REVIEW OF THE TUVALU SOLAR ELECTRIC COOPERATIVE SOCIETY

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## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AGM</td>
<td>Annual General Meeting</td>
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<td>BC</td>
<td>Branch Committee</td>
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<td>BTA</td>
<td>Branch Technical Assistant</td>
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<tr>
<td>EO</td>
<td>Energy Office</td>
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<tr>
<td>Forsec</td>
<td>Forum Secretariat</td>
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<tr>
<td>IEO</td>
<td>Island Executive Officer</td>
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<td>MC</td>
<td>Management Committee</td>
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<td>NBT</td>
<td>National Bank of Tuvalu</td>
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<td>PREP</td>
<td>Pacific Regional Energy Program</td>
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<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>SEC</td>
<td>Solar Energy Company (Kiribati)</td>
</tr>
<tr>
<td>SOPAC</td>
<td>South Pacific Applied Geoscience Commission</td>
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<tr>
<td>TEC</td>
<td>Tuvalu Electricity Corporation</td>
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<tr>
<td>TSEC</td>
<td>Tuvalu Solar Energy Company</td>
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<tr>
<td>TSECS</td>
<td>Tuvalu Solar Electric Cooperative Society</td>
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FOREWORD

In March 1998, at the request of the Tuvalu Ministry of Works, Communication and Energy, the Energy Unit of SOPAC provided assistance to Tuvalu to review the management and institutional aspects of its solar rural electrification program.

The review was to:

- access the accounting and business management practices at TSECS;
- access the adequacy and the role of the management and institutional framework in the realisation of the program's objectives;
- provide on-site advice on issues identified: and
- provide recommendations on possible follow-up measures.

ACKNOWLEDGEMENTS

The assistance of the Secretary and staff of the Tuvalu Ministry of Works, Communication and Energy and the Tuvalu Solar Electric Cooperative Society, particularly that of Messrs Isaia Taape, Timaio Auenga and Kapuafe Lifuka is gratefully acknowledged. Their time and knowledge were very useful in this study. Mr Paul Fairbairn's comments and guidance were instrumental in the writing of this report.

The financial assistance provided by the Forum Secretariat and the logical support provided by Mrs ‘Amelia Kinahoi Siamomua of the Development and Economic Policy Division, are much appreciated.

Mr Herb Wade’s paper on the Pacific's experience with solar rural electrification, his other previous works on the subject matter in the region and Mr Chris Cheatham's work on the Kiribati Solar Energy Company have been invaluable source documents for this review.
EXECUTIVE SUMMARY

The common problem with solar rural electrification programs in the region is that donor-funded projects were accepted while the countries were not fully prepared with the appropriate policy mechanisms to manage these projects in a sustainable manner.

In Tuvalu, the management of the solar electrification program was to be implemented through the establishment in 1984 of the Tuvalu Solar Electric Cooperative Society (TSECS) as a private, commercial enterprise. It was not until 1997 that the Tuvalu government adopted its national energy policies which, among other things, called for the formulation, adoption and the implementation of a financially and technically sustainable rural electrification program.

The provision of business and management assistance to the TSECS has centered on the technical and financial operations of the cooperative with the view to long term sustainability. The review has made an assessment of the current status of the cooperative and also looked at possible options for addressing the issues identified.

Current status of TSECS

Tuvalu’s solar electrification program, which is managed by the TSECS, is presently not sustainable, as the TSECS is effectively bankrupt. This is a result of years of poor financial and business management practices, a poorly staffed, equipped and disciplined TSECS office, an ineffective management committee and the non-observance of the provisions of the Cooperative’s Act and the TSECS bye-laws.

The Recommended Management and Institutional Structure for the Tuvalu Solar Electrification Program

The review has identified that Tuvalu’s solar electrification program could be made sustainable either under its current cooperative structure but with a revised management and operating structure, or alternately by the establishment of a new corporation such as a Tuvalu Solar Energy Company (TSECS).

Both options call for the appointment of appropriately trained and skilled people in the management committee or the Board of Directors. The management of the program has to be carried out from a central office, which is appropriately staffed and equipped. There is an
urgent need to raise a rehabilitation capital fund to ensure immediate improvement in service delivery and certain practices have to be streamlined/adopted in order to ensure efficiency of service delivery and the recovery of the full costs of the services provided.

It is not considered practical to merge the TSECS and the Tuvalu Electricity Corporation right now nor would it be feasible to put the management of the program under a government Ministry.

