Assignment Title: Productive Use Energy Assessment for BRILHO

1. Background

BRILHO is a 5-year Programme (2019 – 2024), with nationwide coverage in Mozambique that aims to catalyze the market for clean cooking solutions, Solar Home Systems (SHS) and Green Mini-Grids so that off grid populations and businesses have access to clean and affordable energy solutions.

Component 3 of BRILHO, Research and dissemination (R&D) aims to improve the availability of relevant information to private and public sector decision-makers on the supply and demand of off-grid energy in Mozambique. To this end, Component 3 has two objectives.

- The first is to augment the existing evidence base on market-based approaches to energy access by undertaking studies in several areas, which includes identifying options for improving the policy and regulatory framework and market.
- The second objective is to strengthen the capacity of Mozambican institutes and organisations to deliver off-grid related research.

The assignment covered by this TOR contributes to the first of these objectives.

One of the key barriers to growth of energy businesses in rural areas in Mozambique is that residential demand for energy from rural communities remains low, making it difficult to secure the income to recoup investment in energy infrastructure and grow markets for energy products. A key means of over-coming this barrier is seen to be the development of productive uses of energy (PUE), which bring additional income into communities and grow livelihoods while also enabling users to pay for energy and hence increase energy business revenues.

PAC, on behalf of BRILHO will conduct research into the potential of PUE applications in Mozambique. This will generate information that supports BRILHO’s engagement with off grid companies, minigrid developers and policy makers.
2. Scope of work
The research will explore the potential of PUE in the rural parts of Mozambique.

The research will have a geographic focus to be defined by BRILHO. Presumably there may be areas that are of more interest to the programme due to the presence of more local partners and areas that may not be feasible for the programme to operate due to security concerns. Any geographic preferences that BRILHO have will inform the geographic scope of this research.

The productive use applications looked at will focus on the agriculture, fisheries and livestock sector. This focus is justified firstly by the dominant role agriculture plays in the country, especially in rural areas. It employs 70% of the population and is the dominant source of income; secondly, The integration of PUE applications related to agriculture is expected to bring additional income into communities, rather than circulating the existing community-resources, thus contributing to the economic development of the target population. This economic development, could, at the same time, have an indirect positive effect in fostering the demand (capability of pay) for solar technologies being offered by the companies supported by BRILHO.

Although the focus will be on agriculture, fisheries and livestock sector, when the selected PUE applications have the potential to support other economic uses, this will be identified. For instance, solar refrigeration technology for fishing or horticulture may also be suitable for small shops to chill food and drinks. Some productive use technologies may have the capacity for other uses to be added directly onto them – for instance, phone charging can be added to appliances that generate electricity.

In these instances, we will identify that there is a likely market for these other functions and where proxy indicators exist (e.g. population size in catchment area) will use these to demonstrate the likely size of the opportunity. However we will not do a comprehensive assessment of market demand for these other productive uses.

The research will be conducted as follows:

- An assessment of livelihoods and economic activity in the identified areas will enable the identification of a long list of sub-sectors that provide opportunities for growth and for reaching large numbers of people. Working with BRILHO we will short-list three (3) sub-sectors to take forward for further analysis. Examples of sub-sectors could be rice, sugar cane or other crops relevant to the country/province(s)

- The markets in these three sub-sectors will then be mapped and opportunities for PUE to improve how the market operates and improve the benefits obtained by marginalised groups will be identified. This will result in a long list of productive use applications (potentially several per sub-sector). A short-listing exercise involving other BRILHO stakeholders will then take place to determine a short list of three (3) productive uses that are taken through to a deeper analysis.

- This deeper analysis will explore:
  - the commercial, practical and social feasibility of each option;
  - the potential depth and breadth of impact from each option;
The aim of this research is to identify the most promising PUE solutions for BRILHO, considering the estimated impact potential and feasibility and viability of the analysed solutions. This will be used to support the design by SNV of the second MDF Call.

3. Methodology and Outputs
The situation with covid-19 is fluid and at the time of writing (05th Feb 2021), it looks like movement restrictions are only going to get more stringent in Mozambique. The methodology has been adapted to reflect this with remote research approaches used as much as possible. However there may still be a need to adjust the methodology as the situation evolves.

The research will utilise a combination of approaches: secondary information reviews as well as primary research including interviews with relevant stakeholders; remote investigations and, where possible, face to face interaction with stakeholders in Mozambique.

