



Feasibility Study for the Utilization of Solar Energy for Sugarcane Irrigation Pumping by Emerging Commercial Small Cane Growers in Eswatini

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1 Introduction

Modern farming faces the dual challenge of maximising productivity while minimising environmental impact. Solar power irrigation systems (SPIS) present an innovative solution, using solar energy to water crops efficiently. This project focuses on introducing SPIS to emerging commercial small-scale cane growers in Eswatini. By adopting these systems, farmers can reduce their reliance on traditional electricity sources, lower their costs, and contribute to the national goal of cutting greenhouse gas emissions from carbon-rich imported electricity.

The report identifies local and regional solar system developers and service providers to ensure a thorough assessment. Detailed information about their services was gathered through direct engagement, with specific questions outlined in the methodology section. The methodology section also defines the criteria for assessing and comparing these service providers. This systematic approach aids in pinpointing the technology service provider that best aligns with the needs and expectations of the growers.

1.1 Objectives

The objective of this report is to leverage the gathered inputs to compare different service providers. By evaluating these service providers according to their responses, the report aims to identify the best service provider that meets the requirements of each smallholder farmer or farming community. This tailored approach ensures that the selected technology and provider are optimally suited to deliver effective and sustainable irrigation solutions.

1.2 Methodology

Data collection was undertaken by asking the service providers about their interest in participating in the assessment for SPIS via email. Once they gave a positive response, the data collection process was initiated. Following this initial contact, the local team followed up with installers via phone calls or in-person meetings to further discuss the assessment and solicit their cooperation.

Once the solution providers expressed interest, the consultant distributed questionnaires tailored to gather specific information relevant to the assessment. The types of questions asked are as follows:

1. Company information: It focuses on gathering detailed insights into the technology provider's operational scope, experience, and offerings related to solar PV installation and irrigation systems.
2. Product/ Service Information: These questions aim to ascertain whether the installer holds certifications for their solar PV systems, both in general and specifically for SPIS.
3. After-sales services: This section aims to gather information about the support services offered by the technology provider after the sale of the PV systems. These



services are crucial for ensuring the installed systems' reliability, performance, and longevity.

4. Training: This aims to understand the installer's approach to educating growers on the proper usage, maintenance, and basic repairs of the products they offer.
5. Financing: It seeks to understand the approach to facilitating payment and financing options for their products. Accessible financing solutions can significantly enhance affordability and promote the adoption of SPIS.

For evaluating the installer for SPIS the process involves the following steps:

1. Selection of Criteria: Following the interview process, the responses were analysed to identify key criteria for installer evaluation. These criteria were divided into Experience, Service, and Financial and were delineated based on the information provided by the technology providers during the interviews, ensuring that the evaluation parameters are aligned with the response obtained. The criteria and sub-criteria to evaluate the installer are as follows:
 - a. Experience: This criterion assesses the technology installer's proficiency and expertise in critical areas relevant to the implementation of SPIS.
 - i. Experience with PV system Installation: Scores range from limited experience (0-2) years to extensive experience (16+ years)
 - ii. Experience with SPIS installation: Evaluate the installer's Familiarity with installing SPIS, ranging from limited experience (0-2) years to extensive experience (16+ years)
 - iii. Geographical Location: Consider the installer's coverage area, from a limited coverage area (Specific region) to extensive coverage (national and international), assessing accessibility and reach.
 - iv. Certification: This sub-criterion determines the installer's adherence to industry standards by the number of relevant certifications obtained, ranging from none to numerous.
 - b. Services: This criterion evaluates the quality and extent of services offered by the technology installer.
 - i. Product Warranty Period: Scores range from short warranty periods (0-1 years) to exceptional warranty periods (10+ years), reflecting the duration and comprehensiveness of product warranties offered by the installer.
 - ii. Customer Support: Evaluate the level of customer support provided by the technology provider, ranging from limited support to excellent support, based on responsiveness and effectiveness in addressing customer needs.
 - iii. End of Life (EoL) Services: Considers the extent of end-of-life services offered by the technology provider, from no services provided to



- comprehensive services covering all aspects of product disposal and recycling.
- iv. Training: Assesses the training programs offered by the provider, from minimal or basic training to comprehensive training covering all aspects of system usage, maintenance, and repair.
- c. Financial: This criterion evaluates the price ranges and financing services offered by installers.
 - i. Price Range: It is categorized based on predefined criteria, ranging from “Limited Affordability” to “Competitive prices with excellent affordability”, allowing for a structured assessment of installer pricing strategies.
 - ii. Financing services: It is evaluated based on the extent of options available, ranging from “No financing services offered” to “Extensive service”, to gauge the level of flexibility and support provided to customers.
- 2. Scoring and Evaluation: Each criterion identified from the responses was assigned a scoring system ranging from 1 to 5, with 1 representing the lowest level of performance and 5 representing the highest. The responses provided by technology providers during the interviews served as the basis for scoring and evaluating their performance across the identified criteria. The following tables describe the detailed scoring for all the categories:

Table 1 - Experience Criteria scoring

Scale Scoring	Experience Criteria		
	SPIS & PV Experience	Geographical Location	Certification
1	0-2 years	Specific region Within the country	No Certification
2	3-5 years	Multiple regions within the country	Minimal (1-2)
3	6-10 years	Adequate coverage within the country	Moderate (3-4)
4	11-15 years	Entire Country	Several (5-7)
5	16+ years	National and International Coverage	Numerous (8+)



Table 2 - Service Criteria Scoring

Scale Scoring	Service Criteria			
	Product warranty period	Customer support	End-of-Life	Training
1	0-1 years	Limited (Only digital Monitoring)	No plans	Minimal (Essential information to operate the system)
2	2-4 years	Basic (Digital monitoring and Communication)	Limited plan (Providing guidance and basic instruction for disposal)	Basic training (operational instruction and Hands-on training)
3	5-7 years	Moderate (Technician support for maintenance)	Moderate plans (Detailed guidelines and some support for disposal)	Moderate (Basic training and will also include guidelines on O&M)
4	8-9 years	Good (Technician Support whenever required)	Good Plans (clear instructions, resources and services for disposal)	Good (Detailed instructions on operation, Maintenance, manual book and basic troubleshooting.
5	10+ years	Excellent (24/7 helpline and Consistent follow-up)	Excellent (Detailed instruction, Full-service pickup and recycling or disposal service)	Excellent (Encompasses all aspects of system usage, maintenance and repairs)

Table 3 - Financial Criteria Scoring

Scale Scoring	Service Criteria	
	Price Range (USD/kWp)	Financing Services
1	Limited Affordability (More than 2,000 USD)	No financing services
2	Below Average Affordability (1,500-2,000 USD)	Limited services (basic options with minimal flexibility)
3	Moderate Affordability (1,000 – 1,500 USD)	Moderate financing services (Terms are more flexible but may still have some limitations such as medium-term payment plans and loans)
4	Above average affordability (500-1,000 USD)	Good (Long-term payment plans, various loan options, possible partnerships with financial institutions)
5	Excellent Affordability (less than 500 USD)	excellent service (Long-term payment plan, multiple loan options, leasing, partnership with FI, customized financing to meet diverse customer needs.)

3. Aggregation and Ranking: The scores for each criterion were combined to derive an overall score for each installer. Appropriate weights were assigned to individual criteria based on their significance, as determined by the responses gathered during the interviews. Each installer could achieve a maximum score of five per criterion, leading to a maximum possible overall score of 15. Installers were then ranked



according to their overall scores, facilitating the selection process based on a comprehensive evaluation.



2 Technology Provider Response Profile

To obtain a comprehensive response for the selected grower from the previous project phase. The table below provides the grower’s location, yearly energy demand (kWh), area available for PV systems (ha), and approximate PV system size (kW).

Table 4 - Selected Grower's Information

Farm Number	Location	Yearly energy demand (kWh)	Area available for PV systems (ha)	Approximate PV system size (kW)
1	Mangweni	165,613	2	110-350
2	Tsambokhulu	1,142,000	10	850-1600
3	Ngcamphalala	144,650	1	95-200
4	Ngcamphalala	2,340,066	10	1500-3000
5	Manzini	181,831	3	130-420
6	MR8 Malkern	173,043	2	120-230

This information serves to provide understanding regarding the services offered by the service provider, including conditions, financial packages, and technical support tailored to the grower’s region.

2.1 Service Provider_1

This company offers various services, such as solar installation, energy audits, maintenance, monitoring, and training, under favourable conditions. Financing options are provided through banking services. The service provider extends their services to the specified locations and has technicians available in those areas. Moreover, the company commits to serving the entire region encompassing all six growers.

2.1.1 Geographical Outreach

The installers operate in Southern Africa, specifically in Eswatini and South Africa. The installer is based in Mbabane Eswatini. This indicates that the company has a substantial regional presence and can manage projects across these countries.

