IVM Institute for Environmental Studies

Sustainability Assessment Framework for Energising Development projects

IS-Academy Renew

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Abbreviations

BoP	Base of the Pyramid
EIA	Environmental Impact Assessment
EnDev	Energising Development
FGDs	Focus Group Discussions
GIZ	Deutsche Gesellschaft für Internationalle Zusammenarbeit, former GTZ
IRR	Internal Rate of Return
IFAD	International Fund for Agricultural Development
IVM	Institute for Environmental Studies, at the VU Amsterdam
KIIs	Key Informant Interviews
NGOs	Non-governmental organizations
RETs	Renewable energy technologies
ROI	Returns on investments
SAF	Sustainability Assessment Framework for EnDev project activities
SHSs	Solar-home systems
SMEs	Small-and-medium enterprises

Summary

Sustainability of activities initiated and implemented through international aid is increasingly considered a prerequisite implementing donor organisations. Project sustainability is defined as a situation in which the institutions and mechanisms supported by the project are maintained and continue to deliver an appropriate level of benefits during an extensive time period after the withdrawal of donor assistance. The availability of conceptual frameworks and practical tools for the assessment of project sustainability in the domain of energy in developing countries is lacking.

This project aims to develop such a framework with the purpose of assessing the sustainability of activities related to the Dutch-German partnership Energising Development (EnDev) founded in 2004. EnDev aims to grant access to sustainable and affordable energy to 5 million people in the developing world. As of December 2011, 23 project activities were implemented in 20 developing countries.

The Institute for Environmental Studies (IVM) at VU University Amsterdam proposed a methodological framework allowing to assess the sustainability of projects implemented under the EnDev programme. Through the assessment of four sustainability dimensions, the "Sustainability Assessment Framework for EnDev project activities" (SAF) helps organisations to identify the areas where a project is likely to be sustainable and where it can be further strengthened. The first version of the SAF was applied on a trial mode during the first half of 2011 in two EnDev intervention countries: Senegal and Mozambique.[1] Based on the lessons learned during the field testing of the framework, an improved version of the tool has been developed incorporating the insights gained during the sustainability assessment experiences.

[1] These two case studies can be downloaded from **www.renew-is-academy.org**.

1 Energising Development

1.1 Introduction

Access to modern energy services is widely regarded as critical for improved livelihoods and the achievement of the Millennium Development Goals (MDG). Currently, more than 1.3 billion people worldwide lack access to electricity and are excluded from its benefits, among them increased labour productivity and improved social services such as education and health care. Unless new policies are introduced and investment trends change, approximately 1 billion people will still be without access to electricity in 2030 (IEA/WEO 2011).

Given the scale and nature of the energy access challenge, energy poverty is becoming a priority for both developing country governments and the international community. On the national level, energy poverty is recognized as a challenge to development and growth. Internationally, drivers such as poverty alleviation, environmental sustainability and climate vulnerability motivate attention for the issue.

The development community has used renewable energy and energy efficient technologies as a means to increase electricity access since the 1970s. Yet, the limited success of past project activities has prompted a move towards market-oriented approaches. In anticipation of the competitive, innovative, and scaling effects found in the private sector, commercial approaches are increasingly adopted to secure the sustainability of interventions, leverage private finance, and ultimately maximize project impacts.

While this shift has improved the design and implementation of energy access interventions, electrification projects often do not lead to a sustained, long-term improvement of the socioeconomic environment (cf. Martinot *et al.*, 2002; Valencia/Caspary, 2008). This can be explained among others by the inadequate design of subsidies, tariffs and financing schemes, the lack of reliable maintenance and post-sales services as well as the insufficient involvement and training of local actors, resulting in a strong dependence on foreign knowledge and equipment (Alzola *et al.*, 2009). In the face of such challenges, a wide-spread consensus has emerged that sustainability should be integrated in the monitoring and evaluation of development projects (Caspari, 2004; Reinke, 1999).

1.2 Energising Development and sustainability

Energising Development (EnDev) is a Dutch-German partnership programme, established in 2004, aiming to provide five million poor people in developing countries with sustainable access to modern energy services by 2015, thus contributing to the achievement of the MDGs. The EnDev programme is funded by the Directorate-General for International Cooperation of the Dutch Ministry of Foreign Affairs (DGIS) and the German Federal Ministry for Economic Cooperation and Development (BMZ). It is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) with NL Agency.

