presence. Depending on the context and the environment, disruptions can prevent users from being able to monitor their facilities, which can have technical and financial consequences.

RECOMMENDATIONS

- → Use digital tools to remotely monitor facilities.
- → Establish local partnerships to maintain contact with beneficiary areas and carry out the distribution and maintenance of the different products.
- → Take out guarantees that cover political risks.

B. Service platform

A service platform is made up of a renewable energy production system – which can be solar, wind, hydroelectric, biomass, etc. – for small-scale urban or rural activities that are grouped together around an energy access point.

Risks	Severity	Frequency	Criticality
FINANCIAL RISKS			
Non-recovery	2	3	**6**
Unbalanced cash flows	2	2	**4**
Mismatch between duration of funding and project lifetime	3	2	**6**
RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT			
Poor data quality	3	2	**6**
Over/undersizing	4	3	**12**
ENTREPRENEURIAL RISKS			
Competition from the informal sector	1	1	**1**
TECHNICAL AND OPERATIONAL RISKS			
Wear and damage	2	4	**8**
CONSUMPTION RISKS			
Changing needs and behaviours	2	1	**2**
INSTITUTIONAL AND REGULATORY RISKS			
Regulatory changes	2	1	**2**
Difficulties obtaining permits	2	2	**4**
POLITICAL RISKS			
Political instability and insecurity	4	2	**8**

I. FINANCIAL RISKS

Non-recovery

Platform managers are at the heart of two transaction flows: with the technical facility developer on the one hand, and with the platform's clients on the other hand (for this second level, please refer to the risk of SHS non-recovery page 8).

RECOMMENDATIONS

- → Support the platform manager upstream in order to reduce the risk of a potential outstanding debt to the developer of the technical solution.
- → Ensure a close link between the developer of the technical solution and the platform manager throughout the project's lifetime.

Unbalanced cash flows

Platform managers may experience difficulties in growing businesses, stimulating income-generating activities or developing a stable customer base.

RECOMMENDATIONS

- → Implement continuous support for managers.
- → Provide sufficient cash reserves to absorb supply or demand shocks.
- → Supplement the activity with new revenue sources, such as – for example – the sale or rental of other equipment (TV, fridge etc.).
- → Provide financial support (e.g. facilitating access to credit in order to acquire equipment) to encourage the beginning or development of activities.

Mismatch between duration of funding and project lifetime

Funding typically covers the first years of a facility (12 to 36 months), but a service platform might have to operate over a longer period before it becomes self-financing. Insufficient financial support to the platform manager over the medium and long term can jeopardise the facility's sustainability and the services it provides.

RECOMMENDATIONS

- → Define all phases of the project (from preliminary study/diagnostic to follow-up/evaluation) and properly define the schedule, including financial needs.
- → Seek longer-term funding.

II. RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT

Poor data quality

During the project's preparatory phase, data about the consumption of systems' end-users, demography, the composition of households' incomes and the means already in place to facilitate access to energy needs to be collected. This data is crucial for project sizing and is often fragmented, unrepresentative or biased. Project leaders may also have difficulties in gathering the necessary analytical evidence for donors and investors, particularly about expected consumption.

Poor data quality can lead to requirements being poorly estimated, resulting in the facility being improperly sized.

RECOMMENDATIONS

→ Entrust field surveys and evaluation to an independent agency when the overall project budget allows it.

→ Build on existing experiences and methodologies to carry out these surveys.

→ Integrate data and long-term monitoring into a digital system to improve the traceability and reliability of the provided information.

Over/undersizing

An undersized facility can lead to faults and poor quality of service.

If there are no operational consequences, then over-sizing results in unnecessary expenditures.

RECOMMENDATIONS

- → Take demographic dynamics and business needs into account when sizing.
- → Use sector professionals to approve sizing decisions.

III. ENTREPRENEURIAL RISKS

Competition from the informal sector

Project leaders may have to deal with the arrival on the market of other operators offering lower prices.

To offer more attractive prices, some competitors may also sell poor quality equipment, the failure of which may damage the reputation of service platforms.

RECOMMENDATION

→ Raise awareness among project leaders and consumers of the risks associated with the informal sector and the importance of having good quality equipment.

IV. TECHNICAL AND OPERATIONAL RISKS

Wear and damage

With harsh weather conditions, especially in sub-Saharan Africa, equipment's electrical components tend to wear out faster. This can lead to loss of user confidence, commercial damage and increased maintenance costs. This risk can lead to the project failing if maintenance is not properly managed or if spare parts are in short supply. This proved to be the case at the height of the pandemic.

RECOMMENDATIONS

→ Create a local business and look for simple and robust technical solutions.

→ Favour quality-certified products and equipment, meeting international standards (such as Lighting Global for example).

→ Support local production and build buffer stocks close to operation areas, so that the equipment needed to maintain facilities can be rapidly provided.

V. CONSUMER RISKS

Changing needs and consumption

- Entrepreneurs' consumption can change considerably when their business grows, when they win over new markets or with the arrival of new consumers as a result of – for example – unanticipated population movements. On the other hand, some activities can use too much electricity – either because of energy-consuming or inappropriate equipment, or as a result of an uncontrolled use. Such unplanned or inappropriate power consumption may exceed the capacity of the facility and result in its failure.

RECOMMENDATIONS

- Anticipate such changes right from the project's design phase (population flows, stakeholders' economic development...).

- Support and raise project leaders' awareness of the importance of managing this risk.

- Facilitate access to appropriate and energy-efficient equipment, for example by encouraging supplies from quality distributors.

VI. INSTITUTIONAL AND REGULATORY RISKS

Regulatory changes

Regulatory and/or legislative changes may pose a risk to service platform projects, particularly in the long term.

RECOMMENDATION

→ Set up monitoring systems focused on the political trends in the area of intervention.

NOTE:
Technical assistance can support governments in developing supportive and robust policy and regulatory frameworks, as well as in implementing capacity building activities.

Difficulties in obtaining permits

The process of acquiring permits and licenses from the competent authorities is lengthy, costly and uncertain. It can cause investments to stall and create difficulties in financing the development phase.

RECOMMENDATIONS

- → Do not increase the numbers of countries in which operations are conducted, so as to avoid being excessively dispersed. This will allow to take the time to gain a sound understanding of the regulatory framework of the target area and make adjustments on a case-by-case basis.
- → Plan the submission of permit applications well in advance and take into consideration the time it takes for them to be granted.
- → Include rural electrification agencies, the state and local authorities in the project ecosystem.
- → Provide funding tools for the preparatory phase.
- → Support public authorities in improving and accelerating these processes.

VII. POLITICAL RISKS

Political instability

In some areas, political instability may result in a sudden interruption of field presence. Depending on the context and the environment, disruptions can prevent users from being able to monitor their facilities, which can have technical and financial consequences.

RECOMMENDATIONS

→ Use digital tools to remotely monitor facilities.

→ Establish local partnerships to maintain contact with beneficiary areas and carry out the distribution and maintenance of the different products.

→ Take out guarantees that cover political risks.

C. Mini-grid

A mini-grid is a system made up of a power generation module that can come from a renewable source (solar, wind, hydroelectric, biomass) and a grid that operates independently of the national grid. Installed capacity can range from a few kW to up to 10 MW. For larger minigrids, the project's lifetime can be up to 25 years.