2.1.2 Years of Experience

The company has five years of experience in solar PV installations. The service provider has installed PV systems ranging from 3 kW to 630 kW. This suggests a moderate level of expertise and a reasonable track record in the industry. The installer has experience installing SPIS, with system sizes ranging from 36kW to 630 kW, specifically for sugarcane crops.

2.1.3 Cost Range of PV/ SPIS Systems Installed

The pricing for PV systems installed by the company ranges from 550 USD/kWp to 1.300 USD/kWp. Similarly, the cost for SPIS falls within this range. The price of SPIS also includes



after-sales service. This further underscores the company's dedication to providing comprehensive support for all its solar solutions.

2.1.4 Certifications

The installer has two certifications for installing solar PV systems. Provided by SolarEdge and Southern African Association of Electrical Contractors. However, the installer doesn't have any certifications which are more specific to SPIS.

2.1.5 Customer Support Services and End-of-Life Management

The installer provides an additional system warranty beyond the manufacturer's warranty, with a warranty period of 1 year. The installer offers remote support to monitor the functionality of the system, as well as dedicated customer support via phone or other communication methods. However, the company currently does not have any plans for the end-of-life management of installed systems. The installer does, however, promise to develop a plan for this in the future. The installer does provide technical training for their grower but has not specified which and how the training takes place.

2.1.6 Financing

The installers do offer financing services for their products. Specifically, the installer provides options for obtaining a bank loan. Regarding payment options, the company accepts bank transfers as a method of payment. The company has experience cooperating with financial institutions, including banks.

2.2 Service Provider_2

The company provides various services in the area where the six selected farms are selected. This involves the following services:

- Conducting site assessments and billing studies to determine appropriate PV size.
- Managing applications and approvals from Eswatini Electricity Company (EEC) for sites over 10 kW and Environmental Authority & Eswatini Energy Regulatory Authority (ESERA) for sites over 100 kW.
- Designing, supplying and installing solar plants.
- Obtaining sign-off and approval from EEC and ESERA.
- Providing Operation & Maintenance Service Level Agreement for financing term.
- Installing security fencing and lights.
- Offering remote monitoring of PV plants.
- Conducting training on energy efficiency and PV management.

2.2.1 Geographical Outreach

The installer was established and is based in Eswatini. The installer has a country-wide presence in Eswatini and is looking to expand its operations into other parts of Africa.



2.2.2 Years of Experience

The installer has 6 years of experience in solar PV installations, with systems ranging in size from 15 kW to 1,564 MW. The installer has extensive experience installing SPIS, particularly for the sugar cane industry with average system sizes ranging from 80 kW to 500 kW.

2.2.3 Cost Range of PV/SPIS Systems Installed

The cost range of both PV systems and SPIS is between 500 USD/kWp and 700 USD/kWp, with after-sales services included in the price.

2.2.4 Certifications

The installer holds certifications for both solar PV systems and SPIS, which include PrEng sign-off with all warranties in place.

2.2.5 Customer Support Services and End-of-Life Management

The installer offers a 12-month workmanship warranty and extends warranties under an Operation & Maintenance (O&M) contract. The installer provides a minimum of 10 years warranty on inverters, extendable to 20 years, and 25 years on solar panels. All installed systems are remotely monitored digitally. Dedicated customer support is offered via phone, WhatsApp, and Email. While there is currently no recollection plan in place, the company plans to implement one in the future.

The products have a minimum lifespan of 25 years, but with proper maintenance, they should last up to 40 years. The company provides comprehensive training to growers on how to use the product, maintain it, and make basic repairs. This offered training, is on-site and provided by a technician from the company and online or physical manual training guides.

2.2.6 Financing

The installer offers financing services for their products, including bank-approved finance, Power Purchase Agreements (PPA) for 20-25 years, and 60–72-month rentals. Payment options for their products include bank transfers and instalments. The installer has experience cooperating with financial institutions, as the installer prefers Engineering, Procurement, and Construction (EPC) installers with all banks in Eswatini.

2.3 Service Provider_3

For all six farms, the company offers the following services:

- Solar installation work: The condition is the availability and right to the site. The growers are assisted in developing a business model for financing, which commences upon approval.
- General Civil Works: The condition is the handover of the site to Service Provider_3 to begin works and the correction of technical information for correct sizing. Service Provider_3 commences work after the signature of the contract.



- Specialized Lighting Works: The condition is the request for 40% of the payment upfront.
- General Electrical Works: The condition is the payment of 60% upon submission of the completion certificate of works.

2.3.1 Geographical Outreach

The company's geographical outreach extends to the southern African region. The installer was established and is based in Eswatini.

2.3.2 Years of Experience

The installer has 6 years of experience in solar PV installations, with a size range of systems installed from 7.5 kW to 600 kW. Additionally, the company has experience installing SPIS purposes, particularly for crops such as sugarcane and bananas. However, the specific sizes of these systems have not been provided.

2.3.3 Cost Range of PV/SPIS Systems Installed

The cost range of PV systems is from 6,750 USD/kWp to 54,000 USD/kWp, and this price includes after-sales service. Similarly, SPIS's price range is from 900 USD/kWp to 1,050 USD/kWp, including after-sales service.

2.3.4 Certifications

The installer holds certification for the solar PV systems they offer, including a Certificate of Compliance and a Quality Management System certificate. For the systems used for SPIS purposes, the installer also possesses certifications, including General Electrical Works Contractor, General Civil Works Contractor, and Electrical Specialist Works Contractor.

2.3.5 Customer Support Services and End-of-Life Management

The installer offers a product warranty beyond the manufacturer's warranty, providing 5 years of warranty on workmanship. The installer also offers digital remote monitoring of installed systems if required. Dedicated customer support is available via phone, WhatsApp, and other channels. While there is currently no recollection plan in place, the company plans to implement one in the future. Growers are trained on how to use, maintain, and make basic repairs to the products by a technician from the company.

2.3.6 Financing

The installer does not offer any financing services for their products. However, the installer provides several payment options, including card payments, bank transfers, and instalments. The company has experience in cooperating with financial institutions, such as banks, and MFIs.

2.4 Service Provider_4

For all six farms, the installer offers comprehensive services from design to implementation, including supply and installation. After-sales services are provided through the O&M



Agreement to ensure maximum benefit to the end user and investor. The conditions for each project will be defined in the final purchase Agreements and O&M agreements, which will outline delivery and payment terms. The installer can provide individual prices for each installation. However, if all these projects are bundled together, Broad Reach is recommended as a financial solution for all the projects. The installer serves all specified locations and has technicians available in those areas.

2.4.1 Geographical Outreach

The installer has a regional geographical outreach within Southern Africa. In Addition to their operations in South Africa and Eswatini, their headquarters are located in Durban, South Africa but they also have a branch located in Matsapha Eswatini. The installer has completed 87 sites in Malawi and approximately 300 residential and Game Lodge plants in Zimbabwe.

2.4.2 Years of Experience

The installer has 10 years of experience in supplying and installing solar geysers. The installer expanded into Eswatini in 2019, demonstrating its commitment to the local economy over the last few years. The Installer has installed over 4.6 MW of PV systems and manages 195 sites exceeding 2.6 MW under O&M Agreements in South Africa and Eswatini.

The Eswatini projects include 76 sites, with system sizes ranging from 15 kWp to over 1.3 MWp. The installer also has experience installing SPIS. The average size of these systems varies, and the installer serves farms that focus on citrus, and sugarcane, as well as some golf courses and school fields.

2.4.3 Cost Range of PV/SPIS Systems Installed

The cost range for PV systems and SPIS installed by the company is as follows:

- A Grid-Tied ground-mount solar system is approximately 650 USD/kWp.
- A Hybrid ground mount solar system with 4 hours of battery backup is approximately 1,250 USD/kWp.

The price of the PV system and SPIS does not include after-sales service. However, the company offers O&M Contracts for 5-year periods, which are extendable at a monthly cost based on a percentage of the installation cost, escalating at a rate of 7% annually. This maintenance service is remotely monitored and implemented on-site with three teams of technicians based in Matsapha, Eswatini.

2.4.4 Certifications

The installer holds several certifications for their solar PV systems, including a PV Green card, PQRS training certification, and Solar Level 4 certifications. The company is also certified for installing SPIS. Jason Wise, the Technical Director, is a qualified plumber with experience in installing over 6,000 high-pressure heating systems, as well as multiple boreholes and water systems.



2.4.5 Customer Support Services and End-of-Life Management

The installer offers a product warranty in addition to the manufacturer's warranty. The installer keeps attic stock of panels to ensure continuity and compatibility and can swap out inverters as needed.

The warranty period for the various components is as follows:

- 25 years for PV panels
- 10 years for inverters
- 10 years of structural elements
- 10 years for all workmanship

Digital remote monitoring of the installed systems is provided as part of the comprehensive O&M Agreement maintenance regime. This agreement includes a monthly fee that covers the following services:

- A minimum of three major services per year, carried out by TRRC-trained personnel.
 - Washing the panels, especially in areas with excessive dust.
 - Conduct integrity tests, both through physical inspection and thermal imaging equipment, to ensure the integrity of all components and optimize power production.
 - Checking the area surrounding the panels for new obstructions that could cause shading.