The main activities are described below in sequence.

1.1. Identification of sub-sectors:
Secondary data will be used to carry out an assessment of patterns of economic activity in the programme areas. Sources are likely to be Government reports and statistics, BRILHO programme reports and information sources from the different components of the programme, reports from other agencies, academic research. The aim will be to identify the sub-sectors that provide the significant opportunities to reach large numbers of people. Particular attention will be paid to sectors that work for women and young people.

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>A list of up to ten (10) sub-sectors that may provide opportunities for productive use in Mozambique</th>
</tr>
</thead>
<tbody>
<tr>
<td>What we need from SNV</td>
<td>Access to BRILHO reports (e.g. long provincial profiles, other background, databases, etc.)</td>
</tr>
<tr>
<td>What we need from GAIA</td>
<td>Advice on other useful sources of secondary information</td>
</tr>
</tbody>
</table>

1.2. Selection of priority sub-sectors:
The identified sub-sectors will be assessed against a set of criteria and the three with most potential will be selected. This will be based on a set of criteria agreed with BRILHO beforehand. The criteria may include:

- Number of people potentially reached by the sub-sector with the PUE solutions
- Ability of women and youth to benefit from the sub-sector with the PUE solutions
- Degree of policy support for the sub-sector
- Presence of financial incentives that may aid PUE development in sub-sector
- Presence of MFIs, cooperatives and other relevant stakeholders/potential partners
- Presence of private sector companies in the sub-sector / degree of dynamisms present
- Demand projections in the sub-sector for the PUE solutions
The selection of the 3 sub-sectors that present the highest potential for PUE solutions to add value, will be a participatory process, carried out together with members of the both SNV and Gaia.

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>The identification of three (3) sub-sectors, which provide the most significant opportunities for BRILHO, to focus the analysis on</th>
</tr>
</thead>
<tbody>
<tr>
<td>What we need from SNV</td>
<td>Agreement on assessment criteria Participation in the assessment and short-listing exercise</td>
</tr>
<tr>
<td>What we need from GAIA</td>
<td>Agreement on assessment criteria Participation in the assessment and short-listing exercise</td>
</tr>
</tbody>
</table>

1.3. Mapping of key sub-sectors

The 3 sub-sectors that have been identified will be mapped using the market mapping methodology from Practical Actions’ PMSD process\(^1\). This methodology has been used in agricultural and energy markets around the world. We will follow a process adapted for the REAL energy project in West Africa\(^2\). This involves mapping the entire market of a particular agricultural sub-sector and identifying where, in the core value chain or amongst the supporting services being provided to the market, the introduction of renewable energy would present an opportunity to improve performances.

PUE applications can improve performance and inclusion in three relevant ways:

- They can support *increased productivity* – e.g. solar powered irrigation – enabling communities to produce more efficiently and obtain increased income by selling more.
- Alternatively, they can enable rural communities to *capture/add more value*. Examples could be small scale processing that allows higher prices to be charged or refrigeration that enables storage, improves quality and enables access to more lucrative wet markets.
- Lastly, productive use applications can *remove blockages* higher up the value chain, which improve overall performance of the sub-sector and increase opportunities for everyone. Examples could be the development of cold chains or the improved access to energy for larger processors.

It is anticipated that we will identify several potential productive use applications in each sub-sector identified, resulting in a Long List of productive uses.

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\(^1\) [https://www.pmsdroadmap.org/](https://www.pmsdroadmap.org/)

\(^2\) The Renewable Energy for Agriculture and Livelihoods Project (REAL) This research project aimed at improving the livelihood of small holder farmers in Western African countries by demonstrating new models for integrating sustainable energy in agriculture value chains, which are financially viable and replicable in large scale.
For the long list of productive uses, PAC, with support from SNV and Gaia, will map potential providers of these technological solutions, particularly those present in Mozambique.