Risks	Severity	Frequency	Criticality
FINANCIAL RISKS			
Non-recovery	3	4	**12**
Unbalanced cash flows	3	2	**6**
Unsustainability of the business model	3	3	**9**
Mismatch between duration of funding and project lifetime	2	3	**6**
RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT			
Poor data quality	4	2	**8**
Over/undersizing	4	3	**12**
ENTREPRENEURIAL RISKS			
Competition from the informal sector	2	4	**8**
TECHNICAL AND OPERATIONAL RISKS			
Wear and damage	3	3	**9**
Demand elasticity in relation to price	3	2	**6**
CONSUMPTION RISKS			
Changes in consumption	3	2	**6**
INSTITUTIONAL AND REGULATORY RISKS			
Non-alignment of actions undertaken by various local institutional stakeholders	3	2	**6**
Regulatory changes	3	2	**6**
Difficulties obtaining permits	4	2	**8**
POLITICAL RISKS			
Political instability and insecurity	4	2	**8**

I. FINANCIAL RISKS

Non-recovery

When a mini-grid is installed, one of the challenges is the ability of end clients to fund the system over the long term. Large numbers of unpaid debts can result in the project leader going bankrupt.

RECOMMENDATIONS

- → Pay particular attention to the quality of the client portfolio.
- → Raise funders' awareness of the importance of providing financing tools that would enable the minigrid operator to connect clients of all social categories.
- → Implement digital solutions to facilitate recoveries: mobile payments, offline applications, prepaid counters.
- → Provide remote power cut-off solutions.

Unbalanced cash flows

Mini-grid project leaders may have difficulties in anticipating cash inflows and outflows during the project, due in part to logistics and after-sales service costs that can be very high. Some parts needing to be replaced are expensive and often need to be imported.

In addition, after-sales service and operating costs are often underestimated. Various factors can be behind these costs: poor use of equipment, poor understanding of energy by local stakeholders, difficulty in obtaining spare parts and undertaking operations in isolated areas, lack of maintenance/repair skills, etc.

RECOMMENDATIONS

- Improve the forecasting and estimation of service costs, do not overestimate the lifespan of the products (especially in rural areas) and factor in possible periods of disruption that can result from a poor after-sales service.

- Invest in training and encourage local maintenance. It is important to develop a network of technicians who can be called upon at any time. This initial investment generates long-term savings, but can also lead to challenges: most of the people who receive training often end up leaving rural areas. It is therefore necessary to work alongside local authorities to build up a model that motivates skilled people to stay.

Unsustainability of the business model

With mini-grid projects, the tariff is often aligned with the national grid's one, which is subsidised by the State. In case of unforeseen events (such as a breakdown requiring that equipment be delivered from abroad, or excessive electricity consumption), the operator must draw on its cash to address the situation, without first having enough cashflow to cover the costs of operating the system (OPEX) and initial investments (CAPEX).

In addition, when the facility is put into service, the local operator may tend to lower the cost of electricity to attract more users. Apart from the fact that this strategy may not work, it could entail additional costs associated with potential new connections, which may jeopardise the viability of the model and lead to the failure of the system.

RECOMMENDATIONS

- → Raise awareness and train entrepreneurs on the business model, in particular to ensure that tariffs are compatible with a long-term viability.
- → Subsidise CAPEX and even OPEX.
- → Stimulate the creation of income-generating activities along the entire network route in order to make energy demand more reliable and anticipate the number of future connections from the beginning of the project.

Mismatch between duration of funding and project lifetime

Funding typically covers a period of 12 to 36 months, while projects can last up to 25 years. This short period does not cover the costs of operating and maintaining the system.

RECOMMENDATIONS

- → Integrate all phases of the project into the economic model, as they are essential.
- → Favour multi-stakeholder consortia in order to mobilise a wider range of funding, as well as expertise and field approaches. This makes it easier to implement the project.

II. RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT

Poor data quality

During the project's preparatory phase, data about the consumption of systems' end-users, demography, the composition of households' incomes and the means already in place to facilitate access to energy needs to be collected. This data is crucial for project sizing and is often fragmented, unrepresentative or biased. Project leaders may also have difficulties in gathering the necessary analytical evidence for donors and investors, particularly about expected consumption.

Poor data quality can lead to requirements being poorly estimated, resulting in the facility being improperly sized.

RECOMMENDATIONS

→ Put in place financing mechanisms for the preparatory phase in order to cover the high costs associated with data collection, surveys for estimating energy demand, obtaining permits and licenses, etc.

→ Ensure a high quality of consumption data (projected load curves, specific needs, etc.). This can be done by an independent agency.

→ Integrate data and long-term monitoring into a digital system to improve the traceability and reliability of the provided information.

→ Assess the number of clients by analysing the network route and undertake a statistical estimate of the average consumption per client based on the consumption data of municipalities that have already been equipped and which are comparable to the same area. For mini-grids, it is not necessary to study the consumption of each household.

Over/undersizing

Depending on local circumstances, demographic dynamics, business needs and changing consumer behaviours, demand may change. The risk of oversizing or undersizing is then frequent.

RECOMMENDATIONS

- → Conduct feasibility studies, even if they may be expensive, lengthy and uncertain.
- → Take into account the dynamics of the village, its population make-up, income-generating activities and future investments combined with the standardised sizing undertaken by local companies.
- → In the case of oversizing, stimulate productive uses of energy.

III. ENTREPRENEURIAL RISKS

Competition from the informal sector

The informal sector very often sells low-cost, but low-quality products and SHSs. This can damage the reputation of all off-grid energy access solutions.

RECOMMENDATION

- → Raise awareness among project leaders and consumers of the risks associated with the informal sector and the importance of having good quality equipment.

IV. TECHNICAL AND OPERATIONAL RISKS

Wear and deterioration

With harsh weather conditions, especially in sub-Saharan Africa, the electrical components of mini-grids tend to wear out faster. This can lead to loss of user confidence, commercial damage and increased maintenance costs. They also require advanced technical skills and a high level of operator responsiveness. This risk can lead to the project failing if maintenance is not properly managed or if spare parts are in short supply. This proved to be the case at the height of the pandemic.

RECOMMENDATIONS

→ Establish training programmes for local technicians and contractors to ensure after-sales service and maintenance (at least first level).

→ Rely on an easy-to-activate maintenance network.

→ Develop predictive maintenance.

→ Favour quality-certified products and equipment, meeting international standards.

→ Support local production and build buffer stocks close to operation areas, so that the equipment needed to maintain facilities can be rapidly provided.

Demand elasticity in relation to price

Changes in electricity prices over time can pose a risk to the operation of facilities – they can lead to sudden changes in demand.

RECOMMENDATION

→ Encourage governments to put in place programmes to distribute productive use equipment adapted to the needs of the local community (millet mills, cassava, welding equipment, sawmills, dryers, refrigerators or freezers, or even water tower retrofit services, etc.). In addition to maximizing the use of energy generated and distributed by the mini-grid, the resulting additional revenues are expected to increase and maintain the ability to pay end-clients in the medium term.

V. CONSUMER RISKS

Changing needs and behaviours

Any mini-grid may encounter consumption peaks which may be linked to daily constraints (bakers' ovens operate in the morning, rice huskers start at the same time, etc.), seasonal constraints (harvests result in increased energy consumption) or to other entrepreneurial events. Facilities are not always designed to withstand these occasional peaks in consumption. Other factors that can affect electricity demand include: user confidence, population movements, demographic change, electricity prices, people's income, illegal connections. If not anticipated, these parameters may also lead to load shedding or premature wear of equipment.

