Solomon Islands Electricity Authority
trading as SOLOMON POWER

Terms of Reference (TOR)

Solomon Power (SP) - Loss Reduction Study for the Honiara Network

1. Introduction

Solomon Power (SP) is embarking on a strategic initiative to strengthen both its technical and commercial operations, with a particular focus on reducing system losses and enhancing the reliability and quality of electricity supply. This programme is being funded entirely through internal resources, ensuring that it aligns closely with SP's core operational priorities, long-term investment planning, and broader corporate sustainability objectives.

To support this objective, Solomon Power seeks to engage a qualified consulting team to undertake a comprehensive Loss Reduction Study and provide expert technical advisory services. The findings of this study will directly inform our Engineering Division—responsible for the operation of our generation, transmission, and distribution systems—on future network infrastructure upgrades, metering enhancements, and operational reforms. These efforts are essential to ensure the Honiara network is operated, and maintained in a manner that consistently delivers a safe, stable, and reliable power supply.

2. Background

The Solomon Islands Electricity Authority (SIEA), now trading as Solomon Power (SP), is a vertically integrated, state-owned enterprise responsible for owning, maintaining, and operating the national electricity grid across the Solomon Islands. The utility's distribution infrastructure consists of 33/11/0.4kV networks serving urban and peri-urban centers across eight islands. SP's installed capacity exceeds 30 MW, predominantly diesel-based, and recently there were 3 MW solar farms (grid connected) added to the network.

Currently, Solomon Power faces critical operational challenges:

- High dependency on diesel fuel,
- Elevated operational costs,
- Total system losses approximating 20%, significantly above international best-practice benchmarks.
- Industrial and Commercial customers seeking migration to off grid, and operating self-generation

As of 2023 to 2025, system losses are estimated to be approximately 16% to 20 % comprised of technical losses and non-technical or commercial losses. These losses are likely attributable to a combination of factors, including:

- Outdated distribution infrastructure,
- Inaccuracies in metering systems,
- Illegal or unauthorised connections, and
- Industrial and commercial customers operating private self-generation systems,

Reducing these losses and maintaining major customers are strategic priority to enhance financial sustainability and service effectiveness and efficiency. In practice it is difficult to determine the balance between the technical and

nontechnical losses without precise measurement, but what is clear is that SP is losing a substantial portion of electricity that could otherwise be sold.

3. Objective

The primary objective of this study is to:

- Identify and quantify technical and commercial losses across the generation, distribution, billing system and customer metering systems
- Recommend cost-effective technical, operational, and commercial interventions to reduce losses and improve the level and quality of service
- Establish Loss prevention strategic solutions to address the system Losses challenges – short & long terms
- Provide cost estimates (based on system reduction loss study) for the works to be carried out to improve the network losses;
- Pin point areas within the network that likely to have losses due to smart grid development or integration of various renewable energy sources

The consultant may be requested, based on good performance, to provide supervision for the implementation of the recommended works as downstream work under a separate engagement (if require).

4. Scope of Services

The consulting engagement will be structured into three primary components:

4.1 Loss Monitoring and Quality of Supply Reporting

a. Review SP historic loss reporting data and establish revise baseline for SAIDI and SAIFI figures based on international best-practice benchmarks which will be used to monitor the results of all programs designed to reduce losses and improve quality of supply. In the process design a template using Microsoft Excel or other readily available spreadsheet application for reporting and calculation of technical and non-technical losses.

b. Prepare a comprehensive metering diagram to ensure that power generation is properly measured and monitored on an ongoing basis. Arrange new bulk metering to be installed at strategic locations especially within the distribution system to ensure that SP can readily measure or estimate energy and reactive flows at the main voltage levels. Identify SP administrative energy use (as distinct for energy used by power station auxiliaries) and un-reimbursed social usage (e.g. streetlights) as part of the measurement of losses;

c. Carry out spot surveys at LV extremities and provide a monitoring (pin board) map of unacceptable (i.e. LV regulation greater than 10%) during peak hour service to quickly identify situations needing SP attention (e.g. by installing intermediate transformers, upgrading LV conductor etc.) as a matter of priority;

d. Review SP's meter reading, billing, and payment procedures to identify the level of non-technical losses and make recommend improvements in meter reading and billing. Also review the current control processes for the issue and installation of pre-payment meters and billing system.