EnDev project activities aim to establish self-sustaining markets for affordable energy technologies, fuels and services adapted to the needs of local populations. This market based approach consists in supporting local small and medium-sized enterprises in delivering sustainable energy products and services to households and social institutions. The main technologies promoted are photovoltaic energy, grid densification, micro-hydropower, biogas and energy-efficient cooking stoves. One innovative aspect of the EnDev programme is the diversity in project design which may be adopted by local project teams. Today 23 projects are being implemented in 20 countries.

Long-term sustainability is a core criterion for EnDev activities. This means that the benefits created by the project are secured over a long time period without depending on external donor funding. While monitoring and evaluation frameworks exist for EnDev activities, the programme to date does not have a formalized approach to assess the projects' sustainability.

Lockwood (2003) describes a development project as sustainable "when it is capable of supplying an appropriate level of benefits during an extensive time period after the withdrawal of all forms of support from the external agency". Similarly, the International Fund for Agricultural Development (IFAD) defines project sustainability as "ensuring that the institutions supported through projects and the benefits realized are maintained and continue after the end of the project" (IFAD, 2009). The following core elements of project sustainability can be extracted from these definitions:

> *The institutions supported by the project are maintained and continue to deliver an appropriate level of benefits during an extensive time period after the withdrawal of donor assistance.*

1.3 Objective and structure of the report

The main objective of this report is to develop a framework to assess the sustainability of electrification initiatives implemented within the Energizing Development programme. The report is organised in line with the structure of the Sustainability Assessment Framework (SAF). Chapter 2 describes the EnDev programme and introduces the overall structure of the framework. Chapter 3 specifically addresses the main elements within the "Enabling Environment" dimension. Chapter 4 concentrates on sustainability issues from the perspective of "Consumer Behaviour". Chapter 5 addresses the "Project design and business planning" dimension and Chapter 6 deals with "Environmental Impacts". Finally, practical use of the framework is described in Chapter 7.

2 EnDev project sustainability assessment framework

2.1 Introduction

The SAF has been developed to assess whether a project being implemented as part of the Energizing Development programme is likely to be sustainable. It constitutes an evaluation tool allowing organizations to identify the areas where a project performs well with regard to sustainability and where it has to be further strengthened. The framework is tailored to EnDev electrification initiatives using renewable energy technologies – i.e. solar photovoltaic, micro- and pico hydropower and biogas. Another tool exists for the sustainability assessment of EnDev projects promoting the dissemination of improved cooking stoves. In order to account for the differences in project design of EnDev electrification initiatives two institutional models are distinguished in the SAF:

- **Sales model**: Under this approach the enterprises supported by the project sell RETs (e.g. Solar Home Systems) to the rural customers on the base of cash payment or consumer credit. As a result individual households or communities (in the case of a village mini-grid for example) own the technology.
- **Fee-for-Service model**: In this concept the electricity users pay an installation fee and a monthly electricity fee to cover operation and maintenance and possible replacement costs of the service provider. A field technician checks the equipment on a regular basis, carries out repairs and collects the fee. Within this model, different billing systems are possible (i.e. pre-paid, flexible payment mechanisms). The government or an Energy Service Company (e.g. local enterprise, NGO, cooperative) owns technology.

Given that these two institutional models have different implications for project sustainability, for certain indicators different assessment questions are proposed respectively. The following icons indicate whether a question is applicable to a fee-for-service project, sales-based project or both.

F For fee-for-service EnDev initiatives

S For sales EnDev initiatives

F S For both EnDev models, fee-for-service and sales initiatives

This framework is complemented by an Excel spreadsheet providing a scoring system for project sustainability (File: Scoring system SAF.xls).

2.2 Structure of the project sustainability assessment framework

The sustainability of a rural electrification project is subject to how characteristics of the macro-environment, the electricity consumers, and the project implementing organizations evolve throughout and after a project activity. In addition, the project has to be environmentally sustainable in the sense that its activities do not lead to a deterioration of local ecosystems, air, soil and water quality. The SAF for EnDev projects thus comprises four different dimensions or pillars that are crucial for sustainability, these are: *Enabling Environment*, *Consumer Behaviour*, *Project Design and Business Planning* and *Environmental Sustainability*. The dimensions will be presented one-by-one in the following chapters.

Each of these four dimensions or sustainability pillars consists of several sub-dimensions which comprise indicators that are evaluated through assessment questions. Figure 1 illustrates the structure of the framework.