RECOMMENDATIONS

→ Ensure an on-site presence to anticipate, prevent and arbitrate exceptional consumer demand. This presence also helps avoid client dissatisfaction with the service provided.

→ Take into account the technical needs of particular client and users (such as bakers) right from the project's design phase.

VI. INSTITUTIONAL AND REGULATORY RISKS

Non-alignment of actions undertaken by various local institutional stakeholders

Many factors can lead to a misalignment between the actions undertaken by various local institutional stakeholders: lack of dialogue, low involvement on the field and insufficient knowledge of the specific features and potential of rural areas, poor understanding of the challenges posed by rural electrification, etc.

RECOMMENDATIONS

→ Establish a regular dialogue with local authorities to raise awareness and train them on rural electrification issues so that they can take them into account in public policy planning. This will also enable them to act as mediators and social awareness-raisers for users.

→ Help reconcile national planning and local initiatives by ensuring that electricity resale clauses are included in contracts with electricity agencies, in the event of a future expansion of the national grid.

Regulatory changes

Regulatory and/or legislative changes may pose a risk to mini-grid projects with lifespans of up to 25 years. The duration of the project is longer compared to other technologies and therefore this risk is higher.

RECOMMENDATIONS

- → Include rural electrification agencies, the state and local authorities in the project.
- → Set up monitoring systems focused on the political trends in the area of intervention.
- → Establish positive ties with the relevant public authorities.

> **NOTE:**
> Technical assistance can support governments in developing supportive and robust policy and regulatory frameworks, as well as in implementing capacity building activities.

Difficulties in obtaining permits

The process of acquiring permits and licenses from the competent authorities is lengthy, costly and uncertain and may lead to increased delays or even partial suspension of the activity. For mini-grid developers, the very long licensing process can make it difficult to finance the development phase.

RECOMMENDATIONS

- → Anticipate delays in permit requests being granted.
- → Include rural electrification agencies, the state and local authorities in the project.
- → Support public authorities in improving and accelerating these processes.

VII. POLITICAL RISKS

Political instability and insecurity

In some areas, political instability may result in a sudden interruption of field presence. Depending on the context and the environment, disruptions can prevent users from being able to monitor their facilities, which can have technical and financial consequences.

RECOMMENDATIONS

- → Use digital tools to remotely monitor facilities.
- → Establish local partnerships to maintain contact with beneficiary areas and carry out the distribution and maintenance of the different products.
- → Take out guarantees that cover political risks.

Synthesis

Risks	SHS	Service platform	Mini-grid
FINANCIAL RISKS			
Non-recovery	9	6	12
Unbalanced cash flows	6	4	6
Unsustainability of the business model			9
Mismatch between duration of funding and project lifetime	4	6	6
RISKS RELATED TO THE PREPARATORY PHASE OF THE PROJECT			
Poor data quality	8	6	8
Over/undersizing		12	12
ENTREPRENEURIAL RISKS			
Competition from the informal sector	8	1	8
TECHNICAL AND OPERATIONAL RISKS			
Wear and damage	6	8	9
Demand elasticity in relation to price			6
CONSUMPTION RISKS			
Changing needs and consumption	3	2	6
INSTITUTIONAL AND REGULATORY RISKS			
Non-alignment of actions undertaken by various local institutional stakeholders			6
Regulatory changes	3	2	6
Difficulties obtaining permits		4	8
POLITICAL RISKS			
Political instability and insecurity	6	8	8

2. Biomass: a future solution to replace fossil fuels?

Introduction

As a result of a workshop held in September 2021[2], this document focuses on the lessons learned from three projects reusing biomass in the form of fuel, implemented in West Africa and Indonesia. Illustrating the potential of biomass fuels and identifying the various drivers to maximise their benefits, this document is aimed at biomass project leaders and also anyone wishing to learn more about this resource.

CAUTIONARY NOTE:
this document presents three biomass reuse projects. It does not claim to be representative of all issues that may be encountered in the field.
The following projects have different levels of maturity. The recommendations must be seen with hindsight and taking into account the context of each project.

2 https://register.gotowebinar.com/recording/1995928482319469570

Background information

Biomass

Agricultural and food residues, wood, leaves, animal waste, fishery waste, etc. Biomass refers to all organic matter that can be reused to produce energy in various forms: solid (chips, logs), liquid (bioalcohols) or gas (biomethane). At a time when use of fossil-fuel energies is being limited or even avoided altogether, the use of biomass energy can be an appropriate solution, relying on abundant local resources to meet many needs: cooking, generating electricity and producing fuels, etc.

Supply chain, production and marketing

This document is structured around the different steps in the value chain for biomass energy projects. From the identification of the source of the biomass to its harvesting, processing, storage, marketing and the study of its yields, a sectoral approach emerges through the addressed projects.

Presentation of case studies

Typha Fuel Construction West Africa project

Deployed in Senegal and Mauritania in partnership with the NGO GRET-Professionnels du développement solidaire, the Typha Fuel & Construction West Africa (TyCCAO) project contributes to the energy transition and combating climate change by developing the use of renewable fuels and energy efficiency in the building industry, through mass distribution of products made from typha, an invasive reed that proliferates in the Senegal River basin.

Green Coal Fuel project

The Green Coal Fuel (GCF) project developed by GreenBuilding in Indonesia aims to offer a competitive, sustainable and fair fuel produced from rice straw as an alternative to the coal used in Indonesian industry. Using an innovative system of mobile production units, GCF is produced directly in the fields by partner farmers.

Renewable energy access programme project

Promoted by the association Le Partenariat, the Renewable energy access programme (PAER) project, based in Saint Louis, Senegal, aims to provide female fish processors with biogas production units that use fishery waste as fuel for cooking fish.

Name of the case study	**TyCCAO**	**Green Coal Fuel**	**PAER**
Project leader	ADEME / GRET (for the fuel part)	GreenBuilding	Le Partenariat / City of Lille
Geographic area	Senegal / Mauritania	Indonesia	Senegal
Process	Creation of carbonised briquettes for domestic or productive use from typha according to 2 processes: artisanal and industrial (typha / rice husk mixture)	Creation of rice straw pellets to fuel industrial boilers	Collection of biogas from fishery waste
Biomass resource	Typha: a harmful invasive plant growing along the Senegal River	Rice straw residues systematically burnt off by Indonesian farmers at the end of the harvest	Fishery waste
Collection logistics	Optimising the cutting technique to increase the yield and make the work less arduous	Use of production units placed directly at the edge of the fields	After the harvest, the raw biomass is taken to the processing unit by lorry
Processing unit	Two production methods: artisanal, based on typha and gum arabic; industrial, with a change of scale, from typha and rice husk	Pellet-type biomass fuel produced directly in mobile production units at the edge of the fields	Resources ground before being fed into the digester
Distribution	Professional customers ensure a degree of profitability, as they buy in large quantities	Delivery to Indonesian industrial clients with a short supply chain	The gas is produced on site using the digesters
Final consumption	Domestic uses (supermarkets and local markets) & professional uses (wholesale)	Professional use for industrial heating (coal substitute)	Directly on site: installation of 10 cooking cabins

Challenges of biomass reuse

I. IDENTIFICATION OF THE BIOMASS RESOURCE

Knowing local energy needs

The first step in a biomass reuse project is to determine the final uses by studying consumers' needs: type of target customer (private individuals, craftsmen, companies, regular consumers or not), their quality requirements, the energy equipment they already have, their ability to pay, etc.

At the same time, there is also a need to assess expected consumption, taking seasonality and possible consumption peaks into account.