Dedicated customer support is available via phone, WhatsApp, and other channels. While there is currently no recollection plan in place for the end of the product's lifespan, the company plans to implement such a plan in the future.

The installer enables and trains growers to use, maintain and make basic repairs to the products through multiple methods:

- Training provided by a technician by the company.
- Online or physical manual training guides.

Additionally, The installer hands over the technical information in a "close-out" package during the training at the final acceptance of the installed system.

2.4.6 Financing

The company offers various financing services for their products, including outright purchase, rent-to-own options over 5 or 10-year periods, cash flow neutral rent-to-own, and financed Power Purchase Agreement (PPA) over various periods (maximum 10 years) with costs based on the system size.

For payment options, the company accepts:

- Bank transfer
- Instalments



Payment is scheduled against milestones in the project program. The company has experience cooperating with financial institutions, having had projects financed by FNB and Nedbank locally. The installer also has a relationship with BroadReach, which is an independent utility solutions provider with a focus on green energy and sustainable solutions. BroadReach, headquartered in Cape Town, South Africa, finances energy solutions across Southern Africa. By 2023, BroadReach funded and developed a portfolio of over 130 projects, totalling more than 25 MWp.

2.5 Service Provider_5

The installer can provide SPIS for all the farmers without specifying any particular conditions for implementing the system. The service provider serves all farming regions. However, technicians are only available in the Malkerns region.

2.5.1 Geographical Outreach

Their geographical outreach includes Southern Africa and International locations. The installer is established in Pretoria South Africa; However, the installer does have a base in Matsapha, Eswatini.

2.5.2 Years of Experience

The installer has 5 years of experience in Solar PV installations. The service provider has installed PV systems with a size range of up to a maximum of 21 MW. They do not have experience installing SPIS.

2.5.3 Cost Range of PV/SPIS Systems Installed

The cost range of the PV system is 76.90 USD/kWp. The price of the PV system does not include after-sales services. They do not have experience with SPIS, so there is no price range available for these systems.

2.5.4 Certification

The company has certifications for the solar PV systems they offer, including a PV Green Card, Licensed Technicians, and membership in the South African Photovoltaic Industry Association (SAPVIA). However, they do not have any certifications for SPIS.

2.5.5 Customer Support Services and End-of-Life Management

The company does not offer any product warranty apart from the manufacturer's warranty but guarantees their workmanship for one calendar year from the date of installation completion. The system warranty provided is for one year (12 months). The installer offers digital remote monitoring of the systems they install. Dedicated customer support is available via phone, WhatsApp, and other communication methods.

There is no recollection plan once the product's life span ends, but the installer plans to implement one in the future. Training for growers on how to use, maintain, and make basic repairs to the product is provided by a technician from the company.



2.5.6 Financing

Financing services for their products are available, and the installer can arrange financing options for growers. Payment options include bank transfers. The installer has experience cooperating with financial institutions and working with banks to secure financing and refinancing for their growers.

2.6 Service Provider_6

The company is based in Germany and specializes in providing customized, sustainable energy solutions, including solar installations and off-grid systems.

2.6.1 Geographical Outreach

This service provider is located in Augsburg Germany. The installer has an extensive international geographical outreach, having served numerous counties in Sub-Saharan Africa, including Eswatini. Additionally, their services extend to regions such as Germany Denmark, Poland, Mongolia, and Indonesia.

2.6.2 Years of Experience

With 30 years of experience in the installation of PV and SPIS systems, the installer handles systems ranging from 100 Wp to 150 kWp. Notably, they have installed a 70.5 kWp off-grid system in Eswatini under the United Nations International Children's Emergency Fund (UNICEF). This project resulted in a fully autonomous solar generation unit with energy storage based on lithium batteries, designed to provide clean and reliable energy for non-grid areas.

2.6.3 Cost Range of PV/SPIS Systems Installed

The installer offers customized sizing based on the requirement, with prices varying according to system size and location. According to an interview response, the estimated cost for growers is between 3-4 USD per kWp.

2.6.4 Certification

The installers hold globally recognized ISO 9001 and ISO 14001 certifications, demonstrating their commitment to quality management and environmental sustainability.

2.6.5 Customer Support Service and End-of-Life Management

Service contracts offered by the installer include inception reports, installation, and maintenance. Contract durations depend on the system size, with a minimum period of five years, adjustable according to system size. Site maintenance is provided twice a year, with on-call service available within 48 hours.

Components are sourced from Chinese and European suppliers, with shipment to Eswatini taking 4-5 weeks. Although there is currently no End-of-Life management plan, the installer intends to implement one in the future. Additionally, they provide training to growers, conducted by company technicians.



2.6.6 Financing

Preferred payment methods include bank transfers and instalments. The installer has experience working with international financial institutions such as the United Nations Development Programme (UNDP), the Food and Agriculture Organization of the United Nations (FAO), and the United Nations High Commissioner for Refugees (UNHCR).



3 Comparative assessment

As mentioned in the methodology section. The comparative assessment was conducted analysing three key criteria.

Service Provider_6 has extensive experience in PV and SPIS projects, with significant geographical outreach and a business model oriented to larger-scale projects in the context of development cooperation. This company is based outside the South African region and even though they have experience with solar irrigation and have implemented projects in Eswatini, they have not yet implemented SPIS in this country.

Due to their focus on large-scale development cooperation projects, they are not a perfect fit for the specific criteria of this assessment, which prioritizes local presence and developers that already are established in Eswatini and have already sold SPIS. Therefore, this installer will be excluded from the comparative assessment, as they excel in a different scale and scope of work. They remain a relevant choice for large-scale programmes or initiatives.

This section will dive deep into the requirements for

3.1 Experience

The Experience criteria evaluate the capabilities and history of the installers in handling SPIS and Solar PV projects. This includes their overall experience, geographical outreach and relevant certifications. Below is a detailed assessment of each installer based on these sub-categories:

3.1.1 Service Provider_1

From the information about the installer described in Chapter 2, the sub-categories are scaled. The installer has 5 years of experience in solar PV systems and has limited experience in SPIS thus scoring 2 out of 5 and 1 out of 5 respectively. Geographically, the installer scored 4 out of 5, as the installer operates widely across southern Africa ensuring broad coverage and effective service delivery. For certification, the installer scores a 2 out of 5, which suggests they may lack some recognized industry qualifications, which could affect their reliability and trustworthiness.

Table 5 - Service Provider_1 Experience Scale

Criteria	Experience Scale				
	1	2	3	4	5
Experience with PV system installation					
Experience with the installation of SPIS					
Geographical outreach					
Certification					

3.1.2 Service Provider_2

This installer has moderate experience with solar PV installations, earning a score of 3 out of 5, which indicates a fair number of completed projects but no extensive experience. Their SPIS system experience is very limited, scoring 1 out of 5. This lack of experience might make



them a less optimal choice for SPIS-specific projects. While they have a strong geographical reach (4 out of 5), their 2 out of 5 certification score suggests that they only meet basic industry standards.

Table 6 - Service Provider_2 Experience Scale

Criteria	Experience Scale				
	1	2	3	4	5
Experience with PV system installation					
Experience with the installation of SPIS					
Geographical outreach					
Certification					

3.1.3 Service Provider_3

The installer shows a solid performance in PV system experience with a score of 3 out of 5, indicating a reasonable number of successful projects. However, their SPIS system experience is minimal, scoring 1 out of 5, which could be a drawback for projects requiring expertise in SPIS. Their geographical reach is excellent, with a perfect score of 5 out of 5, making them well-suited for projects across a wide area. Their certification score of 4 out of 5 reflects a strong commitment to industry standards.

Table 7 - Service Provider_3 Experience Scale

Criteria	Experience Scale				
	1	2	3	4	5
Experience with PV system installation					
Experience with the installation of SPIS					
Geographical outreach					
Certification					

3.1.4 Service Provider_4

This installer has a well-established track record in solar PV installations, scoring 4 out of 5, and a solid experience with SPIS systems, scoring 3 out of 5. This makes them a strong contender for projects with SPIS expertise. Their wide geographical reach, scoring 5 out of 5, and comprehensive set of certifications (3 out of 5) further enhance their profile as a reliable and capable installer, suitable for a variety of projects.

Table 8 - Service Provider_4 Experience Scale

Criteria	Experience Scale				
	1	2	3	4	5
Experience with PV system installation					
Experience with the installation of SPIS					
Geographical outreach					
Certification					

3.1.5 Service Provider_5

This installer has moderate experience with solar PV installations, scoring 2 out of 5, indicating a limited number of projects handled. Their experience with SPIS is very low, with a score of 1 out of 5, which could be a significant disadvantage for SPIS-related projects. Despite having an excellent geographical reach (5 out of 5), their 2 out of 5 certification score suggests they

only meet the minimum industry standards. This could impact their suitability for more complex or large-scale projects.