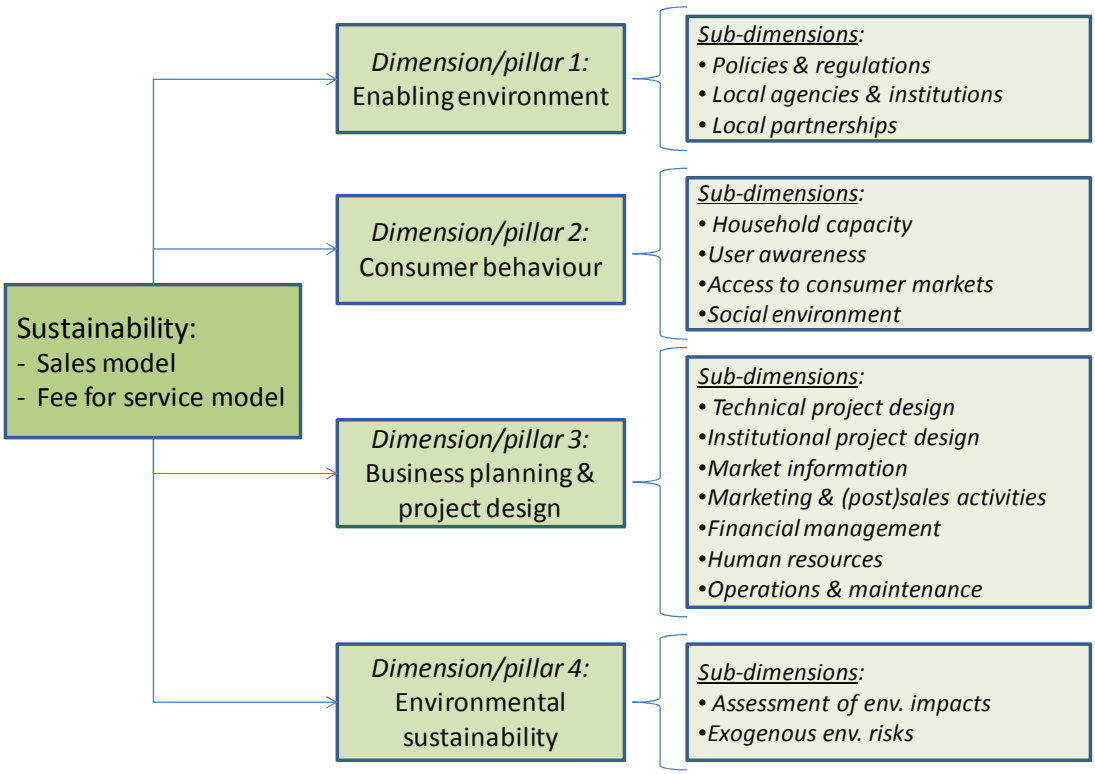

Figure 1 Visual representation of the Sustainability Assessment Framework (SAF)

3 Enabling environment

3.1 Introduction

The "*Enabling Environment*" dimension refers to the macro-environment in which the project is embedded and the factors that influence the dissemination of renewable energy technologies (RETs) throughout a society.

First, *national governments* play a key role in developing institutional and legal frameworks favouring electrification with RETs (Niez, 2010). This includes the creation of rural electrification agencies, the commitment to targets in terms of energy access and renewable energy diffusion and the implementation of policies and financial funds to reach these targets. As electrification by itself does not entail rural development, it has to be linked to other programs in the areas of education, health, communications, economic development, agriculture or water (Taylor, 1998).

Second, since the use of renewable energy technologies (RETs) is often supported by multilateral and donor based financial resources, the diffusion process often face difficulties to be sustained by market demand and supply factors. For the private sector to engage in rural electrification with RETs, governments must ensure a *secure market infrastructure* to support the viability of projects (Niez, 2010).

Third, adopting new technologies requires *capability* for routine operation and maintenance, which is often missing in developing countries (Cohen and Levinthal, 1990; Lall, 1992). Enhancing the knowledge and capacity of entrepreneurs and consumers through continued capacity building programs is an important precondition for widespread diffusion of RETs.

The enabling environment dimension thus captures the role of the government institutions, programmes and supporting agencies involved in these processes.

3.2 EE1 – Policies, strategies and regulations

Sustainable electrification projects require a supportive institutional framework including national policies, strategies and regulations which are implemented effectively on all levels of government.