"In Senegal, 50% of domestic energy consumption is with charcoal, with variations between regions. It is mainly used for cooking, at a certain cost to households."

Maud Ferrer, GRET

"Our customers are in the food and textile industries, where they need high temperatures with good energy performance and minimal ash after combustion. They work in facilities that operate at the megawatt scale."

Franck Miraux, Green Building

Knowing the resource

Project promoters must also carefully study the resource they plan to use (an invasive plant, agricultural waste and fishery waste in the projects presented here):

- How do its physical properties (energy potential, moisture content, emissions or possible toxicity during combustion) compare with fossil fuels?
- In what context does it grow (wild species, cultivated species, by-product, residue, etc.)?
- What quantity is available and what is its economic value? For this point, the operators use a Geographic Information System or GIS (see the GIS box on pages 50-51) to map the resource, understand the supply chains and identify possible conflicts over its use (see the following point p.48 for details).
- How can harvesting or collection be optimised?

> "Typha is an invasive species present on about 120,000 hectares on both banks of the Senegal River, posing economic, health and environmental problems. It is an invasive plant that is present at maturity all year round."
>
> **Maud Ferrer, GRET**

NOTE:
For some of the presented projects, knowledge of the resource is the subject of a separate action, with its own budget and programme.

Avoiding conflicts over use

From harvesting through to transport and storage, the use of biomass resources for fuel production can compete with other uses (as food or in craft activities). There is a need to question the impact of the project on the local socio-economic balance (dedicated plots of land, diversion of agricultural activity away from food production, etc.). Consultation frameworks with the local people, other economic actors and local authorities can thus be set up.

"We have a cross-sectoral consultation committee so that all economic actors, as well as academics and development agencies, can express their points of view. This committee validates the planning documents and the proposed studies."

Papa Mamadou Cissé,
Le Partenariat

II. RESOURCE COLLECTION

Ensuring the conditions for success

To ensure the success of biomass fuel production projects, it is essential to have an exploitable resource in the region and the right physical conditions for its harvesting or collection.

→ It is essential to provide training for local teams on the identification and location of the resource, but also on good practice to avoid damage to the material to be reused.

→ In parallel, it is useful to assess the remuneration of the actors in charge of collection depending on the type of resource (wild plant, agricultural or industrial waste):

- What are the characteristics of the supply chain (on-site processing or delivery to a collection site)?
- What fluctuations are to be expected in the quantity and quality of the collected material?

→ Installation of processing units as close as possible to collection sites should also be considered, with two approaches to be studied: the installation of fixed units (which require the provision of storage facilities or collection at some distance) or the provision of mobile units that facilitate logistics.

"Our factories are mobile and can go directly into the fields, at the edge of the site, to secure our supply"

Franck Miraux, Green Building

Managing supply costs

Transport between the collection zone and the processing unit, protection of the quality of the source during transport... In several respects, supply appears to be a key element for the success of a biomass reuse project. It is also a significant cost item. Controlling these costs involves, among other things, the creation or upkeep of access roads to the harvesting/collection areas and setting up an efficient collection system.

> "Collection of the typha represents about 25% of the production cost of our fuel, and we want to contribute to remunerating an emerging sector."
>
> **Maud Ferrer, GRET**

INVESTMENT IN GEOGRAPHIC INFORMATION SYSTEM (GIS)

The use of GIS software to produce mapping layers allows the development of valuable tools for decision-making support and resource governance.
Mapping of the resource is of course essential, but it should be coupled with other data to make it useful:

- Operating permit zones
- Protected zones
- Roads or communication routes
- Abundance or rarity of the resource
- Transit zones
- Natural obstacles
- Potential customers

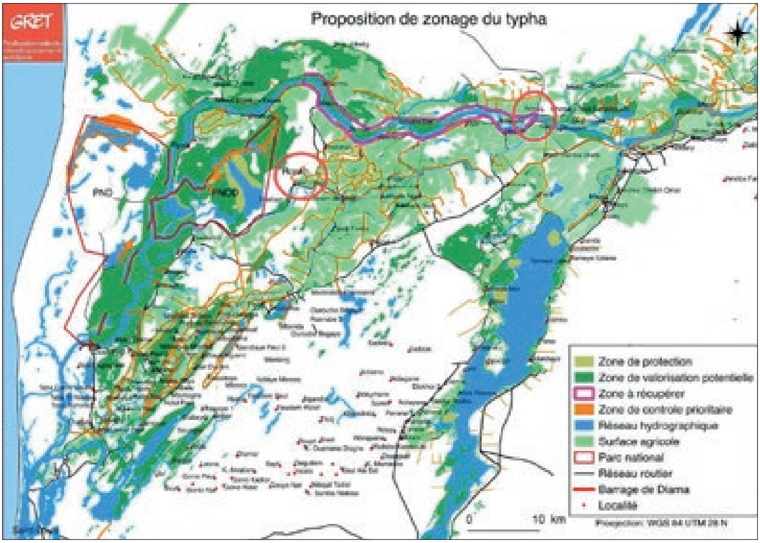

Figure 1 - Identification of typha harvesting zones in the Senegal River basin (© GRET)

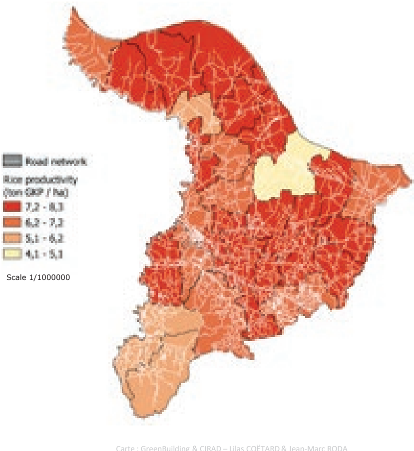

Figure 2 - Identification of rice straw production zones in relation to the road network to transport a mobile production unit (© GreenBuilding)

Investment in mapping such as this seems necessary when the project relies on collection of a sparse resource, with a view to scaling up.

Managing the resource balance over time

Once the resource has been identified and it is known how and where to harvest it, it must be ensured that it can be exploited in the long term without exposing the region to undesirable consequences.

This requires consideration of several issues:

- What is the capacity of the resource to renew itself each year?
- Does this renewal offset the greenhouse gas (GHG) emissions caused by combustion of the biomass?
- What levers can be applied to ensure continuous supply?
- What impact will renewal of the resource have on the region?
- Is non-renewal of the resource ecologically desirable in the long term, as it is the case with invasive plants?
- What collection practices should be put in place to reconcile economic viability and environmental issues?

> "If you want the typha to grow back quickly, like on a farm, you cut above the water level, but if you are in an irrigation canal, where you don't want the typha to grow back, you cut below the water level."
>
> **Maud Ferrer, GRET**

III. PROCESSING THE RESOURCE

Choosing the processing method

Some types of harvested biomass (moist and uniform) can be directly reused without significant processing. Project leaders are thus led to optimise the processing method, relying on preliminary studies to choose the process that will optimise yields according to the expected use and the specific constraints of the final product.

For reuse of typha, GRET makes a distinction between two processing methods. The first "artisanal" method consists in carbonising the typha before mixing it with water and gum arabic, pressing it, drying it in the open air and packaging it. The second "industrial" method consists in drying the typha, grinding it, drying it again, then mixing it with rice straw to produce pressed fuel sticks. In Senegal, local actors supported by the project currently cut and produce on an occasional basis, according to demand and fuel stocks.