It is recommended that the long-term decision on Tuvalu’s solar electrification program’s institutional and management structure should be determined by the Tuvalu Government.

BACKGROUND

The Lome II Pacific Regional Energy Program’s (PREP) photovoltaic (PV) program played a major role in the widespread use of, and the exposure to, PV in the Forum Island Countries’. This program provided funding for around 69 systems in Fiji, 250 in Kiribati, 100 in Tonga and 150 in Tuvalu. In addition, more than 100 energy officials were trained in the maintenance, installation and management of photovoltaic systems/projects. PREP’s objectives were to reduce the dependence on petroleum fuels through the promotion and use of technologies, which would harness indigenous renewable energy resources and to assess these technologies in terms of their technical and economic suitability for the region.

Various project concepts have been used in the region for the management of PV projects. Though their functions are predominantly the same, they do differ in the areas of component ownership, responsibility for installation, system capacity, sources of capital funding, sources of maintenance funding and maintenance responsibility. A detailed description of these various project concepts is provided in Annex 1.

Sustainability has become a common issue with rural electrification programs in the region and solar PV programs are no exception. The review of the Tuvalu Solar Electric Cooperative Society (TSECS) is primarily aimed at: (i) assessing the sustainability of the program under its current institutional and management structure, (ii) examining the sustainability of the

program under different institutional and management structures and (iii) providing a recommendation on an institutional and management structure for the program. The review is focussed on the use of solar energy for domestic stand-alone lighting systems rather than a general focus on rural electrification. It is carried out in the context of developing appropriate policy guidelines for Tuvalu’s solar rural electrification program.

This review of Tuvalu’s solar rural electrification program arises from the concerns raised by the Tuvalu government in its Amatuku retreat in August 1997. This retreat was carried out under the Tuvalu Public Sector Reform Consultations and it produced the Amatuku Plan, which contained resolutions approved by consensus during the consultations. The retreat, appreciating the management and financial difficulties at the TSECS, considered de-registering the TSECS under the Cooperative Act and run it as a Corporation or even perhaps merge it with the Tuvalu Electricity Corporation (TEC).

The public sector reform program of the Tuvalu government is still at its early infancy stage. It is important that any future consideration of the institutional and management structure of Tuvalu’s solar electrification program be carried out in light of later developments in the reform program.

AN OVERVIEW OF THE TUVALU SOLAR RURAL ELECTRIFICATION PROGRAM

Background to the TSECS

The introduction of solar PV systems in Tuvalu dates back to 1979 when solar was first used to power the inter-island telecommunication systems. Its use for domestic lighting came later in the early 80’s with the USA’s Save the Children Federation playing a major role in establishing the Tuvalu solar electrification program, hence, the establishment of a community and nationally oriented TSECS. TSECS was established in 1984 as a private, commercial enterprise and charged with implementing and managing domestic solar lighting projects. In 1988, the USA Save the Children Federation withdrew its administrative support from the TSECS and the cooperative then became an independent, locally owned and operated commercial enterprise. TSECS then became dependent on income from member fees for all its operational and maintenance expenses.

The options of merging TSECS and the Tuvalu Electricity Corporation (TEC), the formation of a Tuvalu Solar Energy Company (TSEC) and putting the management of the program under a government Ministry are examined.
Management Structure

The management structure of the TSECS is provided for in the Cooperative Act and its Byelaws represented in Figure 1:

![Management Structure Diagram]

*Figure 1: The Management Structure of the TSECS*

The Cooperative Act and its subsidiary legislation (regulations) stipulate, among other things, the manner in which the business of the cooperative and its meetings are to be conducted. It also gives the Registrar of Cooperatives the authority to oversee that the business of the TSECS is being conducted in accordance with its byelaws and the cooperative's regulations. This includes the preparation of the cooperative's annual financial accounts and reports, the conduct of annual general meetings whereby the audited financial reports would be presented, and the paying out of dividends to the cooperative members.

The prime objects\(^3\) of the TSECS according to the 1990 version of its byelaws is to provide electricity to households and organisations that have not been designated by the Electricity Regulations as Tuvalu Electricity Corporation's (TEC) supply areas, and more particularly to:

- purchase, lease or otherwise acquire electrical equipment, fixtures and other assets necessary to carry out the prime object;
- maintain, repair, replace, sell, trade in, scrap or otherwise dispose of electrical equipment and fixtures and other property as necessary;

\(^3\) According the 1990 version of its bye-laws
apply for grants and loans in the name of the Society for the purpose of conducting the business of the Society;

- collect monies from members for services provided by the Society including initial payments and weekly or monthly charges and to invest these monies at interest;

- to engage in other lawful and appropriate activities relating directly or indirectly to the objects of the Society;

  - enter into any agreement with any other society, company, corporation or person carrying on, or about to carry on, any business capable of benefiting the Society and to acquire shares in such body; and

  - to promote the principle of Cooperative, mutual help, and self help.