EE1.1: Existence of policies and strategies supporting electrification with RETs

1. Are there laws and government policies addressing rural electrification with RETs? F S
2. Is there a target set by the government in relation to the use of renewable energy in the future? F S
3. Is there sustained (central and local) government support and long-term commitment of funds for rural electrification with RETs? F S
4. Is electrification linked to other policies to foster rural development (e.g. economic development, poverty reduction, education, health programmes)? F S
5. Are there strategies to engage private companies in rural electrification with RETs? F S

EE1.2: Existence of regulatory mechanisms fostering the diffusion of RETs

1. Are there subsidies, tax exemptions or import tariffs which foster the development of RETs compared to conventional energy sources? F S
2. Are there national standards and certifications for RET components? F S

EE1.3: Effective implementation of RE policies, strategies and regulations

1. Is progress in policy implementation monitored on an regular basis? F S
2. Are there national/local programs for the training and development of RET technicians and entrepreneurs? F S
3. Are there awareness raising and information campaigns about electrification with RETs for local populations? F S
4. Are there national or regional programs for the development of markets for RET products and services? F S

3.3 EE2 - Local agencies and institutions

This element of the enabling environment refers to the presence of local agencies with clear roles, responsibilities and authorities at different levels supporting the use of renewable energy technologies. They can be public energy authorities, local NGOs, financial or educational institutions. The combined actions of multiple stakeholders are essential for robust technology diffusion.

EE2.1: Capacity of local agencies in charge of electrification with RETs

1. Do RET agencies have sufficient capacity and resources to support the use of renewable energy? F S
2. Are rural electrification officials willing and motivated to promote energy access through RETs? F S
3. Are there mechanisms in place to disseminate information to enterprises and consumers? F S

EE2.2: Presence of renewable energy issues in the educational system

1. Are energy policy and renewable energy issues part of school curricula/ university programs? F S
2. Are there graduates from vocational and technical training institutions related to RETs? F S

EE2.3: Existence of micro-credits for RETs

1. Are there micro-credit institutions offering loans (for capital investment, productive use or consumption) in the context of electrification with RETs? F S

3.4 EE3 – Partnerships among local agencies and other actors

Networks among stakeholders are useful to have a shared understanding about the existence of energy related problems in a society and possible solutions for it. A dense network among actors can increase the availability of financial, human and technical resources for RET dissemination and utilization. Thus, partnerships among private enterprises, governments, local NGOs and financial institutions are important elements for market development in the area of rural electrification. Likewise, a coordination of electrification activities between different donor organisations can lead to synergies and ensure the efficient use of available funds through the government of the recipient country.

EE3.1: Existence of partnerships among different stakeholders in the field of RETs

1. Are there industries, consumer associations or NGOs in the field of renewable energy? F S
2. Is there regular contact and knowledge exchange between RET stakeholders (e.g. government and local NGO)? F S

EE3.2: Coordination of activities between donor organizations

1. Does a coordination of rural electrification activities between (international) donor organizations take place? F S

4 Consumer behaviour

4.1 Introduction

"*Consumer behaviour*" describes the actions and choices households make to consume certain products and services. In order to assess the sustainability of household energy access projects, an improved understanding of the behavioural drivers that affect the household decision making process is crucial. Products or services which do not fit the needs and abilities of the final consumer will not be viable long term. Considering household decision-making, attention should be paid to the environment in which decision are made. Such an environment consists of the household's assets also referred to as the household's capacity or opportunity set. The asset base of the household is facilitated or constrained by policies, institutions and processes within a certain vulnerability context. The interaction between the household's capacity and the living context results in household behaviour. The degree of involvement of rural communities in the electrification process, particularly their participation in decision-making committees, is another important aspect which is analysed in the consumer behaviour dimension.

4.2 CB1 – The household's capacity

The household capacity is determined by the household's asset endowment. Included in this sub dimension are the tangible assets: human and financial capital.[2] Human capital, also known as livelihood capabilities, refers to the quantity and quality of labour available to the household, including educational level, knowledge and skills. Financial capital refers to the monetary resources people have access to. Their income is often derived from agricultural work or informal selling resulting in irregular and variable income flows. When designing payment schemes or fee-for-service agreements for households these particular income flows need to be taken into account.

CB 1.1: Knowledge and skill levels of consumers fit the technology

1. Do the consumers possess the skills to correctly use the technology? F S
2. Are the consumers aware of and do they respect the limits of the system? F S
3. Are consumers able to carry out basic repair and maintenance tasks? S

CB1.2: Technology is in line with the household labour economy

1. Does the scope of the electricity access allow for productive uses? F S
2. Do consumers (especially women) experience a gain in labour time due to the electricity access? F S

[2] Note that the social capital will be addressed under the sub dimension "social environment".

CB1.3: The household financial capacity corresponds to the service costs

1. Are households willing and able to pay for the electricity service on a regular basis?	F	
2. Is the technology affordable for households (through cash payment or consumer credit)?		S
3. Can households afford appliances (e.g. TV, radio) and replacement items (e.g. light bulbs) necessary to use the technology?	F	S
4. Do households generate extra income through the technology?	F	S

4.3 CB2 - User awareness

Once households have adopted a new technology consumer satisfaction plays an important role. If a user does not see the benefits of the technology he or she will be less likely to continue using the product or replace it when broken. Satisfied consumers will also positively influence the diffusion of a technology through mouth-to-mouth propaganda within their social network.