Usually this exercise would be done with a collection of stakeholders from the relevant sub-sector. It is unlikely that this option will be available. The situation with covid is unlikely to allow us to do this. As an alternative we suggest a process that includes the following:

- Secondary research to build up as detailed a picture of the relevant sub-sector as possible.
- Two hour remote session with 2-3 experts from the relevant sub-sector further building up this analysis. Within the expert group there would need to be knowledge of the overall market system for the sub-sector being looked and knowledge of potential energy applications in the sub-sector in the particular local context.
- Validation of information through follow up interviews with other informants and further secondary research, as necessary

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>Initial market maps of three sub-sectors</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>The identification of potential PUE opportunities (long list) in three sub-sectors</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What we need from SNV</th>
<th>Identification of relevant experts with knowledge from the relevant sub-sector in the BRILHO roster</th>
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</thead>
</table>

| What we need from GAIA | Identification of relevant experts with knowledge from the relevant sub-sector through their local networks Logistical support to setting up of virtual expert sessions and follow up interviews Advise on suitable sources of secondary information. Carrying out of interviews that cannot be done remotely? |

1.4. Short-listing of productive use applications

It will not be feasible to do a deep analysis on all of the productive uses on the long list, we will need to identify a smaller number of priority productive uses to take forward. We suggest 3 would be a suitable number to target.

In order to develop the short list, we will first search for further secondary information that will help us analyse each of the PUE options.

We will then run a participatory short-listing process with BRILHO and Gaia EES Consulting (and other stakeholders if required) based on an agreed set of criteria. These criteria will be developed further and agreed with BRILHO prior to the exercise but an indicative set of criteria is included below:

Potential criteria to assess short list (illustrative):

- Potential to benefit women and youth
- Presence of relevant market actors to support this form of PUE
- Number of people potentially reached
- Direct-ness of impact on target groups
• Government support
• Relevance to other parts of the BRILHO programme

1.5. Deeper analysis of productive use applications

The 3 productive use applications that make it onto the short-list will be subject to a deeper assessment of their social, economic and practical viability. This can be broken down into the following parts.

1.5.1. Business model assessment
For each productive use we will produce a write up, documenting learning, best practise and guidance to inform business model development for the three identified PUE, which will inform on the financial-economic feasibility for the PUE solutions. This will be obtained from secondary sources of information such as business model analysis for relevant PUE applications and where possible data from actual enterprises in Mozambique. It could involve some interviews with experts and business owners if feasible.

The depth of information obtained for this will be subject to what is available through these means but it is anticipated that it will include:

• energy requirements and technology specifications of the identified PUE
• learning on how a business could be structured including delivery channels to customers
• preliminary ideas on financial models (a full financial model will not be able to be developed although this could be a target for future research if conditions in the country allow it).

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>Document setting out learning and guidance on relevant business models for three PUE applications.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What we need from GAIA</td>
<td>Assistance in finding suitable examples, documents/existing studies – PUE potential in MZ and stakeholders in Mozambique to interview Logistical support in setting up interviews when necessary</td>
</tr>
</tbody>
</table>

1.5.2. Impact analysis
Information on the potential impacts of PUE applications will help BRILHO make more informed decision about future strategy. For each productive use application we will conduct a social and economic impact analysis that captures the main potential impacts on relevant target groups. We will be assessing potential impacts rather than actual impacts and as a result, conclusions will be based on a number of assumptions. The geographic focus of the impact Analysis can be determined at a later date with BRILHO. Areas that will be investigated will include:

• Incomes (local community) – changes to income, disaggregated by gender, seasonal changes as well as absolute changes, directly as a result of the productive use.
• Productivity – direct changes to agricultural or non-agricultural productivity as a result of the productive use
• Gender – changes to the status of women that result from increased access to PUE

We will also identify and attempt to quantify broader indirect impacts associated with the productive use application. For instance the improvised functioning of a part of the value chain due to the introduction of PUE may result in downstream or upstream changes. These could be positive (e.g. increased incomes in other activities) or they could be negative (e.g. people whose roles may be displaced by the new technology).

The impact analysis will require a mixture of secondary and primary research.

• Baseline: Data will be collected from BRILHO project data, other project reports, Government statistics and some primary research (e.g. farmers, local enterprises) using local researchers in order to build up as comprehensive set of baseline data from which to assess changes.
• Future impacts: Learning from similar PUE initiatives and market data (e.g. on value added) will be used to project enable potential impacts to be projected. These will be based on a number of assumptions that will be made clear.