The TSECS is managed by a management committee (MC) comprising of the chairmen of the eight Branch Committees (BC) and the Manager of the TSECS who acts as Secretary/treasurer. The major functions of the MC are to fix or alter the maximum liability, which the TSECS may incur in loans or deposits, to consider the audited financial reports and to approve the annual estimates of revenue and expenditure.

There are presently 8 BC. Each BC comprises of four office holders elected by branch members, which consist of one individual from each of the households, and organisations that are users of services provided by the cooperative. Except for the first annual meeting of the BC, members of the BC can only serve a two-year term. The Branch Technical Assistants (BTA) serve as secretary/treasurer in the BC.

The byelaws spell out that the MC is to have an annual general meeting and special meetings as the MC sees fit. Every branch shall hold annual and special meetings where every member can attend. The BCs shall hold regular quarterly meetings to review their operations and their quarterly financial statements.

**Financial Structure**

All of TSECS's projects have been funded through grant aid (estimated total value of AUD2 million), with the EU being the major donor. The TSECS's revenue comes from a refundable membership deposit of A$50 and a monthly rental, which is charged on the members with PV systems. It is TSECS's policy that PV systems are to be disconnected when the monthly

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After the deductions of all arrears to the TSECS
Presently set at $7 per system with one light and 60 cents for each additional lights
rental arrears accumulate for 3 months. Once disconnected, PV systems are to be transferred to members who are on the waiting list.

The TSECS keeps all its accounts with the National Bank of Tuvalu (NBT). It has separate accounts for each of its externally funded projects and deposit accounts for each of its island branches. The TSECS has only one working account. Expenditures that are to be paid from the islands and projects accounts are to make transfers to this working account first before payments are effected. The Manager and the registrar of cooperatives sign on TSECS’s cheques.

Branch Technical Assistants (BTAs) who are stationed in each of the islands and are employed by the TSECS make the collection of the monthly rentals. From their collections, BTAs deduct their wages (A$30 plus $1 for each working system per month) and then deposit the balance to the office of the island council in each of the respective islands. This is then transferred to the cooperative’s accounts with the NBT. A separate return showing a summary of the fees collected and the deductions (Annex 2) made is sent by the BTAs to the TSECS Head Office in Funafuti.

The TSECS operates a petty cash system where cash is readily available for the payment of miscellaneous goods, which do not warrant the use of a cheque.

**TSECS’s Existing PV projects**

The EU has been a major donor to the TSECS along with Canada and the USAid. In 1994, the EU was responsible for the rehabilitation and upgrade of the 265 systems installed since 1984 and the installation of over 150 new systems. Table 1 provides a summary of TSECS’s members and systems that are currently working.
Table 1: TSECS’s members, systems installed and systems currently working.

<table>
<thead>
<tr>
<th>ISLANDS</th>
<th>MEMBERS</th>
<th>SYSTEMS INSTALLED 1994</th>
<th>SYSTEMS WORKING 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nanumea</td>
<td>105</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Niutao</td>
<td>100</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>Vaitupu</td>
<td>80</td>
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<td>Nanumaga</td>
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<td>51</td>
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<td>Nukufetau</td>
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<td>49</td>
<td>44</td>
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<td>Nukulaelae</td>
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<td>44</td>
<td>36</td>
</tr>
<tr>
<td>Nui</td>
<td>50</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Funafuti</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Niulakita</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>528</td>
<td>428</td>
<td>402</td>
</tr>
</tbody>
</table>

Source: TSECS & Dept of Planning and Statistics

Staffing of the TSECS

Figure 2 shows TSECS’s current staffing structure. TSECS is presently manned by 9 people, consisting of the Manager and a Senior Technician who are based at the Head Office in Funafuti and seven BTAs who are stationed in each of the outer islands. The Senior Technician services Funafuti. The Manager oversees the financial matters of the cooperative and services the management committee whereas the Senior Technician ensures that the BTAs are performing their functions effectively. The BTAs requirements for supplies such as stationery, light tubes, battery water, etc are relayed to the Senior Technician who then send these supplies from Funafuti. The Manager and the Senior Technician have been trained in solar lighting systems through participation at overseas training workshops. They in turn provided the local training to the outer islands BTAs, most of whom have not had any secondary education. The TSECS previously employed a secretary/bookkeeper to look after the books of the cooperative but the Manager is presently performing this function.
ASSESSMENT OF THE TSECS

The operations of the TSECS are presently not sustainable. This is a result of years of poor fraudulent practices, a poorly staffed, equipped and disciplined TSECS office, an ineffective MC and the non-observance of the provisions of the Cooperative’s Act and the TSECS byelaws.