CB2.1: Consumers are aware of the technological advantages

1. Are households aware of the advantages of the new technology (the electric current) compared to their traditional practices?	F	S

CB2.2: Consumers are satisfied with the technology

1. Is the electricity service well adapted to consumers' needs?	F	
2. Are consumers satisfied with the electricity access?	F	
3. Is the technology well adapted to consumers' needs?		S
4. Are consumers satisfied with the performance of the technology?		S

4.4 CB3 – Access to consumer good markets, and services

A crucial factor is the access to the appliances (e.g. radios, TVs, lamps) and replacement items (e.g. light bulbs, fuses). Local markets need to supply the correct products at reasonable prices and with good quality in order to allow consumers to benefit from the technology. Thus, stability and reliability of the appliance markets are crucial for the sustainability of the project. Second, access to maintenance services is essential as technologies need to be repaired and maintained on a regular basis if they are to deliver continued benefits to consumers. Third, the sustainability of the electricity supply can be strengthened through provision of micro-credits. Besides access to credit households also need to be willing to take a loan which depends on their trust in the existing financial institutions.

CB3.1: Access to appliances/replacement items needed for using the technology

1. Do local markets offer appliances (TV, radio, sewing machine, etc.) necessary to benefit from the electricity access? F S
2. Do local markets offer replacement items (light bulbs, batteries)? F S
3. Can consumers afford (a) appliances and (b) replacement items? F S
4. Can consumers easily access local markets? F S
5. Can consumers always get what they need (reliability of the market)? F S

CB3.2: Access to effective maintenance services

1. Is the system maintained by the operator on a regular basis (preventive maintenance)? F
2. Is a technician readily available when consumers experience problems with the system (repair service)? F S
3. Can consumers afford the repair service? S
4. Does the system work well again after the technician's intervention? F S

CB3.3: Access to financial institutions

1. Do households have access to low risk credit schemes via formal financial institutions? F S
2. Do households feel comfortable taking loans from these institutions? F S

4.5 CB4 – Social environment

The technology supplied has to be compatible with the norms, values and preferences of a community in order to gain broad acceptance. Further, the prospects for long-term sustainability of the projects increase if the community is actively involved in the electrification project, meaning that information meetings take place and communication channels exist between the community and the other actors involved in the project.

CB4.1: The technology is in line with existing norms, values and cultural preferences

1. Did consumers' habits change after technology adoption? F S
2. If so, do they regard this change as positive or negative? F S

CB4.2: The technology is accepted by the community

1. Does the community trust the technology? S
2. Does the community trust the electricity service? F
3. Do communities/individual households gain prestige through the electricity access? F S

CB4.3: The community is involved in the planning and implementation of the project

1. Are consumers actively involved in decision-making processes related to the electrification project? F S
2. Are there ways of communication/problem solving between the community and the project implementers? F S

5 Project design and business planning

5.1 Introduction

"*Project design and business planning*" refers to the way in which the energy access initiative takes into account the commercial viability of the development and implementation of the activity. Today it is realized that self-sustaining, commercial energy projects are a prerequisite for long-term delivery of electricity. The objective of this dimension of the SAF is to determine whether these enterprises appear suitable for sustained operations following the conclusion of program support. Low performing aspects of the enterprise operations may indicate aspects which need to be addressed to increase the likelihood of sustainability in order to at least cover their operational costs.

5.2 PD1 - Technical project design

In pilot projects, robustness and reliability of the technology are essential. Possibilities of upscaling the existing capacity in order to meet growing electricity demand can strengthen sustainability as it raises people's satisfaction levels and the operational costs decrease due to economies of scale.

PD1.1 The technology is robust and reliable

1. Has quality equipment been used in the RET installation? F S
2. Have the systems been operating without (recurring) technical problems? F S

PD 1.2 The existing capacity can be upscaled as the demand for electricity increases

1. Does the project allow for upscaling of the existing capacity to meet increased electricity demand (e.g. more SHS, connection of additional households to mini-grid)? F S

PD 1.3 The scope of the electricity access enables productive use applications

1. Do the technical features of the technology (power, voltage, type of current) allow for productive uses? F S

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5.3 PD2 - Institutional project design

The way a project is designed from an institutional or organisational perspective can both foster or harm its sustainability. Within a fee-for-service approach, adequate metering, billing and payment recovery are fundamental to sustainable electrification. The effective recovery of customer payments allows electricity companies to supply reliable and sustainable power. Lack of payment for electricity use not only weakens the financial stability of the electricity provider (World Bank, 2000), but also discourages investors to engage in rural electrification because of uncertain revenues.