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>Project Impact Analysis setting out expected social and economic impacts of each of three PUEs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What we need from SNV</td>
<td>Provision of relevant project information</td>
</tr>
<tr>
<td></td>
<td>Identification of suitable locations for primary research</td>
</tr>
<tr>
<td>What we need from GAIA</td>
<td>Provision of relevant project information</td>
</tr>
<tr>
<td></td>
<td>Advice on other sources of information</td>
</tr>
<tr>
<td></td>
<td>Identification of suitable locations for primary research</td>
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<tr>
<td></td>
<td>Identification and logistical management of 2-3 researchers for each site</td>
</tr>
</tbody>
</table>

1.5.3. **Market systems barriers and opportunities**

The growth and potential of productive use applications may be constrained by blockages holding up the sub-sector in which they are found. For instance: transport problems may hinder the potential expansion of local processing because they limit the quantity of produce that can reach market; a lack of access to finance may impede farmer’s investments in productive use technologies; Government policy may provide disincentives for small companies to invest.

Some of these wider ‘system constraints’ could be so significant that they will hold back the productive use applications from reaching their potential. In some situations, it may be possible to address some of the constraints through advocacy or through collaboration with others. This could potentially be justified when overturning the constraint was feasible and the impact of this, in terms of potential growth in the productive use, was significant.
To generate this information we will re-visit the market maps produced in 3.3. and deepen our analysis. This will require targeted investigation into specific issues involving secondary research and interviews with relevant stakeholders. It will look at the market at three levels:

- **Enabling environment** – the role of policies, regulations and the behaviour of formal institutions
- **Core market** – the actors in the value chain, their individual performance and the relationships between them
- **Inputs and service** – the provision of inputs and services that enable market actors to perform their function.

<table>
<thead>
<tr>
<th>Outputs from this stage</th>
<th>Market analysis of each sub-sector identifying constraints and opportunities that will influence how well the PUE progresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>What we need from BRILHO</td>
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</table>

### 4. Outputs and deliverables

The main deliverables and the timeframe for their submission is presented in the table below:

The main output will be a report documenting the findings from the activities in Section 3. Prior to the production of the report will provide and then agree a template for the report with BRILHO.

<table>
<thead>
<tr>
<th>Deliverable/outcome</th>
<th>Details</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>A list of <strong>up to ten (10) sub-sectors</strong> that may provide opportunities for productive use in Mozambique</td>
<td>Final list agreed with SNV &amp; GAIA</td>
<td>15&lt;sup&gt;th&lt;/sup&gt; March</td>
</tr>
<tr>
<td>The identification of <strong>three (3) sub-sectors</strong>, which provide the most significant opportunities for BRILHO, to focus the analysis on</td>
<td>Final list agreed with SNV &amp; GAIA</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; April</td>
</tr>
<tr>
<td>Initial market maps of 3 sub-sectors The identification of potential PUE opportunities (long PUE list) in three sub-sectors</td>
<td></td>
<td>May 10th</td>
</tr>
<tr>
<td>Short-list of (3) PUE applications</td>
<td>Agreed with SNV &amp; GAIA</td>
<td>May 24&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Presentation of preliminary findings, feedback from SNV and GAIA</td>
<td>Internal remote session</td>
<td>June 30&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>PUE study – main report inc summary &amp; databases</td>
<td>30 pages plus annexes, Word</td>
<td>July 31&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>Feedback from BRILHO</td>
<td></td>
<td>August 14th</td>
</tr>
<tr>
<td>Final report submission</td>
<td></td>
<td>August 31&lt;sup&gt;st&lt;/sup&gt;</td>
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</tbody>
</table>
5. Coordination with other BRILHO components
This work will be most successful if it is well aligned to the other parts of the BRILHO programme. In order to ensure that this is the case, PAC will participate in monthly update calls dedicated to exploring progress with the PUE study in order to ensure that the assignment is progressing in line with BRILHO expectations. The calls will also support the continuous exploration of the potential and the practicalities of collaborations with the other components’ teams and relevant external stakeholders. Bilateral calls will also take place as and when required. It is anticipated that regular communication will be required, especially when support is required form the BRILHO team.

In addition to this and, as identified in the Methodology, PAC will involve BRILHO and Gaia EES Consulting at strategic points in the research process (e.g. shortlisting of sub-sectors, shortlisting of PUE for detailed analysis).

6. Application process
Interested parties should email isabelle.nelder@practicalaction.org.uk as soon as possible with the following:

1. CV highlighting the applicants skills and experience specific to this assignment (in FCDO format)
2. Daily fee rate in GBP

Practical Action treat all applications on their merits and do not take into consideration any factors that are not relevant to the assignment such as disability, race, age, caste, religion, gender, gender reassignment or sexual orientation.

To ensure that Practical Action meets its legal obligations, appointments with the organisation will be subject to criminal screening, legal tax requirement and professional reference checks.