LIGHT UP THE WORLD (LUTW)

FRAMEWORK FOR SUSTAINABILITY

Program sustainability refers to the ability to continue operations/activities that provide a service over a long-term. The duration of the desired term depends on how long the service is considered appropriate or useful. In the case of technology transfer projects that involve renewable energy, sustainability implies the ability to sustain the function and use of renewable energy systems indefinitely. In order to be able to design renewable energy projects that can be sustained, it is important to understand the different ways that a renewable energy system and its support systems may fail over the desired term. As points of failure become well understood, projects can be designed to include activities that establish the tools and mechanisms to mitigate and manage the risk of failure.

Based on both research and project experience, Light Up The World (LUTW) has identified nine critical success factors to sustaining renewable energy system use in off-grid locations. LUTW's Framework for Sustainability is based on these nine factors. The nine critical success factors and the Sustainability Framework activities are described below.

1. Partnerships and planning

Successful projects are the result of functional partnerships. Partnering with organizations that share mutual objectives, have sufficient organizational resources, project implementation experience, relationships with key stakeholders in the target community and the capacity to implement the project will help to increase the likelihood of project success. Establishing clearly defined roles/responsibilities and communicating frequently and openly about the execution of activities to fulfill responsibilities is another feature of a functional partnership.

Alternatively, a project is likely to fail/be unsustainable if a partner organization is unstable, lacks capacity for project implementation and/or is unable to dedicate sufficient time to undertaking project activities (i.e. lack of resources).

Sustainability Framework activities (how to address this issue):

I) Assess possible partner candidates:

a) Assess communication between you and the partner candidate prior to signing an agreement (i.e. did the organization communicate in a timely manner, appropriately and clearly prior to establishing a partnership via phone and email)

b) Discuss organization's long-term goals and how long-term renewable energy service provision fits their mandate

c) Learn about their existing network and range of activities (i.e. does the organization have a useful network of staff that have regular contact with communities)

d) Learn about and assess the organization's previous project implementation experience in the area (i.e. have they worked on projects involving transition to a new technology/tool)

e) Assess if the organization has sufficient administrative resources to manage and execute projects (i.e. does it have a diverse portfolio of projects with stable funding)

f) Discuss existing relationships with communities, local government(s), other local actors and organizations

2. Baseline, market and project feasibility study

It is important to understand the existing demand for basic electricity services and supply of products available to meet needs in the targeted project area. Understanding this dynamic can help to ensure that the renewable energy system that is introduced will be useful, valued by beneficiaries and is able to meet expectations in terms of representing an improvement on the current and pending technologies that will be available to households in the short to medium term (3-5 years).

Alternatively, a project is likely to fail/be unsustainable if the project proponent/entrepreneur has little information about demand for basic electricity services and mismatches a renewable energy alternative to the needs.

Sustainability Framework activities:

I) Conduct a baseline, market and feasibility study:

a) Evaluate the existing demand for electricity for basic electrification services such as lighting and communication (i.e. fixed and portable illumination, charging cell-phones, powering radios in the home etc…)

b) Evaluate what products are available in the local marketplace and barriers to products entering the market

c) Evaluate economics of existing demand and income earning potential

d) Evaluate/discuss long-term potential demand for electricity services so that system design can reasonably accommodate future modification

e) Evaluate how the partner's administrative structure fit with local management structures and communication channels in place that may be leveraged to serve long-term project interests of technical support

f) Evaluate local natural resources and which renewable energy technology (i.e. solar, wind, micro-hydro etc…) may be most appropriate to meet needs

g) Research government plans for electrification in the target area over a reasonable term (i.e. 3-5 years)

3. System design, community consultation and project approach

Renewable energy systems should be designed with consideration to the economic capacity of households. For example, there must be a demonstrated history of household income spent on energy services, which can be redirected to pay for the renewable energy system or a technician to repair the system. In some cases, other household assets can be considered as part of possible assets that could be liquidated to cover maintenance costs. Community consultation in deciding what renewable energy systems will be offered as an alternative to the existing fuel source mitigates the risk of technology rejection due to inappropriateness or unwillingness to economically support the renewable energy system. The project approach, which dictates the method of renewable energy system acquisition, maintenance and component replacement, should utilize an existing management structure and include community involvement.

Alternatively, a project is likely to fail/be unsustainable if the community is not consulted on the type of system they will be offered (i.e the system is not contextually appropriate) and if the system does not consider their economic capacity for maintenance over the long term.

Sustainability Framework activities:

I) Perform community consultations:

a) Design/offer renewable energy systems that are matched to existing basic electricity demand for services, expenditure patterns as well as income/assets

b) Demonstrate the technology to the community, explain how it works, let community members test as appropriate

c) Propose system design(s) (based on feasibility study) to community members along with cost implications for variations in size/services

d) Discuss and evaluate whether a tariff, microfinance or one-time payment for ownership (or hybrid) approach will be suitable for the partner organization and community

e) Discuss and determine the contribution from households for the system based on current economic capacity

4. Technical capacity

It is important to explicitly train members of the community during the installation phase of the project. Practical, hands on training enables local technicians to troubleshoot and maintain systems and replace components or modify systems when necessary. In most projects, community technicians serve as the first line of technical support with the partner organization, which may be based in a more distant location, being able to respond to more significant issues with systems and handling replacement of components.