Table 9 - Service Provider_5 Experience Scale

Criteria	Scale				
	1	2	3	4	5
Experience with PV system installation					
Experience with the installation of SPIS					
Geographical outreach					
Certification					

3.1.6 Comparison of Service Providers

Service Provider_4 stands out with high scores across all sub-categories, making them a strong candidate for both PV and SPIS projects. Both Service Provider_2 and Service Provider_3 perform well in PV system experience and geographical reach, though their limited SPIS expertise could be a concern. Service Provider_1 and Service Provider_5 have moderate to low experience, particularly in SPIS systems, which may limit their suitability for projects requiring specialised SPIS knowledge and skills.

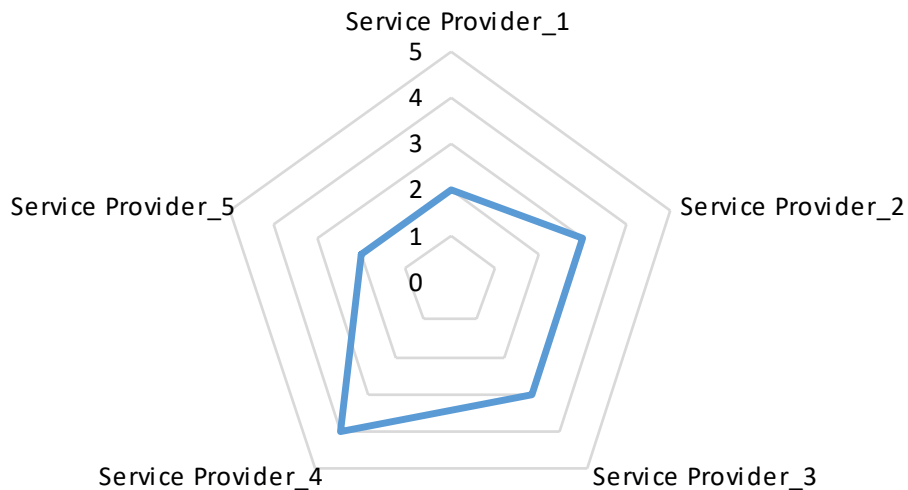


Figure 1 - Experience scale of all service providers

3.2 Services

The service criteria assess the support and warranty services provided by the installers, including the length of the product warranty, availability of customer support, training provided to growers, and end-of-life for the systems installed.

3.2.1 Service Provider_1

The installer scores low in the product warranty period with a score of 1 out of 5, indicating that they provide minimal warranty coverage, which may not instil confidence in the longevity and reliability of their installations. Their customer support is also limited, scoring 2 out of 5, suggesting that growers might face challenges in receiving timely and effective support.



Table 10 - Service Provider_1 Service Scale

Criteria	Service Scale				
	1	2	3	4	5
Product Warranty period					
Customer support					
End-of-Life					
Training					

The installer provides basic training for end users, scoring 2 out of 5. For end-of-life services, with a score of 1 out of 5, they are going to have a plan for handling systems at the end of their lifespan, aiding growers in managing disposal more efficiently.

3.2.2 Service Provider_2

They offer a moderate product warranty period, scoring 3 out of 5, which provides a reasonable level of assurance for many projects. Their customer support scores 2 out of 5, suggesting there is potential to enhance grower’s satisfaction and system performance over time. They provide minimal training (2 out of 5), highlighting an opportunity to better equip growers with maintenance and repair skills, the installer scores low in end-of-life services (1 out of 5), they are in the process of developing a plan to implement sustainable practices for system disposal or recycling.

Table 11 - Service Provider_2 Service Scale

Criteria	Service Scale				
	1	2	3	4	5
Product Warranty period					
Customer support					
End-of-Life					
Training					

3.2.3 Service Provider_3

Service Provider_3 provides a moderate product warranty period, scoring 2 out of 5, indicating some level of coverage, though it may not be extensive enough for longer-term assurance. Their customer support is also limited, with a score of 2 out of 5, suggesting there is room for improvement to enhance grower satisfaction. They offer slightly better training services, scoring 2 out of 5, which could be beneficial for growers in managing basic system functions. Additionally, they are in the process of developing a plan for end-of-life support, scoring 1 out of 5, indicating a commitment to addressing system disposal or recycling at the end of their lifespan.

Table 12 - Service Provider_3 Service Scale

Criteria	Scale				
	1	2	3	4	5
Product Warranty period					
Customer support					
End-of-Life					
Training					



3.2.4 Service Provider_4

This installer excels in providing services, scoring 4 out of 5 for the product warranty period, indicating robust and long-term coverage. Their highly rated customer support, scoring 4 out of 5, suggests strong and responsive growers' assistance. They also provide good training services, scoring 3 out of 5, which helps growers maintain and manage the systems effectively. However, like other installers, they are currently developing end-of-life services (1 out of 5). Indicating their intention to implement plans for system disposal or recycling in the future.

Table 13 - Service Provider_4 Service Scale

Criteria	Scale				
	1	2	3	4	5
Product Warranty period					
Customer support					
End-of-Life					
Training					

3.2.5 Service Provider_5

Service Provider_5 offers a basic product warranty, scoring 1 out of 5, which lays a foundation for system durability. Their customer support is moderate, with a score of 2 out of 5, indicating they provide decent grower assistance. They offer some training, scoring 2 out of 5, which supports growers in basic system management. Like other installers, they are yet to introduce end-of-life services (1 out of 5), suggesting they are planning for future systems disposal or recycling initiatives.

Table 14 - Service Provider_5 Service Scale

Criteria	Scale				
	1	2	3	4	5
Product Warranty period					
Customer support					
End-of-Life					
Training					

3.2.6 Comparison of Service Providers

Service Provider_4 stands out as the best performer in the service criteria, offering an excellent product warranty, customer support, and training services, though the installer, like other installers, is planning to improve their end-of-life services. Service Provider_3, Service Provider_2, and Service Provider_5 offer moderate services but have significant warranty periods, customer support, and training gaps. Service Provider_1 offers room for improvement in their services, presenting an opportunity for enhancement across all sub-categories.

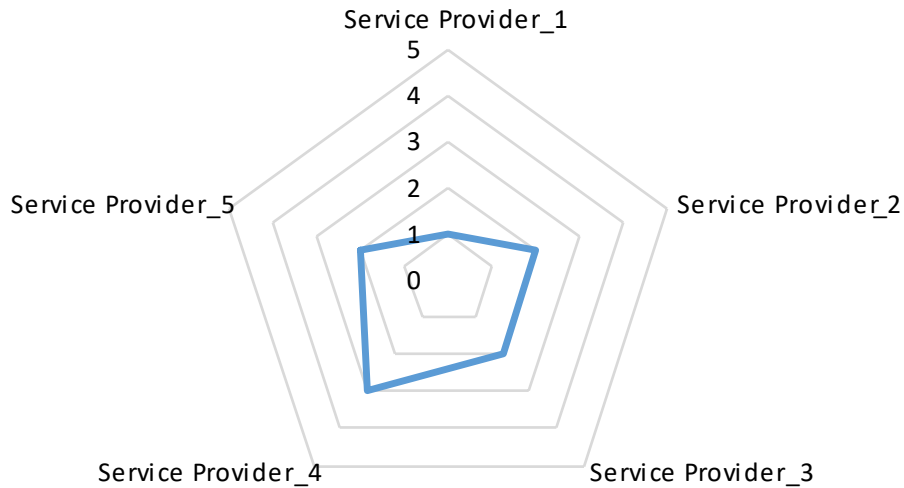


Figure 2 - Service Scale of all service providers

3.3 Financial

The financial criteria assess the cost-effectiveness and availability of financing services provided by the installers. This includes the price range of the PV systems and the options for financing the installations.

3.3.1 Service Provider_1

The installer scores moderately on the price range, with a score of 3 out of 5. This suggests that their pricing is competitive and reasonably cost-effective. Their financing services also receive a moderate score of 2 out of 5, indicating that they offer some financing options that may meet many growers' needs.

Table 15 - Service Provider_1 Financial Scale

Criteria	Financial Scale				
	1	2	3	4	5
Price Range					
Financing Services					

3.3.2 Service Provider_2

The installer performs well in terms of price range, scoring 4 out of 5, indicating that their pricing is likely competitive and cost-effective, providing good value for growers. They also have a better score for financing service, at 3 out of 5, suggesting they offer more diverse and flexible financing options.

Table 16 - Service Provider_2 Financial Scale

Criteria	Financial Scale				
	1	2	3	4	5
Price Range					
Financing Services					



3.3.3 Service Provider_3

The installer scores well in the price range criteria, achieving 4 out of 5, indicating competitive pricing that aligns with market rates. However, their financing service is 1 out of 5, highlighting a significant opportunity to expand their financing options to better support growers needing financial assistance.