"To produce one metric ton of industrial fuel, it takes 2 t of dry typha or about 6 t of fresh typha, which represents an area of around 800 m². The industrial unit set up in Rosso (Mauritania) has a maximum production capacity of 80 t of biomass fuel a month or about 450 t of fresh typha, equivalent to 6.5 ha per month or about 80 ha per year. Given that the typha resource is renewed in 4 to 6 months (in the case of cropping), the needed area would be between 25 ha and 40 ha per year.

As for artisanal units, they have a maximum production capacity of 700 kg a month. These units are proportionally more resource-intensive, as producing one metric ton of artisanal fuel requires 6.5 t of dry typha, or about 19 t of fresh typha, representing an area of around 0.25 ha."

Maud Ferrer, GRET

In Mauritania, an industrial unit is being tested; this will require continuous supply through collaboration with local groups.

In Saint-Louis, Senegal, the association Le Partenariat had to test different technical solutions for biogas production with different tank sizes and different types of inputs. They ended up choosing the "Puxin" model, which has a lower part for anaerobic digestion and an upper part for storage of the produced gas. There are inlets and outlets to allow the organic matter to pass through. The biodigesters are emptied manually.

Controlling the quality of the final product

It is essential to ensure that the product has at least the same qualities as the energy source it replaces, particularly in terms of combustion potential and energy performance. Along with this quest for quality, the associated costs must also be kept under control, because the final product will have to sell at a competitive price compared with other energy sources.

"Our customers are manufacturers, who will use our fuel in heating boilers. We have to guarantee better energy performance and less residual ash"

Franck Miraux, Green Building

« The better we control the combustion, the less energy intensive it becomes."

Franck Miraux, Green Building

Optimising storage

The storage of the resource matter and final product is a key element for project viability. The product must be suitably packaged to avoid losses (breakage, crumbling, expiry, loss of efficiency over time) while at the same time coping with variations in supply and demand, due to seasonal effects for example, including in the event of a breakdown in the supply chain.

> “The drying stage is important, yet it represents a barrier to scaling up. As the volume increases, there is a need for more space to store it while it dries.”
>
> **Maud Ferrer, GRET**

IV. MARKETING

At each stage when setting up the production chain, project leaders must ensure that the finished product has all the characteristics required to compete with the fuels to be avoided (fuel oil, mining coal, charcoal, etc.). The biomass fuel must make a difference, either through a favourable price mechanism or through advantageous characteristics.

> «We have a distribution network set up as part of a marketing project for improved cookstoves, made up of groups, mutual societies, associations, etc. We want to use this network too to facilitate marketing.»
>
> **Maud Ferrer, GRET**

Determining the right price

A competitive price should take many factors into account:

- → The price of the fuel that the product replaces. If the substitute is more expensive than the original fuel, it risks being quickly dropped.
- → A guarantee of price stability over time, most especially during periods when the original fuel is in short supply.
- → Operating, supply, raw material processing, storage and logistics costs, which vary from one operation to another.
- → The spending power of the target customers.

NON-PRICE COMPETITIVENESS:
A competitive product is not always the least expensive. It is also a product of superior or equal quality to the fuel it replaces, in all the criteria of choice: energy performance, LHV (lower heating value), ash content, solidity, ease of use, fumes and emissions. Constant availability throughout the year is also a key competitive lever in customers' purchasing strategies.

Devising effective marketing messages

The aim is also to convince targeted consumers (individuals, informal groups, companies) to change their habits and choose this new energy source.

It is advisable to use market research to understand customers' expectations, which can then be used to target clients in the marketing messages:

→ Which characteristics should be promoted?

→ Which weaknesses in the fuel to be replaced can be highlighted?

→ Is the target audience receptive to environmental arguments?

V. SCALING UP

What happens if the biomass energy solution appeals to the various target audiences and is a success? The success of a project is not only played out in the months following its implementation, but also in the long term. This involves taking into account several factors to ensure that the benefits of the new product do not fade over time and are not overtaken by adverse effects.

Project leaders should therefore assess the consequences of growth in their activities at an early stage, and in particular the risks associated with possible over-exploitation (erosion, deforestation, pollution, threats to biodiversity and ecosystems), as well as the risks of conflicts over use already mentioned.

They should also consider the impact of increased demand on the sales price of the resource material if it is also used for other purposes, particularly food.

> "In our experience, it is important to try out different business models at the start of a project, to see what works."
>
> **Papa Mamadou Cissé, Le Partenariat**

VI. PROJECT MANAGEMENT

Consultation frameworks

The sectoral supply and processing approach prevails for the 3 projects presented in this document.

Working as a sector – from identification of the resource to its collection, processing, storage and marketing – involves many local actors. These may be groups of artisans, managers of natural areas, producers of inputs, other traders selling coal etc.

To avoid disrupting the environmental, social or economic balance, there is a need to unite all these actors around the project. Le Partenariat, for example, set up a cross-sector committee to bring together the various actors in the project: users, producers, academics and local development agencies. The role of this committee is to validate programme documents and work on studies and planning documents.

Project business model

For a supply chain to be sustainable, it must be profitable enough to allow its growth. Yet the chain is often made up of several companies that exist side by side. Therefore, a lot of work needs to be done on the business model of each company: definition of the service/product, customer/supplier market study, financial study over a minimum of 3 years (projected budget for expenses and turnover for 3 years), cash flow plan, legal study.

Customer support

The factors influencing decision-making by target customers are many and complex. Even if all the above conditions are met, there is no guarantee that consumption patterns will change.

A lot of work needs to be done to support customers, involving all the concerned local actors, while demonstrating the effectiveness and benefits of the product (by carrying out a marketing or advertising campaign, for example).

Synthesis

IDENTIFICATION OF THE RESOURCE	**Knowledge of local energy needs**	• Determining final uses and expected consumption
	Knowledge of the resource	• Studying the characteristics of the biomass, availability of the resource and collection methods
	Conflicts over use	• Analysing the project's impact on local socio-economic balances
COLLECTION	**Conditions for success**	• Training local teams to identify and collect the resource • Devising fair and appropriate remuneration • Installing production units as close as possible to collection sites • Creating and/or maintaining access roads
	Balance over time	• Assessing the renewal capacity of the resource • Determining the practices to be put in place to reconcile economic viability and environmental issues
REUSE/PRODUCTION	**Choice of the process**	• Carrying out studies to choose the processing method that will optimise yields according to the expected use and the specific constraints of the final product
	Quality	• Ensuring that the product has at least the same technical characteristics as the energy source it replaces
	Storage and conservation	• Planning suitable packaging to avoid losses and cope with variations in supply and demand

MARKETING	**Competitiveness**	• Setting a price at least as attractive as the fuel it replaces • Ensuring price stability over time • Taking all operating costs into account • Studying levers for non-price competitiveness
	Marketing messages	• Using market research to understand customers' expectations
MANAGEMENT	**Governance**	• Setting up a consultation framework for local actors
	Business model	• Studying the viability of the various companies involved at each stage in the project
	Support	• Encouraging behavioural change on the part of customers

3. The involvement of local authorities in off-grid energy access projects

Introduction

As a result of a workshop held in November 2021[3], this document focuses on the lessons learned from three projects involving local authorities in sub-Saharan Africa. It seeks to draw on these experiences to explore different ways for enabling the success of off-grid energy access projects through a greater involvement of local authorities. More specifically, it attempts to identify the expectations and practices of local authorities as a function of their roles as project pilots, experts in energy access issues and facilitators of local governance.