Alternatively, a project is likely to fail/be unsustainable if technical expertise cannot be sourced within reasonable proximity to the community.

Sustainability Framework activities:

I) Prepare the community to be able to respond to technical needs:

a) Identify a number of community members that may have some previous experience working with electricity, sufficient interest in developing their skills in a new area and participating in the project. It is critical that individuals selected have sufficient time to dedicate to project activities, from time to time, over the long-term

b) Discuss future employment/service exchange prospects that can arise as a result of being able to provide a technical service to end users (tied into decision about project approach)

c) Select an appropriate/practical method to educate a community member how the technology works, how to install and maintain it over time. It may be appropriate to introduce more advanced concepts such as system design over 2-3 phases of training

d) Establish channels of communication between community technicians and the partner organization (i.e. cell phone)

5. User education and knowing where to get additional technical support

A basic understanding of the system at the household level helps to avoid premature system failure. Beneficiaries who know how to properly use and care for their system directly influences the life-cycle cost of using the technology. Furthermore, when technical issues do arise, they must know who to contact to provide them with technical support in a reasonable amount of time and at a cost that is within their financial means.

Alternatively, a project is likely to fail/be unsustainable if system users lack sufficient information on how to use their system.

Sustainability Framework activities:

I) Educate the end user:

a) Develop a structured and contextually appropriate approach to educating end users after system installation. User education should focus on how the renewable energy system works, basic operation, system capacity limitations, monitoring system status and how to perform basic troubleshooting

b) Provide a user friendly system manual that uses simply and effective imagery that end users can refer to it when necessary

c) Inform end users who they can contact in cases where problems with their system are beyond their ability to troubleshoot and resolve (i.e. cell phone number for local technicians and partner organization)

6. Incentives

Establishing the availability of technical support services with appropriate social/economic incentives (that are within the economic means of beneficiaries) is fundamental to long-term sustained use of renewable energy systems. This means that while an investment in local technical capacity is necessary it can be rendered insufficient if there are limited incentives for trained technicians to travel to installation locations to provide support services. This means that compensation should be provided which appropriately reflects the value of the technician's time and expertise. It's important to note that the application of incentives differs depending on the project approach (i.e. rental via tariff model vs. outright ownership).

Alternatively, a project is likely to fail/be unsustainable if technicians are not compensated sufficiently, relative to other work opportunities in the area, for technical support services provided.

Sustainability Framework activities:

I) Prepare the technicians and community for the long-term costs of maintaining systems:

a) Discuss with project partners and local technicians what would be reasonable compensation for maintenance and repair of systems in nearby and more remote locations where systems have been installed

b) Discuss openly and honestly with families the factors involved in maintaining systems and what costs they can expect to incur on an annual (i.e. general maintenance) and periodic basis (i.e. replacement of components)

7. Equipment type and quality

Using equipment that has performed well in rural settings will help to reduce potential project problems due to premature component failure. It is important to assess the costs and benefits of various equipment options based on performance (i.e. quality), product features (i.e. indication of status etc…), ease of use as well as supply chain considerations.

Alternatively, a project is likely to fail/be unsustainable if equipment is of disproportionately low quality and if equipment selection does not consider the performance of the equipment chosen in relation to user preferences, environmental conditions and other contextually specific circumstances.

Sustainability Framework activities:

I) Establish a process of equipment selection:

a) Perform a market availability study of products that are locally available and can be imported for us on the project

b) Conduct a cost benefit analysis (as part of the system design stage) that looks at quality of equipment available while considering the trade-offs of local availability and the importance of local technicians and partner being able to exchange goods and services, the fundamentals of a sustainable market, in the long-term

c) Map the anticipated life-cycle of all equipment chosen and using this information as part of the community consultation process where system design(s) are confirmed and costs to households in the short and long-term are discussed

8. Supply chain

While the components in renewable energy systems are known to last for long periods of time, component replacement is necessary in order to achieve sustained use over the long-term. A dependable supply chain that has a reasonable response time is important. Technicians, or the local management body, should be aware of original suppliers and alternative suppliers of projects for when equipment failure occurs.

Alternatively, a project is likely to fail/be unsustainable if replacement components cannot be obtained within a reasonable amount of time.

Sustainability Framework activities:

I) Establish links between relevant actors in project and supply chain agents:

a) Create channels of communication between community technicians (i.e. phone numbers, email addresses), partner organization and companies involved in the supply chain

b) Maintain an updated list of products available from different suppliers and share this information with project agents when there are significant changes

9. Political environment

External factors such as a difficult economic environment or political change may impact the economic situation in a community and/or the incentives to use a particular technology. This may adversely affect the ability of a household to afford replacement components pay for technical support. Although this may affect the long-term sustainability of a project, it is externally determined meaning it is beyond the control of an organization to influence. That being said, organizations

implementing projects should always be aware of their operating environment and potential project risks associated with politics.