Table 17 - Service Provider_3 Financial Scale

Criteria	Financial Scale				
	1	2	3	4	5
Price Range					
Financing Services					

3.3.4 Service Provider_4

The installer has a moderate price range score of 3 out of 5 reflecting a balanced approach that combines affordability with quality. However, they provide a good balance of cost and quality. Their financing services are also rated moderately, with a score of 3 out of 5, indicating that they offer reasonable financing options that cater to various growers’ financial needs.

Table 18 - Service Provider_4 Financial Scale

Criteria	Financial Scale				
	1	2	3	4	5
Price Range					
Financing Services					

3.3.5 Service Provider_5

The installer has an excellent price range, scoring 5 out of 5, which suggests they offer the most competitive and cost-effective pricing among the assessed installers. Their financing services score 2 out of 5, showing that while they have some financing options available, their primary strength lies in their attractive pricing.

Table 19 - Service Provider_5 financial Scale

Criteria	Financial Scale				
	1	2	3	4	5
Price Range					
Financing Services					

3.3.6 Comparison of Service Providers

Service Provider_5 stands out for offering the most competitive pricing, making them an excellent choice for growers primarily concerned with cost. Their pricing strength is a major advantage for budget-conscious growers. Service Provider_4 and Service Provider_2 offer a good balance between cost and financing flexibility, making them strong contenders for growers looking for both affordability and reasonable financing support. Service Provider_3, despite the limited financing options this installer is well-suited for growers due to their competitive price range. Service Provider_1. Offers moderate pricing and limited financing options, which can suit growers looking for a balanced approach.

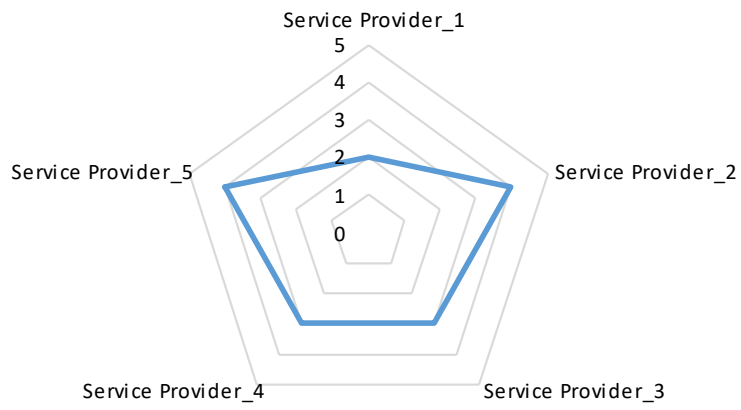


Figure 3 - Financial scale of all service providers

4 Overall Comparative

This radar graph compares five solar service providers, across three evaluation criteria: Experience, service and Financial.

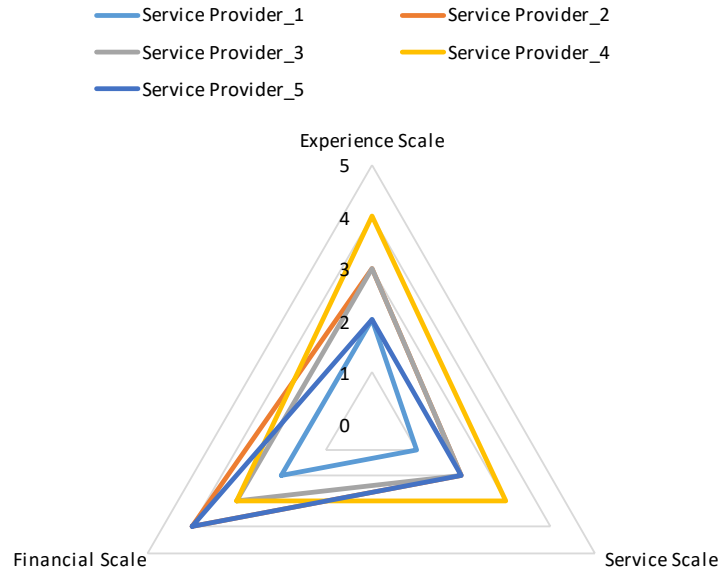


Figure 4 - Overall scale of all service providers

This balanced performance indicates that Service Provider_4 has substantial experience in both PV and SPIS systems, ensuring they have the expertise to handle complex projects. Their service quality is above average, suggesting they offer reliable customer support, adequate product warranty, and effective training. Financially, they are robust, providing a fair price range and financing options, making them an accessible choice for growers. Service Provider_2 with commendable proficiency in PV and SPIS installation, while their service offerings present an opportunity for improvement, the installer’s competitive pricing and flexible financing options make them an attractive choice for budget-conscious growers.

Service Provider_3 performs moderately to well in all three criteria, showcasing a well-balanced service provider for a grower. Their consistent performance in experience, service quality, and financial criteria highlight their reliability and adaptability, making them a dependable choice for growers. Service Provider_1 and Service Provider_5 each possess notable strengths. Service Provider_5, for instance, stands out for its financial prowess, while Service Provider_1 displays promising capabilities in various aspects. However, there is room for enhancement, particularly in accumulating more experience and refining service quality to further bolster their overall performance.



5 Summary

5.1 Conclusion

The figure below illustrates the overall scores of all service providers based on the defined scaling criteria. The maximum combined score a service provider can achieve is 15.

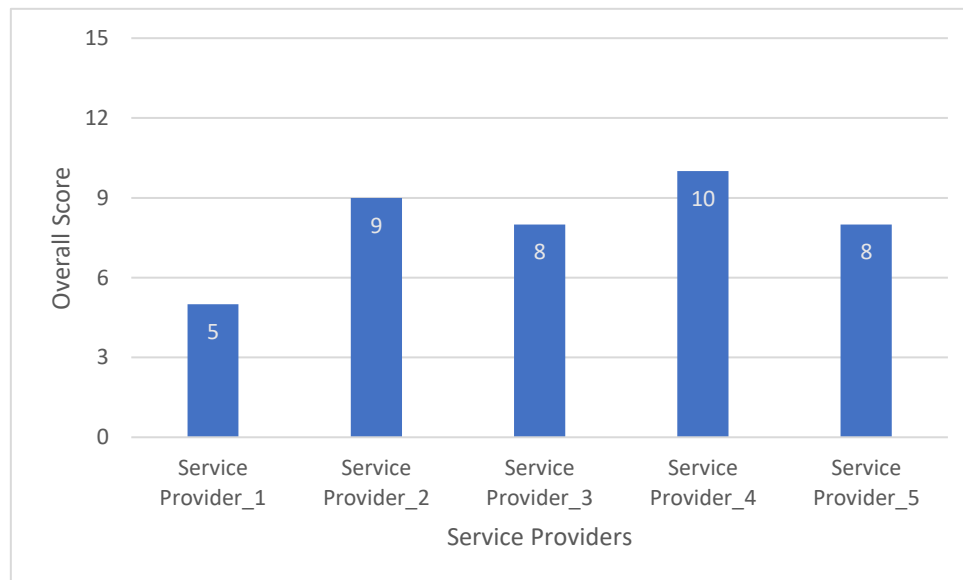


Figure 5 - Overall Combine Score of all Service providers

1. Service Provider_4: Experienced in PV and SPIS systems, Offers reliable customer support, product warranties, effective training, fair pricing and flexible financing options.
 2. Service Provider_2: Experienced in PV and SPIS systems, competitive pricing, and flexible financing.
 3. Service Provider_3: The installer is a well-balanced service provider, performing well in all three criteria: experience, service quality, and financial options.
 4. Service Provider_5: Excels in financial terms, the potential for growth and development in service quality, and Experience in PV installation.
 5. Service Provider_1: Displays promising capabilities in various aspects. There is room for enhancement, indicating potential for growth and improvement.
- Suitable Technologies- The installers offer a range of advanced technical components, including:
 - GROWATT Inverters: Known for high efficiency and smart monitoring features. The company's headquarters and manufacturing are located in China. The holds more than 20 certifications worldwide. The company has BISNODE AAA certification, which indicates the financial stability and business reliability of the company based on a continuously measured and proven system developed by international experts.



- LONGi Hi-Mo 5m Solar Modules (415 W): Highly efficient, suitable for residential, commercial, and industrial applications. The company's headquarters and manufacturing are located in China. The company holds certificates such as the China Quality Certification Centre (CQC) indicating that the company can now implement PV module certification tests based on the international standards of IEC 61215 and IEC 61730.
- Service Provider_3's Mono Perc SOL-73L9 (445-455 W): Provides a 25-year linear power output warranty. The company's headquarters is located in Mbabane Eswatini.
- Services Provided - The installers offer moderate service across all grower's regions, such as:
 - A minimum of 12 months of workmanship warranty.
 - Maintenance service provided one or two times a year.
 - Basic training for clients to help with the operation and basic maintenance of the system.
- Financing Options - The installers provide competitive financial solutions tailored to grower's needs, including:
 - Customized financial options such as Power Purchase Agreements, rent-to-won, and leasing.
 - Preferred payment methods are bank transfers or instalments.
 - The service provider_4 has a tie-up with BroadReach an independent utility solution provider located in Cape Town South Africa but provides finance energy solutions across Southern Africa

It is important to note that none of the service providers offers end-of-life service for their products, which could be a significant consideration for long-term sustainability.