This document is intended for the members of the Working Group on access to energy and, more broadly, all French stakeholders working on energy access projects involving African local authorities: NGOs, French local and regional authorities in the context of their decentralized cooperation, mini-grid operators etc.

CAUTIONARY NOTE:
this document relates experiences from three projects involving local authorities in sub-Saharan African countries. It does not claim to be representative of all issues that may be encountered in the field.
The following projects are at different stages of development. The recommendations must be seen with hindsight and taking into account the context of each project.

3 https://www.youtube.com/watch?v=zWjFGKzYO1g&list=UU5kYjc3eFAw8HzsmGSJcSKA&index=4

Presentation of case studies

Rural municipality of Antranokarany, Madagascar

The rural municipality of Antranokarany on the north of Madagascar, in cooperation with a French NGO and private operators, is implementing a project with:

- A photovoltaic power plant with a distribution system in a village, commissioned in December 2019 under a delegation contract with a private operator.
- A "reseau d'énergies villagoises" ("village energy grid") in the centre of the village to improve public services (health, education, administration) and the economic and social development of the territory.

Contact : Aurélie BUFFO, Experts Solidaires · abuffo@experts-solidaires.org

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The city of Tsévié - Togo

After extensive work with Civil Society Organizations (CSOs), the city of Tsévié in Togo was one of the first in the Covenant of Mayors for Sub-Saharan Africa to draw up a Sustainable Energy and Climate Action Plan (SECAP).

Contact : Michel HOUNDJO, City of Tsévié · houndjo21@gmail.com

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The city of Saint-Louis in Senegal

Under a decentralized cooperation agreement, the twin cities of Saint Louis in Senegal and Lille in France pooled their expertise to install a public lighting system and develop an experimental biogas project.

Contacts : Lucie COQUISART, City of Lille · lcoquisart@mairie-lille.fr

Background information

In sub-Saharan Africa, local authorities are decisive players in energy access policies. With in-depth knowledge of their territories, the actors involved and their needs, local authorities are the natural leader for coordinating territorial action on issues such as public lighting or the electrification of health centres or schools. They also provide a vital liaison with the national administrative ecosystem and the population. It is therefore crucial to involve local authorities in energy access projects on their territory.

What expectations?

Local authorities

Prior to the workshop, a questionnaire was sent to several networks of local authorities (ADEME's partners). The responses gave a general view of the expectations of local authorities:

→ Strengthening their knowledge in energy access issues and developing local expertise:

- Improving knowledge of energy access issues (technical and socio-economic, exploitation of local energy sources, design, operation and maintenance of facilities etc.) among local teams in charge of electrification programmes and other stakeholders such as cooperatives.
- Sharing experiences and expertise: organize internships with international organizations, peer exchange visits etc.
- Training the trainers and developing training programmes primarily directed at young people, to create a reservoir of local expertise for better dissemination of knowledge and good practices.
- Securing local technical support (methodology, management tools, data collection etc.) through the entire life cycle of the projects (design, implementation, operation, monitoring and maintenance).
- Raising public awareness of energy access issues.

→ Having access to adequate funding tools:

- Securing financial backing for initial investments and throughout the life cycle of the project.

French actors

French local authorities, NGOs and partner enterprises of African local authorities also voice their needs frequently. Discussions at the beginning of the workshop identified the following ones:

→ Building knowledge:

- Gaining a better understanding of the current regulations on the field.
- Gaining more visibility on local authorities' internal skills (available technicians) to better address capacity building needs and to identify the potential input from the project and the partnership.

→ Capitalizing:

- Receiving feedbacks on best practices for scaling up initiatives.
- Evaluating the impacts of implemented projects more systematically, in order to continuously improve their implementation.

A. The local authority as the pilot of energy access projects on its territory

Decentralization in Africa is an uneven phenomenon. Although the mandates of local authorities rarely concern energy, they are directly involved in ensuring the continuity of local public services that are dependent on access to energy (public lighting, electrification of public buildings) - and are the decision-making instances closest to the daily lives of the population. The examples below highlight some of the governance models adopted by local authorities in Africa.

I. LOCAL AUTHORITY COORDINATES THE ACTION OF FOREIGN ACTORS ON ITS TERRITORY

In this governance model, local authorities support project leaders, liaising with stakeholders, monitoring operations and maintenance. Technical problems are reported by permanently-available personnel.

Issues at stake

Local authorities may encounter difficulties in recruiting qualified personnel to ensure the coordination of the project. They also struggle to find their place in frequently-complex ecosystems of foreign private and public actors.

RECOMMENDATIONS

→ Introduce a public service delegation (PSD) contract between the local authority and the project operators, under which the local authority owns the installations and guarantees the service.

→ Train the local authority staff, particularly elected officials, to monitor the project.

- Create a scorecard to help local authorities monitor the project or the operation of the facilities.

- Organize community consultation meetings between the local authority and energy users.

EXAMPLE:
The rural municipality of Antranokarany, Madagascar

The governance of the REV (Réseau d'Energies Villageoise) project is based on three main partners: the Antranokarany municipal council, 1 private manager and investor operator and an NGO. The local authority is largely involved in supporting the project leader, liaising between stakeholders, monitoring operations and maintenance. Despite the presence of permanent staff to carry out these activities, it remains largely understaffed in view of the magnitude of the task and budgetary constraints on recruitment. The local Economic Development Officer takes also care of water and energy issues. The NGO has opted for a public service delegation scheme and supports the municipality as project leader; it also plans to train and strengthen the municipal team's skills concerning monitoring and ownership of the project. For the municipal council of Antranokarany, the idea is not to operate directly but to play the role of coordinator and facilitator in a rural electrification project. In this perspective, the NGO endeavours to help the municipality oversee the project, emphasizing in particular the need for global monitoring of the objectives - a delicate task when multiple public service contracts are in play. Discussions also highlighted the importance of the involvement of local actors when choosing the energy service, in order to ensure its ownership by the beneficiaries.

II. THE LOCAL AUTHORITY RELIES ON A CONSORTIUM OF LOCAL ACTORS

In this model, the local authority identifies needs and mobilises local stakeholders, seeking their active appropriation of the implemented energy solution (facilitation of maintenance, monitoring).

Issues at stake

The main challenge facing the local authority lies in its ability to find and involve the right local actors with the relevant skills to participate in the identification of needs and to make the project work over time.

RECOMMENDATIONS

→ The local authority organizes working groups involving different categories of the population and energy projects' beneficiaries.

→ The local authority makes an inventory of local or regional skills to be mobilized.

→ The local authority identifies local funding sources.

EXAMPLE:

The city of Tsévié, Togo

The project deployed by the city of Tsévié is implemented under the Covenant of Mayors for Sub-Saharan Africa. The city has thus cooperated closely with civil society organizations (CSOs) within its territory, while mobilizing community development organizations that have a good understanding of the population needs. Traditional leaders have also come out in support of the project. This consortium of actors has enabled the creation of synergies and the collection of concrete information on the real needs of the population in terms of access to energy. Moreover, young people have also been identified in each locality to ensure daily monitoring of the solar facility.

III. THE LOCAL AUTHORITY IS INVOLVED IN A DECENTRALIZED COOPERATION PROJECT TO FACILITATE ACCESS TO ENERGY

In this model, the local authority joins forces with a French local authority in an energy access project, as part of a balanced and reciprocal partnership. This collaboration allows the implementation of large-scale projects, with external skills being mobilized at both technical and organizational levels.