Once systems are installed and the electricity service is provided, it is important to make sure that the rural communities are sufficiently skilled to operate and maintain the systems. Lack of any basic skills (including the ability to read the maintenance handbook) may lead to the system being abandoned in case of malfunctioning.

PD2.1 Clear assignment of responsibilities within the project

1. Are consumers adequately informed about their rights and duties within the electrification process (e.g. through pre-electrification	F	
2. Is there a clear repartition of responsibilities between enterprise employees, informal employees and other actors (e.g. village chief, villager in charge of fee collection)?	F	

PD2.2 Existence of a problem-solving infrastructure

1. Is there a supportive infrastructure to deal with unforeseen problems/ conflicts?	F	S
2. Are there clear communication paths between all actors involved in the project?	F	S

PD2.3 Presence of a differentiated tariff system

1. Does the tariff system take local income characteristics and differences into account?	F	

PD 2.4 Training of users

1. Are users trained with regard to the about technical limitations of the system?	F	S
2. Are users trained about productive uses?	F	S

5.4 PD3 - Market information

A lack of specific market information describing low income markets remains an important barrier for private enterprises operating in low income markets. Without appropriate information regarding consumers, product suitability, and regulatory frameworks, entrepreneurs are challenged in developing profitable and sustainable businesses. This has been shown to be true within the energy access sector through a number of project experiences.

Indicators which may be used to assess changes in consumer, service or product, and regulatory information from the perspective of an energy enterprise are proposed in this dimension. The motivation for the selection of these indicators is that knowledge of these issues is of critical importance for increasing the strength of business planning in low income markets.

PD3.1: Consumer information is used for business planning

1. Have market studies including comprehensive consumer data been performed by the enterprise or other organizations? F S
2. Is the enterprise using a mechanism for collecting, monitoring, and responding to consumer and product data? F S
3. Has the enterprise used consumer data to improve business planning of the project? F S

PD3.2: Information on energy use patterns is collected

1. Has the enterprise adjusted the service offered based on greater knowledge of consumer preferences? F S
2. Has the enterprise adjusted its product offer based on greater knowledge of product use? F
3. Is feedback collected on service uses utilised to modify the design of the service being provided? F S

PD3.3: Level of regulatory knowledge held by the enterprise is increased

1. Does the enterprise have a developed network with regulatory officials and advisers? F S
2. Is the enterprise a member of a local industry group? F S
3. Are the planned activities of the enterprise for the development of the project aligned with national energy policy and planning goals? F S

5.5 PD4 - Sales, marketing, and post-sales activities

The general characteristics of the BoP (e.g. poverty, lack of infrastructure, gaps in education) require innovation in the ways in which sales, marketing, and post-sales activities are developed and implemented. Firstly, the enterprise should emphasize localized efforts for sales, marketing, and post-sales activities that overcome gaps in transport and infrastructure for the consumer. Secondly, the distribution of energy-efficient end-use appliances which are critical to economically sized renewable energy systems can facilitate access for the customer and generate additional revenues for the enterprise. Sales activities should also leverage social networks where possible in order to reinforce trust in the product and the service. Finally, the enterprise must adapt activities to consumer knowledge and skills in terms of the method of payment, reaction to non-payment, the perception of product benefits through marketing activities, and the levels of post-sales maintenance needed. Initial payments for the connection are often high for the rural poor. They may have enough to pay for the regular use of electricity but may not be able to afford the connection fees. This problem can be tackled by offering connections free of charge for the very poor or by spreading the connection fee over several years.

PD4.1: Sales, marketing, and post-sales activities leverage trust in community

1. Has the enterprise developed a network of local sales and post sales agents?		S
2. Does the enterprise perform household or community visits in sales and post sales activities?		S
3. Does the enterprise distribute products (e.g. energy-efficient household appliances, replacement items) complementing the technology?	F	S

PD4.2: Payment and finance mechanisms are supportive of sustained product use

1. Does the enterprise employ flexible consumer payment mechanisms?	F	S
2. Does the enterprise offer solutions to reduce the barrier to electricity access for the very poor (e.g. free connection; connection fee spread over several years)?	F	
3. Does the enterprise have a mechanism in place to react to non-payment of the monthly electricity fee?	F	
4. Does the enterprise have an adequate bookkeeping system and reliable documentation of cash flows?	F	S
5. Has the enterprise partnered with local financial institutions to develop lending products for energy services?	F	S

PD4.3: Marketing activities raise consumer awareness effectively

1. Do marketing activities penetrate rural markets and urban slums through technology demonstrations or use of other localized techniques?		S
2. Are local thought leaders (CSOs, politicians, social institutions) included in marketing events?		S

5.6 PD5 – Financial management

Profitability is critical for the sustainability and growth of all energy access initiatives, though is particularly challenging to maintain in low income markets. The effective financial management of an energy enterprise is thus critical for sustainability, in terms of maintaining profitable operations, preparing for scale, and using subsidies wisely.