5.2 Preferred Service Providers

- Therefore, based on a comprehensive evaluation, Service Provider_4 is the preferred installer due to their strong and balanced capabilities across experience, service, and financial criteria, making them reliable and well-rounded for both PV and SPIS projects.
- Service Provider_2 is the second preference, offering solid expertise, experience with ECC and ESERA and financial flexibility, with room for service improvements. Service Provider_3 is positioned as the third preference due to its moderate experience, service and financing options.
- While there is potential for improvement compared to higher-ranked providers, the installer still offers a reliable choice for growers. Service Provider_5 remains the fourth preference, noted for its moderate experience and excellent price ranges, with opportunities for growth and development.
- Finally, Service Provider_1 provides quality services and a financing range, but with further room for improvement compared to other service providers.



- Regarding Service Provider_6, this service provider has an extensive experience providing sustainable energy solutions in Africa (including on-grid, off grid, hybrid and solar irrigation systems) under the scope of international development cooperation projects. The expertise of this technology provider should be considered in the event of an international development cooperation programme aimed at a large-scale deployment of SPIS throughout the country.



Annexes

Annex 1. Service Provider Assessment Questionnaire

As part of this assignment, MicroEnergy International will conduct the identification of relevant technology and service providers involved in solar system development in Eswatini.

1. General data	
Name of the supplier	
Name of the respondent	
Position	
Date	
Time	
Mode of interview (in person, phone call)	

2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [] 2. Country-wide [] 3. International []	
2	How many years of experience do you have in Solar PV installations?	Specify	
3	Size range of PV systems installed (kWp)	Specify	
4	Cost range of PV systems installed. (USD/kWp)		
5	Does the price of the PV system include after-sales service?	1. Yes [] 2. No []	
6	Do you have experience installing solar systems for pumping/ irrigation?	1. Yes [] 2. No []	



	<i>If yes, please ask about the average size of the solar systems and the type of crops they serve</i>		
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	
8	Does the price include after-sales service		
3. Product/Service Information			
#	Question	Options	Notes/further details
9	Do you have any certifications for the solar PV systems you offer? If yes, specify which certifications <i>This questions refers for solar PV systems in general</i>	1. Yes (Specify) [] 2. No []	
10	If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer? If yes, specify which certifications <i>This questions refers for solar PV systems for pumping or irrigation purposes</i>	1. Yes (Specify) [] 2. No []	
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	1. Yes [] 2. No []	
12	How many years of warranty do you provide for the system?		
13	Do you offer any digital remote monitoring of the systems you install?	1. Yes [] 2. No []	



14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	1. Yes [] 2. No []	
15	Is there any recollection plan once the product's life span ends?	1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection) 2. No recollection plan [] 3. No recollection plan, but we plan on doing so in the future. []	
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	1. Yes, provided by a technician from your company [] 2. Yes, provided via online/physical manual training guide 3. No []	
6. Financing			
#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	1. Yes (specify) [] 2. No []	
18	Which payment options do you offer for your products?	1. Cash [] 2. Mobile money [] 3. Card payment [] 4. Bank transfer [] 5. Instalments [] 6. Other []	
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [] No []	



20. For the six grid-connected sugarcane farms below located in Eswatini:

Farm Number	Location	Yearly energy demand (kWh)	Area available for PV systems (ha)	Approximate PV system size (kW)
1	Mangweni	165,613	2	110-350
2	Tsambokhulu	1,142,000	10	850-1600
3	Ngcamphalala	144,650	1	95-200
4	Ngcamphalala	2,340,066	10	1500-3000
5	Manzini	181,831	3	130-420
6	MR8 Malkern	173,043	2	120-230

Provide the following data:

Farm Number	Services that you offer	Conditions	Financing plans	Do you serve those specific locations? – (yes/no)	Do you have technicians in the area? – (yes/no)
1					
2					
3					
4					
5					
6					

21. Please provide any materials, products or service catalogues that you can share with us



Annex 2. Service Provider Responses & Provided Materials

5.2.1 Service Provider_1

1. General data			
Date	15/04/2024		
Time	1200hrs		
Mode of interview (in person, phone call)	Phone Call		
2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [<input type="checkbox"/>] 2. Country-wide [<input checked="" type="checkbox"/>] 3. International [<input type="checkbox"/>]	Eswatini and South Africa
2	How many years of experience you have in Solar PV installations?	Specify	5years
3	Size range of PV systems installed (kWp)	Specify	From 3kW – 630kW
4	Cost range of PV systems installed. (USD/kWp)		550USD/kW – 1300USD/kW
5	Does the price of the PV system include after-sales service?	1. Yes [<input checked="" type="checkbox"/>] 2. No [<input type="checkbox"/>]	
6	Do you have experience installing solar systems for pumping/ irrigation? <i>If yes, please ask the average size of the solar systems and the type of crops they serve</i>	1. Yes [<input checked="" type="checkbox"/>] 2. No [<input type="checkbox"/>]	36kW-630kW for sugarcane
7	If 6 is yes, what is the range of prices for the solar irrigation	Specify	550USD/kW – 1300USD/kW



	systems you offer (USD/kwp)?		
8	Does the price include after sales service		Yes

3. Product/Service Information			
#	Question	Options	Notes/further details
9	<p>Do you have any certifications for the solar PV systems you offer?</p> <p>If yes, specify which certifications</p> <p><i>This question refers for solar PV systems in general</i></p>	<p>1. Yes (Specify) [v]</p> <p>2. No []</p>	By Solar edge and South African Association of Electrical Contractors
10	<p>If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer?</p> <p>If yes, specify which certifications</p> <p><i>This question refers for solar PV systems for pumping or irrigation purposes</i></p>	<p>1. Yes (Specify) []</p> <p>2. No [v]</p>	
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	<p>1. Yes [v]</p> <p>2. No []</p>	System Warranty
12	How many years of warranty do you provide for the system?		1 year



13	Do you offer any digital remote monitoring of the systems you install?	1. Yes [v] 2. No []	
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	1. Yes [v] 2. No []	
15	Is there any recollection plan once the product's life span ends?	1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection) 2. No recollection plan [] 3. No recollection plan, but we plan on doing so in the future. [v]	
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	1. Yes, provided by a technician from your company [v] 2. Yes, provided via online/physical manual training guide 3. No []	
6. Financing			
#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	1. Yes (specify) [v] 2. No []	Bank Loan



18	Which payment options do you offer for your products?	1. Cash [] 2. Mobile money [] 3. Card payment [] 4. Bank transfer [✓] 5. Instalments [] 6. Other []	
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [✓] No []	Bank

20. For the six grid-connected sugarcane farms below located in Eswatini:

Farm Number	Services that you offer	Conditions	Financing plans	Do you serve those specific locations? – (yes/no)	Do you have technicians in the area? – (yes/no)
1	Solar Installation	Good	Banking	Yes	Yes
2	Energy Audit	Good	Banking	Yes	Yes
3	Maintenance	Good	Banking	Yes	Yes
4	Monitoring	Good	Banking	Yes	Yes
5	Training	Good	Banking	Yes	Yes
6					



5.2.2 Service Provider_2

1. General data			
Date	15 April 2024		
Time	2.50 Pm		
Mode of interview (in person, phone call)	Phone Call		
2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [] 2. Country-wide [Y] 3. International []	Currently Eswatini, Country wide but looking at expanding into Africa
2	How many years of experience do you have in Solar PV installations?	Specify	6 Years
3	Size range of PV systems installed (kWp)	Specify	15Kw – 1.564MW
4	Cost range of PV systems installed. (USD/kWp)		500USD/Kwp- 700 USD/Kwp
5	Does the price of the PV system include after-sales service?	1. Yes [Y] 2. No []	Yes, it does
6	Do you have experience installing solar systems for pumping/ irrigation? <i>If yes, please ask about the average size of the solar systems and the type of crops they serve</i>	1. Yes [Y] 2. No []	Yes , 95% of the 8 +Megawatt we have installed in country is for the Sugar Cane industry for pumping needs Average sizes of 80Kw to 500Kw
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	500USD/Kwp- 700 USD/Kwp
8	Does the price include after-sales service		Yes