4.2 Retention of major customers within SP grid

a. Conduct a stakeholder assessment of all major industrial and commercial customers currently

connected to the Solomon Power (SP) grid, identifying their energy usage profiles, supply reliability requirements, and future growth expectations.

b. Develop a Customer Retention Strategy, including:
   - Tailored service offers
   - Incentives or technical partnerships for embedded generation integration within the SP network,
   - Power quality and reliability improvement measures targeting large-load feeders.

c. Recommend a policy and operational framework to support long-term engagement with major customers, including regular performance reviews, connection agreements, and support for energy efficiency or renewable initiatives that maintain SP as the primary supply partner.

4.3 Technical Design and Operational Improvements

a	Conduct load flow analysis on SP's 33 and 11 kV feeders to identify any network restrictions and recommend capital investments supported by Cost Benefit Analysis to overcome the problems with the aim of improving quality of service, reliability and reducing losses; and prepare the readiness of the operations to handle distributed renewable energy in the distribution system in future.
b	Provide a suitable training on how to address technical losses through the load flow analysis using digsilent package used and recommend possible strategic interface connection points within SP's existing network for renewable energy to improve system losses and efficiency.
d	Perform spot surveys of power factor (PF) measurements at the larger commercial industrial establishments taking particular note of PF variation throughout the day. Prepare standard notices informing consumers where PF exceeds regulations, including advice on how they should take steps to meet SP requirements and the costs and commercial benefits to them of doing so and charging of customers if they produce poor pf to the SP grid.
e	Review SP distribution 33/11/0.4 kV design and operational standards and recommend improvements in equipment design and metering infrastructure that to reduce losses and improve reliability of service to consumers.

5. Key Deliverables

Deliverable	**Due Date**
Inception Report	2 weeks after signing of contract
Draft Report providing assessment data and recommendations	10 weeks after signing of contract
Workshop to present Draft Report (Pdf & word)	2 weeks after circulation of Draft Report
Final Report (pdf)	2 weeks after Workshop

6. Duration and location of Engagement

The estimated level of effort is for a four months commencing upon date of signing the contract. The consultants are to provide the scope of services as detailed in this TOR and will have to travel to site for assessment and discussion with SP relevant stake holders. There is a possibility of additional and follow-on work if required by SP. The works/support will be provided remotely and on site as agreed between SP and the consultant during the implementation.

7. Consultant profile

The consultancy is expected to take up to four months from signing of contract to the submission of final reports.
As a minimum, the study will require technical experts to be led by a Team Leader, who must be a technical electricity sector expert with a strong background in power system operations, network analysis, network design and asset management. The Team Leader must have demonstrated ability in demand side and network asset management in power utilities.

Other members of the team must be professional engineers who have experience in power system operation, load flow analysis, protection coordination and network management.

The integration of local expertise is encouraged.

At least two visits to the Solomon Islands are envisaged with the first mission for discussion with SIEA and other stakeholders, data collection and field visits to be undertaken by all team members. A second visit will be, for at least the team leader to present the draft report at a workshop and hold stakeholder training.

8. Key Staff

The study team should consist of at least the following staff.

Role	Required experience
Team Leader	Professional engineer with extensive (10 years plus) experience in leading the planning and operations of power utilities, including: • Electricity Loss Reduction & Theft Management • Power generation & system audit losses • power system operations & analysis; • power system performance monitoring; • Revenue protection/Loss prevention • network design, commissioning, testing, and asset management; • Renewable energy integration
Electrical Engineer	Professional engineer with a minimum of 5 years' experience in power system operation, distribution metering capabilities, metering thief, Billing (Commercial/ Retail) load flow analysis, smart metering system risks including Safety, reliability, or customer-facing process deficiencies (metering inventory errors)

Metering Engineer	Professional engineer with a minimum of 5 years' experience in various type customers metering techniques and SCADA systems, power system operation, , metering thief, Billing (Commercial/ Retail) and network management.

9. Payment Schedule

Payments will be made upon completion and submission of key milestone below:

Milestone	**Payment (%)**
Submission and acceptance of inception report	20
Submission and acceptance of draft report	50
Completion and acceptance of workshop to present Draft Report	20
Submission and acceptance of final	10

All payments are subject to verification and approval by Solomon Power and may take up to 14 working days for processing after acceptance of reports.

10. Support from Solomon Power

The Client will provide the consultant office space for the duration of each visit as well as personnel to assist carry out surveys if and when required. The client will also make available any reports and statistics which the consultant may require in undertaking the study.

11. Reporting.

The consultant will be reporting directly to the **Chief Engineers' office, Mr. Joshua Suiramo** Email: Joshua.Suiramo@solomonpower.com.sb, phone: (677) 7640295. Or a nominated officer of the project**.**

SP will nominate point of contact for the project/assignment whom which the Consultant shall liaise directly as required.