Net income may be used to analyze whether the project is turning a profit, and annual trends may be analyzed as a measure of success. IRR may be used to determine the financial feasibility of an activity for capital budgeting decisions; however at a more granular scale, it is important to understand at which level of activity a project should be performing in order to make a profit.

PD5.1 The project is able to recover start-up and operational costs

1. Has the enterprise performed a financial analysis including IRR, ROI, payback period, and breakeven analyses for each of the projects undertaken? F S
2. Do the prices set allow for full cost recovery? F S

PD5.2 Scalability of the enterprise is financially feasible

1. Does the enterprise have a business plan for the project? F S
2. Is the project performing according to the design and estimations in the business plan? F S
3. Does the business plan consider the future replacement of equipment? F
4. Are potential investors considering further investment for expansion of the project? F S
5. Has the enterprise considered business risks for expansion? If yes, does the enterprise have a risk mitigation strategy? F S

5.7 PD6 - Human resources

The conditions of BoP market pose internal stresses on an organization as well as external, as human resources available as qualified employees and technicians associated with an energy enterprise may be in limited supply. Management and accounting skills are of equal importance to technical skills development, and thus the delivery of regular trainings in each of these regards has been suggested for improved sustainability. At an institutional level, long term training programs for local technical personnel must be developed, however enterprise focused trainings may be coordinated by partnerships of donors and external institutes.

A second aspect of human resources describes the local ownership of energy access projects. While successful SMEs may be foreign owned, it is critical that local employees are involved in developing the company. Local ownership is essential for scaling up, and assuring the longevity of a profitable business; enterprise process needs to be aligned with peoples own desires and aspirations, something they can operate and manage themselves.

PD6.1 Managerial and technical capacity of human resources

1. Are the employees of the enterprise committed to the project? F S
2. Do employees receive continuous management and technical training? F S
3. Is there a mechanism for employee performance monitoring and assessment? F S
4. Have there been incidents of corruption related to the project? F S

PD6.2 Local employment within the project

1. Does the enterprise prioritize the employment of local employees? F S

2. Are local technicians incentivized to work for the project; is this considered a profitable profession? F S

5.8 PD7 – Operations and maintenance

Monitoring and evaluation is critical to track progress towards the achievement of project objectives, and should be emphasized for both product and staff performance. The notion that low income consumers are sophisticated in terms of preferences for high quality products has specific implications for the level of quality control implemented by the enterprise. Customer services and monitoring activities may be combined with visits for maintenance and payment collection activities.

PD7.1 Extent of monitoring and quality control

1. Is product or service use and consumer satisfaction monitored? F S

2. Does the product or service adhere to established technical standards? F S

PD7.2 Existence of long term maintenance scheme

1. Does the enterprise have a long term maintenance scheme? F

2. Are maintenance activities performed on a regular basis? F

3. Does the enterprise offer post-sale maintenance and repair service? S

PD7.3 Establishment of a network for operations

1. Are all business functions such as customer service and operations decentralized? F S
2. Does a technician reach the customers in reasonable travel time (depends on reasonable quality of access roads etc.)? F S

6 Environmental sustainability

6.1 Introduction

In addition to the previous dimensions describing project sustainability, EnDev project activities aiming to increase sustainable electricity access must also consider environmental sustainability. The operations of energy enterprises supported by EnDev may impact the environment in different ways and to varying degrees of severity, depending on the energy technology being promoted, and the way in which a project is designed.

This dimension of the framework provides indicators to assess the environmental sustainability of EnDev activities. The objective is to ensure that EnDev activities do not cause adverse environmental impacts. The indicators described in this section of the framework draw on examples from previous energy access project experiences. Their assessment gives an insight as to whether the EnDev project activity effectively increases energy access while simultaneously ensuring environmental sustainability.

6.2 ES1 – Assessment of environmental impacts

The environmental impacts originated by the project are a crucial aspect for the sustained operation of the EnDev initiatives. This sub-dimension addresses the issue of the potential environmental impacts originated during the implementation of EnDev projects.