Issues at stake

For decentralized cooperation to be successful, it is crucial to build a partnership with the right local authority, so that cooperation is as efficient as possible. Furthermore, the targeted actions must fall within the respective areas of competence of the two partners. It is also necessary for both structures to be able to mobilize in-house skills.

RECOMMENDATIONS

→ Draw up a scorecard with relevant indicators and reliable data, enabling the development of a decentralized cooperation project with shared oversight and measurable effects.

→ Coordinate with the French local authority to mobilize the various support programmes for decentralized cooperation offered by the Ministry of Europe and Foreign Affairs via the Delegation for the External Action of Local Authorities (DAECT), the French Development Agency via FICOL and the European Union via its calls for proposals. This could also help identify relevant partners.

→ Multi-annual thematic cooperation programmes allow actions to be planned over the long run.

EXAMPLE:
The city of Saint-Louis in Senegal

The contract on public lighting for the city of Lille includes a "decentralized cooperation clause" whose beneficiary is Saint-Louis, its partner city. This clause allowed to mobilize a certain percentage of the contract for the installation of an adapted and energy-efficient public lighting and a control centre (which manages lighting-up schedules, detection of breakdowns, energy consumption etc.) in Senegal, with technical and financial support from the city of Lille's energy provider: ENGIE-Citeos. This arrangement has enabled the preparation of a master plan to ensure consistency, good management of lighting infrastructure and training of community agents.

B. The local authority as an expert on local energy access issues

The issue of access to energy is inseparable from other aspects such as economic development, urban and rural development, education and health, as well as access to other essential services. The local authority has expertise in its own territory, its capacities and and the challenges it faces.

It has in-depth knowledge of the specificities of its territory and adopts a political vision of energy access as a service to the population. Finally, it must be able to think beyond the installation of equipment to build a vision for the future of its territory.

I. STRENGTHENING LOCAL EXPERTISE

The local authority mobilizes a technical and financial strategy that allows it to increase its skills in energy access and to attract and retain technical staff. It precisely identifies the skills it needs to develop a training plan. It organizes and structures information to ensure it does not revolve around a single individual.

Issues at stake

Many local authorities lack locally-available expertise and budgetary constraints do not allow for the recruitment of additional qualified staff. Furthermore, skills are not always systematically transferred within the local authority.

RECOMMENDATIONS

- → Set up technical training on energy access: design of installations, technical vigilance points, economic viability, pricing, maintenance, breakdown diagnostics and routine repairs.
- → Organize the transfer of expertise to other project stakeholders.

EXAMPLE:
The city of Saint-Louis in Senegal

The city of Saint Louis still needs training in the maintenance of public lighting. Several streetlights broke down, but the local authority cannot find a technician to fix them. Its partnership with the city of Lille allows Saint Louis to benefit from technical support and training that extends over the long term, beyond the end of the project.

II. TRAIN LOCAL AUTHORITIES TO MANAGE ENERGY ACCESS PROJECTS

The local authority oversees energy distribution in accordance with its demographic and economic development. It makes sure managers carry out their work and that the service provided to the public is satisfactory. It is also able to raise the alert and find solutions in case of malfunctions.

Issues at stake

Some local authorities lack the resources to design and pilot energy access projects, on the one hand, and the means to set up a technical service that is essential for their long-term success, on the other. Moreover, not all of them have the tax revenues that would enable them to increase their efficacy in this area. More generally, local authorities often feel that they lack information.

RECOMMENDATIONS

- → Collect data to identify the needs of the local authority.
- → Strengthen the capacities of local authorities (elected officials and technicians) in the governance, oversight and coordination of energy access projects, including the management of facilities under delegation agreements.
- → Have trained and qualified personnel to coordinate and support maintenance and to report technical issues.
- → Ensure that the skills acquired are sustainable within the local authority: transfer of know-how between colleagues, recurrent training with international organizations, internal availability of internal factsheets, etc.

- Keep a precise inventory of private actors present in the territory and ready to be mobilized for operative purposes.

- A municipal tax on facilities, a fee structure or PSD can allow the local authority to better play its role as a pilot.

EXAMPLE:
The city of Saint-Louis in Senegal

The city of Saint Louis uses a database to manage its public-lighting facilities and equipment. However, this database is complex and when a technician leaves his or her position, it is very difficult to find and train a replacement.
The municipality has therefore identified a need for maintenance training, particularly in the field of data gathering and management, to enable the local authority to ensure better management. A project has been launched with the actors in the city of Lille to meet this need.

III. SUSTAIN AND SECURE FUTURE DEVELOPMENTS

The local authority is gradually undertaking its mission of capitalizing on acquired know-how. The increased skills of technical personnel enable it to exercise full oversight and coordination of the service. The local authority can now manage "periods of uncertainty, e.g. planning and organizing changes of service provider. It also works to create local dynamics, including after the end of the various projects, permitting the uses of energy to expand, especially productive uses.

Issues at stake

Local authorities suffer from a lack of skills and resources (computer hardware, means of transport etc.) to properly monitor the implementation of energy services and the maintenance of facilities. They have difficulty in identifying interlocutors for the recruitment and training of monitoring staff. They do not always have a service continuity plan for breakdown situations that the technicians are unable to solve themselves.

RECOMMENDATIONS

- → Conduct regular briefings on the implementation of public service contracts and delegation agreements.
- → Define operational performance indicators (growth of consumption, production or storage capacity, grid expansion, gaining new customers, share of productive consumption, use of back-up solutions) and monitor them over time. Take corrective action in the event of discrepancies between forecast and actual performance.
- → Include an "energy access" component in territorial programming frameworks such as local development plans.
- → Include a fee in operating contracts to equip the local authority with the means to monitor the project.

EXAMPLE:

The rural municipality of Antranokarany, Madagascar

The rural municipality benefited from capacity building by an NGO and a local partner. This cooperation enabled it to publish a call for tenders for the operation of the energy access structure and the selection of a service provider. It then received support in contract negotiations with the service provider and in the management of the contract. This support enabled it to act as the project's owner and to plan for future developments.

C. The local authority as a facilitator of local governance

An off-grid energy access project involves a complex set of local and national actors: Rural electrification agencies, national electricity companies, regional development agencies, local NGOs, consumers, public bodies, local businesses etc. For an external operator, it is not always clear where to position itself in this environment.

Local authorities have both a knowledge of the actors and the legitimacy to call on them and bring them together behind an energy access project. They can provide a legal framework, articulate the governance of a project through all its stages, promote the uptake of certain energy uses and create ties with users.

I. KNOW LOCAL REGULATIONS AND UNDERSTAND THE DISTRIBUTION OF COMPETENCES IN THE INSTITUTIONAL ECOSYSTEM

The local authority works with the national electricity provider or the rural electrification agency and therefore it is both a beneficiary and a go-between. It makes plans, maps needs, identifies existing equipment and proposes solutions. The local authority also ensures a link with the population to report damaged equipment or voice new needs. Also, depending on the legislation specific to each country, it may also be responsible for connecting public establishments (hospitals, schools etc.).

Issues at stake

Small local authorities or those not connected to the national grid find it difficult to make themselves heard by the public bodies responsible for local development, such as state-run rural electrification agencies. Moreover, they are not all equally familiar with their national regulations.