3. Product/Service Information			
#	Question	Options	Notes/further details
9	<p>Do you have any certifications for the solar PV systems you offer?</p> <p>If yes, specify which certifications</p> <p><i>This question refers to solar PV systems in general</i></p>	<p>1. Yes (Specify) [Y]</p> <p>2. No []</p>	PrEng Sign off with all warranties in Place
10	<p>If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer?</p> <p>If yes, specify which certifications</p> <p><i>This question refers to solar PV systems for pumping or irrigation purposes</i></p>	<p>1. Yes (Specify) [Y]</p> <p>2. No []</p>	PrEng Sign off with all warranties in Place
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	<p>1. Yes [Y]</p> <p>2. No []</p>	12 Month Workmanship and extended warranties under O & M contract
12	How many years of warranty do you provide for the system?		Minimum 10 Year on Inverters extendable to 20yrs , 25 on Solar Panels
13	Do you offer any digital remote monitoring of the systems you install?	<p>1. Yes Y[]</p> <p>2. No []</p>	All sites are monitored remotely
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	<p>1. Yes [Y]</p> <p>2. No []</p>	Yes , whats App , Email and through APP



15	Is there any recollection plan once the product's life span ends?	<p>1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection)</p> <p>2. No recollection plan []</p> <p>3. No recollection plan, but we plan on doing so in the future. [Y]</p>	Products have a minimum 25 year life span but with correct maintenance should last 40 years
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	<p>1. Yes, provided by a technician from your company [Y]</p> <p>2. Yes, provided via online/physical manual training guide Yes</p> <p>3. No []</p>	Yes on Options 1 & 2 , we have a comprehensive training program in place
6. Financing			
#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	<p>1. Yes (specify) [Y]</p> <p>2. No []</p>	Bank Approved finance, PPA 20-25years, 60-72 Month Rentals
18	Which payment options do you offer for your products?	<p>1. Cash []</p> <p>2. Mobile money []</p> <p>3. Card payment []</p> <p>4. Bank transfer [Y]</p> <p>5. Installments [Y]</p> <p>6. Other []</p>	Bank Transfers only



19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [Y] No []	We are a Preferred EPC installer with all Banks in Eswatini
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20. For the six grid-connected sugarcane farms below located in Eswatini:

Farm Number	Services that you offer	Conditions	Financing plans	Do you serve those specific locations? – (yes/no)	Do you have technicians in the area? – (yes/no)
1	Full Turn Key	Due diligence on each site	Client Own Bank financed	Yes	yes
2	Full Turn Key	Due diligence on each site	Client Own Bank financed	yes	yes
3	Full Turn Key	Due diligence on each site	Client Own Bank financed	yes	yes
4	Full Turn Key	Due diligence on each site	Client Own Bank financed	yes	yes
5	Full Turn Key	Due diligence on each site	Client Own Bank financed	yes	yes
6	Full Turn Key	Due diligence on each site	Rent to own	yes	yes



5.2.3 Service Provider_3

1. General data			
Date	22 APRIL 2024		
Time	0900 HOURS		
Mode of interview (in person, phone call)	IN-PERSON		
2. Company Information			
#	Question	Options	Notes/further
1	What is your geographical outreach?	1. Regional (Southern Africa) []	SOUTHERN AFRICA
2	How many years of experience you have in Solar PV installations?	Specify	6 YEARS EXPERIENCE
3	Size range of PV systems installed (kWp)	Specify	7.5KW-600KW
4	Cost range of PV systems installed. (USD/kWp)		6750USD-54000USD
5	Does the price of the PV system include after sales service?	1. Yes [] 2. No []	YES
6	Do you have experience installing solar systems for pumping/irrigation? <i>If yes, please ask the average size of the solar systems and the type of crops they serve</i>	1. Yes [] 2. No []	YES SUGARCANE, BANANA
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	900 USD-1050 USD/KWP
8	Does the price include after sales service		YES



3. Product/Service Information			
#	Question	Options	Notes/further details
9	Do you have any certifications for the solar PV systems you offer? If yes, specify which certifications <i>This question refers for solar PV systems in general</i>	1. Yes (Specify) [] 2. No []	YES Certificate of Compliance Quality Management system certificate
10	If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer? If yes, specify which certifications <i>This question refers for solar PV systems for pumping or irrigation purposes</i>	1. Yes (Specify) [] 2. No []	YES General Electrical Works Contractor General Civil Works Contractor Electrical Specialist Works
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	1. Yes [] 2. No []	YES
12	How many years of warranty do you provide for the system?		5 YEARS ON WORKMANSHIP
13	Do you offer any digital remote monitoring of the systems you install?	1. Yes [] 2. No []	YES, IF REQUIRED
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	1. Yes [] 2. No []	YES
15	Is there any recollection plan once the product's life span ends?	1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection) 2. No recollection plan [] 3. No recollection plan, but we plan on doing so in the future. []	1.NO RECOLLECTION PLANS, BUT WE PLAN ON DOING SO IN FUTURE. 2.WE PLAN ON REVISING SOLAR PANELS FOR SMALL SYSTEMS AND FLOOD LIGHTS
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	1. Yes, provided by a technician from your company [] 2. Yes, provided via online/physical manual training guide 3. No []	WE TRAIN CLIENTS BY A TECHNICIAN FROM OUR COMPANY ON HOW TO USE PRODUCTS
6. Financing			
#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	1. Yes (specify) [] 2. No []	NO
18	Which payment options do you offer for your products?	1. Cash [] 2. Mobile money [] 3. Card payment [] 4. Bank transfer [] 5. Instalments []	1. CARD PAYMENT 2. BANK TRANSFER 3. INSTALMENTS



		6. Other []	
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [] No []	YES

20. For the six grid-connected sugarcane farms below located in Eswatini:

	Services that you offer	Condition Conditions	Financing plans	Do you serve those specific locations? - (yes/no)	Do you have technicians in the area? - (yes/no)
1	Solar installations work	Availability and right to site.	Client is assisted to develop business model to finance and upon approval.	YES	COUNTRY-WIDE
2	General Civil Works	Site handover to the Company to begin works and correct technical information for correct sizing	Service the company commences work after the contract signature.		
3	Specialized Lighting Works		40% is requested upfront.		
4	General Electrical Works		60% is paid upon submitting of the final completion certificate of works		
5					
6					



5.2.4 Service Provider_4

1. General data			
Date	22 April 2024		
Time	14h40		
Mode of interview(in person, phone call)			
2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [X] 2. Country-wide [] 3. International []	Outside of South Africa and Eswatini, we have completed 87sites in Malawi and approximately 300 residential and Game Lodge plants in Zimbabwe
2	How many years of experience you have in Solar PV installations?	14 years in Southern Africa being SA, Zimbabwe, Botswana, Malawi &Eswatini	An additional 10 years' experience in solar geyser supplyand fitment. We expanded into Eswatini in 2019 which demonstrates our commitment tothe local economy over the last 5 years
3	Size range of PV systems installed (kWp)	We have installed more than 4,6MW ofPV	We are currently engaged to manage 195 sites over 2,6MW under our O&M Agreements in SA & Eswatini. The Eswatini project sites
			comprise some 76 sites out of the 195 total sites. These range from 15kWp systems to systems over 1,3MWp
4	Cost range of PV systems installed. (USD/kWp)	Our current installation for a Grid Tied Ground Mount solar system is in the region of E12.50/Watt or \$0,65/Watt	Our current installation for a Hybrid Ground Mount solar system with 4 hours of battery backup is in the region of E24.00/Watt or \$1,25/Watt



5	Does the price of the PV system include after sales service?	1. Yes [] 2. No [X]	We offer O&M Contracts of 5 year periods renewable at a monthly cost of based on a percentage of the installation cost escalating at a rate of 7% annually. This maintenance is remotely monitored and implemented on site with 3 teams of Technicians based in Matsapha, Eswatini.
6	Do you have experience installing solar systems for pumping/ irrigation? If yes, please ask the average size of the solar systems and the type of crops they serve	1. Yes [X] 2. No []	We have supplied solar to farms where pumping is included and the farms focus on citrus, sugar cane and some golf courses and school fields.
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	The costs are as detailed in item 4 above
8	Does the price include after-sales service		The costs are as detailed in item 5 above
3. Product/Service Information			
#	Question	Options	Notes/further details
9	Do you have any certifications for the solar PV systems you offer? If yes, specify which certifications <i>This question refers to solar PV systems in general</i>	1. Yes (Specify) [X] 2. No []	PV Green card, PQRS certified, Solar level 4 Certified
10	If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer?	1. Yes (Specify) [X] 2. No []	Jason Wise, the Technical Director is in addition a qualified Plumber and has installed over 6000 high pressure heating systems, multiple boreholes and water systems



	If yes, specify which certifications <i>This question refers for solarPV systems for pumping or irrigation purposes</i>		
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	1. Yes [X] 2. No []	We keep attic stock of panels to ensure continuity and compatibility. We are able to swap out inverters as may be required
12	How many years of warranty do you provide for the system?		The various components have different periods however we generally stand by warranties of 25 years PV Panel, 10 years for Inverters, 10 years on workmanship
13	Do you offer any digital remote monitoring of the systems you install?	1. Yes [X] 2. No []	This is part of the vigorous O&M Agreement maintenance regime.
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	1. Yes [X] 2. No []	
15	Is there any recollection plan once the product's life span ends?	1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection) 2. No recollection plan [] 3. No recollection plan, but we plan on doing so in the future. [X]	
5. Training			
#	Question	Options	Notes/further details



16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	<p>1. Yes, provided by a technician from your company [X]</p> <p>2. Yes, provided via online/physical manual training guide</p> <p>3. No []</p>	We also hand over the technical information in a “Close-out” Pack when carrying out the training at Final Acceptance of the installed system
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6. Financing

#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	<p>1. Yes (specify) [X]</p> <p>2. No []</p>	We offer Out Right Purchase, Rent To Own over 5 or 10 year periods, Cash flow neutral Rent To Own, Financed PPA over various periods (maximum 10 years) at various costs based on the size of the system
18	Which payment options do you offer for your products?	<p>1. Cash []</p> <p>2. Mobile money []</p> <p>3. Card payment []</p> <p>4. Bank transfer [X]</p> <p>5. Instalments [X]</p> <p>6. Other []</p>	Payments are scheduled against milestones in the Project Program
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	<p>Yes (specify) [X]</p> <p>No []</p>	We have had projects financed by FNB and Nedbank locally. We have a relationship with BroadReach who fund “Green Projects” using the PPA as a basis.