ES1.1: Assessment of environmental impacts

1. Has an Environmental Impact Assessment (EIA) or a similar analysis been performed during site selection and project implementation, F S
2. Has the environmental sustainability of input materials (e.g. clay for ICS, water for biogas digesters) been investigated? F S
3. Is a developed hardware collection or recycling program in place for end-of-life products (e.g. batteries for SHS and pico-PV)? F S

6.3 ES2 - Exogenous environmental risks

As some activities outside the boundaries of an EnDev project might originate negative environmental impacts that put at risk the sustained operation of the EnDev energy access initiatives, this sub-dimension aims to address the potential exogenous environmental risks that could affect an EnDev project.

ES1.2: Risks of environmental impacts originated outside boundaries of project

1. Has the enterprise made an assessment to identify activities outside the boundaries of the EnDev project that could have environmental impacts affecting the project? F S
   i. If so, are there activities outside the boundaries of the EnDev project that could generate environmental impacts to the project? F S
2. Has the enterprise determined the risks for the EnDev project associated to the environmental impacts identified? F S

7 Practical use of the framework

7.1 Research methods proposed

For the application and data collection of the SAF two semi-structured methods and one structured method are proposed:

- Focus group discussions (FGDs) with consumers of the electrification project in order to assess the consumer behaviour dimension. FGDs are a qualitative method which generates a rich understanding of participants' experiences and beliefs (Morgan, 1998); with this method it is possible to grasp the thoughts, feelings and behaviour of an important amount of consumers in a short period of time. FGDs generally require less time and resources than household surveys in order to obtain reliable results.
- Household Surveys with consumers of the electrification project in order to assess and quantify the consumer behaviour dimension. Household surveying is mainly a quantitative assessment method based on a fully structured interview and a statistical analysis of the results. The advantage of household surveys is that it provides very accurate and concrete results. The disadvantage of household surveys is that they generally take substantially more time and effort and are therefore often considered too expensive for impact assessment and sustainability assessment. Also note that the quantitative results of a market survey can often be well combined with the qualitative outcome of FGDs.
- Key Informant Interviews (KIIs) with project stakeholders, namely
  - Government representatives, NGOs, financial and education institutions with a link to renewable energy and rural electrification for the enabling environment dimension
  - Enterprises involved in the EnDev project and members of the project implementing organisation for the project design and business planning dimension
  - Enterprises, project managers and environmental organisations for the environmental sustainability dimension.

7.2 Scoring system

In order to have an objective result of the sustainability assessment a scoring system has been developed, complementing the SAF. Each indicator within a sub-dimension has to be assessed by attributing it a score on a 4-point depending on its contribution to project sustainability.

0	**No contribution to sustainability**
0.25	Low contribution to sustainability
0.5	Medium contribution to sustainability
1	High contribution to sustainability

Through the assessment questions proposed for each indicator the assessor determines the contribution to sustainability of a given indicator and scores it according to the system here described. All the indicators, subdimensions and dimensions have the same weight.

The scoring system builds up on the data organisation template included in Annex I.

7.3 User guide

The application process of the Sustainability assessment framework can be divided in three phases for which the steps are specified below.

1. **Preparation**
   - Data collection about project (objectives, duration, scope, target group, technology, business model, financial design)
   - Identify project stakeholders and their roles

2. **Field work**
   - Determine and contact interview partners (with support of local project implementers)
   - Set up work plan for field research
   - Formulate interview questions for different groups of interviewees (government officials, local companies, etc.) based on the assessment questions of each SAF dimension
   - Prepare focus group discussions (questions and participants)
   - Perform interviews and focus group discussions

3. **Assessment**
   - Summarise data using the template for organisation of data (Annex I)
     - Determine contribution to project sustainability for each indicator (high/ medium/ low/ no contribution)
     - Justify your choice with a short explanation in the “Comments” section
   - Enter data in scoring system and generate overall scores and graphs for each dimension (cf. separate Excel spreadsheet)
   - Write assessment report, containing the scores and a brief qualitative description of the results of the sustainability assessment for each subdimension

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Annex A: Template for organisation of data

EnDev Sustainability Assessment Framework

Summarising the data gathered

Dimension:				
Sub-dimension:				
Indicator:				
Contribution to sustainability	High	Medium	Low	No contribution
Comments:				
Indicator:				
Contribution to sustainability	High	Medium	Low	No contribution
Comments:				
Indicator:				
Contribution to sustainability	High	Medium	Low	No contribution
Comments:				
Indicator				
Contribution to sustainability	High	Medium	Low	No contribution
Comments:				