RECOMMENDATIONS

- → Involve public bodies responsible for local development, such as rural electrification agencies or national electricity companies, in projects from the earliest stage.
- → Clearly define the different responsibilities of the authority and public bodies, including electrification agencies.
- → Identify the obligations of the state towards local authorities in terms of access to energy (connection of educational establishments, installation of the grid etc.) and thereby avoid duplication or projects not falling within the remit of local authorities.

EXAMPLE:
The city of Saint-Louis in Senegal

In Saint-Louis, the local authority collaborates with Senelec, Senegal's national electricity provider. Since 2011, Senelec has been required by law to facilitate access to public lighting to local authorities by installing poles and grids.

II. CLARIFY THE ROLES OF EACH ACTOR IN OPERATION

The local authority fits well into its role of local governance and representation of the interests of the territory. It is capable of arbitrating conflicts of practice between the various actors (consumers, operators, electrification agency etc.). It defines future prospects for operation: expanding the programme to other zones, strengthening the existing ones, supporting technicians' skills improvement etc.

Issues at stake

In some projects it can be difficult to know who is responsible for maintenance: the local authority, the NGO or a local company. Moreover, the articulation of facility management with other stakeholders can be difficult, even though it is essential if needs and expectations are to be met as close to the field as possible.

RECOMMENDATIONS

→ Clearly define roles in operation. Establish an organizational chart that specifies hierarchies of control, financial flows, the contracts drawn up etc.

→ Create a consortium that brings together groups of local actors (CSOs, traditional chiefs, youth and women's associations etc.).

→ Involve young people (universities, associations etc.) and civil society organizations (associations, tontines) in the monitoring of the facilities to maximize local appropriation of the project.

→ Establish a multi-stakeholder partnership agreement involving the various local energy access actors.

→ It is important to keep in mind that commitment to the project is a necessarily long-term undertaking if the project is not to run out of steam. The local authority can play a decisive role in this, but to do so it needs trained and available technical personnel over the long term.

EXAMPLE:
Rural municipality of Antranokarany, Madagascar

In the case of the municipality of Antranokarany, the local authority is not directly responsible for maintenance, which has been entrusted to an external operator. For its part, the municipality focuses on monitoring the correct operation of public services: ensuring electricity is well distributed, that the number of connections corresponds to the forecasts and that energy actually benefits the development of businesses.

III. DEVELOP THE ECONOMIC ACTIVITY OF THE TERRITORY IN LINE WITH ENERGY NEEDS

The local authority contributes to the creation of an environment enabling the sustainable operation of the facilities. This includes the development of income-generating activities (IGAs) that will support the economic development of the community. It also helps to strengthen the solvency of current and future energy system customers by creating business zones, developing the local market, helping to structure agricultural cooperatives etc.

Issues at stake

To function properly, an energy access system needs solvent customers. IGAs or productive uses often act as “drivers» of energy access in the territory. On the one hand, these activities require energy to operate, and on the other hand, the revenues generated make individual consumers solvent.

Issues of off-grid energy access and local economic development need to be addressed together. Local authorities are the only actors with a global vision of their territory allowing these two topics to be conceived as a single issue. They may, however, find it difficult to identify the right policy levers to operate.

RECOMMENDATIONS

→ Integrate energy needs into local development policies.

→ Identify local resources to promote economic development through IGAs.

→ Develop “electrified business zones” to attract local entrepreneurs.

EXAMPLE:
Rural municipality of Antranokarany, Madagascar

The village electricity network (REV) project involves the creation of energy service platforms – cold production, recharging, grinding, grilling – for rural economic actors. The network is then designed to expand from these first productive uses.

IV. PROMOTE APPROPRIATION BY USERS

The local authority ensures that energy needs have been correctly identified and are being met. It also ensures that consumers appropriate the facility and make good use of it.

Issues at stake

Users often lack commitment in the use and maintenance of installations.

RECOMMENDATIONS

→ Technical personnel make trade-offs between available and suitable techniques, but it is important to involve users in the choice of technology and equipment for a better appropriation.

→ Populations and users must feel that they are being listened to throughout the project.

EXAMPLE:
The city of Tsévié, Togo

In Tsévié, the selection of equipment (including improved cookstoves) was discussed with women's associations. These associations chose the model of equipment, which reinforced their sense of appropriation and thereby facilitated distribution and maintenance.

Conclusion

Access to energy is a difficult issue for local authorities to grasp, yet they have a key role to play in local energy planning. Therefore, we can identify four main issues, each of which can be addressed by French NGOs, local authorities and enterprises engaged in this field.

- Strengthen the capacity of local authorities at all levels of project development and secure acquired skills over the long term.

- Remove financial barriers that prevent local authorities from sourcing the personnel and equipment necessary for monitoring the facilities and services provided.

- Enable local authorities to support the ownership of energy services by local populations and entrepreneurs.

- Enable local authorities to become more involved in the planning and strategic management of installations and equipment, in conjunction with electrification agencies and local actors.

The various case studies in Africa show that local authorities are key actors who have been able to overcome their lack of resources or skills to ensure the implementation of energy access projects adapted to the needs of their territories. This prompts a rethinking of public-private partnership mechanisms, whether these involve local organizations or international actors.

Presentation of the copilots of the “Capitalisation and sharing of experiences” sub-working group

Lianes Coopération

Lianes coopération is a network for all actors of international solidarities no matter their legal status in the region of Northern France.

With offices in 3 towns of the region, it gathers all project leaders : SME, NGOs, local authorities, school and universities, etc. Together its members build common actions, gain compétences, discuss with donors and national authorities. Working on all topics related with international cooperation, Lianes cooperation offers support and networking for all organizations in various fields but all connected with SDGs.

Since 2017, Lianes coopération supports Haut-de-France Region in its commitment for energy access in Africa and in the world. The network mainly helps building consortia bringing together NGOs, companies, researchers, etc. to design off-grid solutions.

Réseau CICLE

The Cicle network (International Climate Energy Cooperation) is the national multi-stakeholder network specializing in energy access issues.

It brings together local authorities, public institutions with a local mandate, NGOs, companies, corporate foundations, professional organizations. Its mission is to promote, facilitate and support their international cooperation actions, aimed at improving the living conditions of the beneficiary populations and protecting the natural environment.

We provide several tools to assist in action: methodological guide, selection of action support documents, advisory support, enhancement of the 1% Energy and networking with the aim of improving the quality of projects carried out in the field.*

**French financing mechanism*

Coleaders of the national working group on energy access

ADEME

Here at ADEME – the French Agency for Ecological Transition – we are firmly committed to fighting global warming and the depletion of our natural resources. On all fronts, we mobilise citizens, economic actors and territories, giving them the means to move towards a fairer, more harmonious, low carbon and resource-efficient society. Whatever the field - energy, air, circular economy, food, waste disposal, soils, etc. - we advise, facilitate and help finance many projects, from research to solutions sharing. At every level, our expertise and forecasting capacities serve to guide and inform public policies.

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in 1993 and comprises, whether directly or indirectly, several thousand businesses, resource producers, manufacturers and installers, power plant developers and operators, and specialist professional organisations, representing the different sectors. Its members include world leading energy companies as well as local groups and stakeholders in the renewable energy sector, but above all it comprises a large number of SME's. Its mission is to increase renewable energy's share of the energy produced in France, and to promote the interests of the industrialists and professionals operating in the sector, in both the domestic and foreign markets. As a key contact for the public authorities and a proactive representative of the whole sector, the SER works with French, European and worldwide institutional bodies to help draft and implement renewable energy development programmes, and also serves as a catalyst in efforts to structure French export streams.

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