20. For the six grid-connected sugarcane farms below located in Eswatini:



Farm Number	Services you offer that	Conditions	Financing plans	Do you serve those specific locations? –(yes/no)	Do you have technicians in the area? – (yes/no)
1	Full services from design to implementation including supply and installation. After-sales service through the O&M Agreement is very important to ensure maximum benefit to the end user and Investor.	The final MOU or Purchase Agreements and O&M Agreements will define the conditions which will define delivery and payment terms in each case including the ones below.	We can provide individual prices for each installation or should all these projects be bundled together we would recommend BroadReach as a financial solution for all these projects	Yes	Yes
2	The above comment will apply		The comment apply above will	Yes	Yes
3					
4					
5					
6					



5.2.5 Service Provider_5

1. General data			
Date	20/05/2024		
Time	12:08		
Mode of interview (in person, phone call)	Phone Call		
2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [<input type="checkbox"/>] x 2. Country-wide [<input checked="" type="checkbox"/>] 3. International [<input checked="" type="checkbox"/>]	
2	How many years of experience do you have in Solar PV installations?	Specify 5 Years	
3	Size range of PV systems installed (kWp)	Specify 21 000 kWp	
4	Cost range of PV systems installed. (USD/kWp)	76,90 USD/1 kWp	
5	Does the price of the PV system include after-sales service?	1. Yes [<input type="checkbox"/>] 2. No [<input checked="" type="checkbox"/>]	
6	Do you have experience installing solar systems for pumping/ irrigation? <i>If yes, please ask about the average size of the solar systems and the type of crops they serve</i>	1. Yes [<input type="checkbox"/>] 2. No [<input checked="" type="checkbox"/>]	
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	
8	Does the price include after-sales service	No	
3. Product/Service Information			
#	Question	Options	Notes/further details
9	Do you have any certifications for the solar PV systems you offer? If yes, specify which certifications <i>This question refers for solar PV systems in general</i>	1. Yes (Specify) [<input checked="" type="checkbox"/>] 2. No [<input type="checkbox"/>]	PV Green Card, Wiremens License, SAPVIA



10	<p>If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer?</p> <p>If yes, specify which certifications</p> <p><i>This question refers for solar PV systems for pumping or irrigation purposes</i></p>	<p>1. Yes (Specify) []</p> <p>2. No [x]</p>	
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	<p>1. Yes []</p> <p>2. No [x]</p>	We can only guarantee our workmanship for 1 Calendar Year, From date on installation completion.
12	How many years of warranty do you provide for the system?	1 Year - 12 Months	
13	Do you offer any digital remote monitoring of the systems you install?	<p>1. Yes [x]</p> <p>2. No []</p>	
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	<p>1. Yes [x]</p> <p>2. No []</p>	
15	Is there any recollection plan once the product's life span ends?	<p>1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection)</p> <p>2. No recollection plan []</p> <p>3. No recollection plan, but we plan on doing so in the future. [x]</p>	
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	<p>1. Yes, provided by a technician from your company []</p> <p>2. Yes, provided via online/physical manual training guide</p> <p>3. No []</p>	
6. Financing			
#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	<p>1. Yes (specify) [x]</p> <p>2. No []</p>	We can arrange financing
18	Which payment options do you offer for your products?	<p>1. Cash []</p> <p>2. Mobile money []</p> <p>3. Card payment []</p> <p>4. Bank transfer [x]</p> <p>5. Instalments []</p>	



		6. Other []	
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [<input type="checkbox"/>] No [<input type="checkbox"/>]	We work with banks to secure financing and refinancing for clients.

20. For the six grid-connected sugarcane farms below located in Eswatini:

Farm Number	Services that you offer	Conditions	Financing plans	Do you serve those specific locations? – (yes/no)	Do you have technicians in the area? – (yes/no)
1	Solar PV System		TBC	Yes	No
2	Solar PV System		TBC	Yes	No
3	Solar PV System		TBC	Yes	No
4	Solar PV System		TBC	Yes	No
5	Solar PV System		TBC	Yes	Yes
6	Solar PV System		TBC	Yes	No



5.2.6 Service Provider_6

1. General data			
Date	04-06-2024		
Time	11 am		
Mode of interview (in person, phone call)	Online – Google Meet		
2. Company Information			
#	Question	Options	Notes/further details
1	What is your geographical outreach?	1. Regional (southern Africa) [] 2. Country-wide [] 3. International []	International
2	How many years of experience you have in Solar PV installations?	Specify	Yes, 30 years
3	Size range of PV systems installed (kWp)	Specify	100 Wp – 150 kWp
4	Cost range of PV systems installed. (USD/kWp)		3 – 4 USD/kWp
5	Does the price of the PV system include after sales service?	1. Yes [] 2. No []	Yes, depending on the size of the system
6	Do you have experience installing solar systems for pumping/irrigation? <i>If yes, please ask the average size of the solar systems and the type of crops they serve</i>	1. Yes [] 2. No []	Same as PV systems
7	If 6 is yes, what is the range of prices for the solar irrigation systems you offer (USD/kwp)?	Specify	Same as PV systems
8	Does the price include after sales service		Same as PV systems
3. Product/Service Information			
#	Question	Options	Notes/further details
9	Do you have any certifications for the solar PV systems you offer? If yes, specify which certifications	1. Yes (Specify) [] 2. No []	Yes, ISO 9001 – Certified ISO – 140001 certified



	<i>This questions refers for solar PV systems in general</i>		
10	<p>If 6 is yes, do you have any certifications for the systems for pumping/irrigation that you offer?</p> <p>If yes, specify which certifications</p> <p><i>This questions refers for solar PV systems for pumping or irrigation purposes</i></p>	<p>1. Yes (Specify) []</p> <p>2. No []</p>	No
4. After sales services			
#	Question	Options	Notes/further details
11	Do you offer any product warranty apart from the manufacturer's warranty?	<p>1. Yes []</p> <p>2. No []</p>	Yes
12	How many years of warranty do you provide for the system?		5 years
13	Do you offer any digital remote monitoring of the systems you install?	<p>1. Yes []</p> <p>2. No []</p>	Yes
14	Do you offer dedicated customer support (via phone, WhatsApp, etc)?	<p>1. Yes []</p> <p>2. No []</p>	Yes
15	Is there any recollection plan once the product's life span ends?	<p>1. Yes [] (please specify on the recollection plan, which part of the product it covers and what happens to the collected asset after collection)</p> <p>2. No recollection plan []</p> <p>3. No recollection plan, but we plan on doing so in the future. []</p>	No recollection plan
5. Training			
#	Question	Options	Notes/further details
16	How do you enable/train the client to use the product, maintain it and make basic repairs to it?	<p>1. Yes, provided by a technician from your company []</p> <p>2. Yes, provided via online/physical manual training guide</p> <p>3. No []</p>	Yes, provided by a technician from their company
6. Financing			



#	Question	Options	Notes/further details
17	Do you offer any kind of financing services for your products? If yes, please elaborate.	1. Yes (specify) [] 2. No []	No
18	Which payment options do you offer for your products?	1. Cash [] 2. Mobile money [] 3. Card payment [] 4. Bank transfer [] 5. Instalments [] 6. Other []	Bank Transfer, Instalments.
19	Do you have any experience in cooperating with a financial institution (banks, MFIs, SACCOs)?	Yes (specify) [] No []	International Donor: UNDP, FAO, UNHCR

20. For the six grid-connected sugarcane farms below located in Eswatini:

Farm Number	Location	Yearly energy demand (kWh)	Area available for PV systems (ha)	Approximate PV system size (kW)
1	Mangweni	165,613	2	110-350
2	Tsambokhulu	1,142,000	10	850-1600
3	Ngcamphalala	144,650	1	95-200
4	Ngcamphalala	2,340,066	10	1500-3000
5	Manzini	181,831	3	130-420
6	MR8 Malkern	173,043	2	120-230