Poor Financial and Business Management Practices

- The Financial Situation up to May 1994

The year 1994 marked the ten years of existence of the TSECS. Regrettably, it also marked the unveiling of the systematic abuse of the TSECS’s financial resources by the TSECS’s Manager. Investigations into the matter identified a total of $42,647 as misappropriated by the Manager between January 1990 and May 1994. Of this amount, it is interesting to note that between the period of January 1990 - June 1992, $5,970 was misappropriated in the form of salary advance\(^6\) (-3%), annual leave (23%) and imprest/per diem/airfare (80%). For the period of July 1992 - May 1994, $36,677 was misappropriated with the salary advance (65%), annual leave (7%) and imprest/per diem/airfare (28%).

The defrauding of the TSECS was highlighted in the investigations, which concluded that the organisation is effectively bankrupt, based on the following:

\(^6\) This is negative since the amount repaid was more than what was advanced.
* current account: $3,600
* outer islands account: approx $3,000
* uncollected monthly rental fees: between $5,000 - $10,000
* long term fixed deposit: zero (should be $75,000 - $100,000)
* repayment of the $25,000 Barclays loan account: zero
* membership fee deposits: zero (should be about $17,000)

This effectively meant that in May 1994, TSECS's financial assets were only $6,600, when they should have been well over $100,000.

The Financial Situation from May 1994 - now

The present financial situation of the TSECS has remained virtually unchanged from its 1994 level despite an improvement in the collection of the monthly rental arrears and a write-off by Barclays Bank of the $25,000 loan. The current financial asset is estimated at $6,600 and TSECS still has no long term fixed deposit. It also does not have a separate deposit for the membership fees, which should now total $26,400. The TSECS has a liability of some $4,000 to the Kiribati Solar Energy Company.

It is noted that a new Manager was appointed in 1994 but was later sacked in 1996 for alleged misappropriation of the TSECS's materials. The Manager appointed in 1996 was also sacked in early 1997 for alleged misuse of the TSECS's funds. The exact losses to the TSECS have not been confirmed but it is estimated to have reached $10,000. It is also noted that the present Manager has an unpaid salary advance of $9,277.

The existing poor financial position of the TSECS, is due to sequential misappropriation by three Managers, and has affected its operations in the following areas:

* essential maintenance work has not been carried out

It is estimated that at least 40 members need new batteries and some 200 burnt out lights have not been replaced. The replacement of the batteries and lights will cost approximately $10,000 (40 batteries @ $200 and 200 lights @ $20). The management of the TSECS have recently chosen to conserve its financial assets and have now asked its members to replace the batteries and lights at their own cost. This is a threat to the well being of the systems since some well-off members have completed the replacements at their own cost, whereas the majority of the members do not have the money to pay for the replacement components.
It is noted that car batteries costing around $150 at a local hardware shop are being used for the battery replacements. The 12V lights are not yet available at the local stores and hardware shops in Tuvalu and are only supplied by the TSECS, who are using converted 240V ballasts and tubes supplied from the TEC. It is also noted that the replacement of components by the members is contradictory to the Service Agreement signed between the TSECS and its members. Here, the TSECS is responsible for the replacement of non-working components, which are not due to the negligence of the members.

* qualified and experienced staff have not been recruited

The TSECS has been without a secretary/bookkeeper since late 1996 and the Manager is presently looking after the books of the TSECS. The performance of the secretary/bookkeeper was limited as she was not able to prepare the Statements of Income and Expenditures and the Balance Sheets required by the TSECS. The accounts of the TSECS for 1996 and 1997 have not yet been prepared and audited.

* attempts to use aid funds to cover the operational costs of the TSECS

In 1996, the Lome 3 PREP’s manpower development program provided $7,000 for a solar training course for TSECS’s outer islands technicians. Out of the funds advanced, some $700 remained unutilised. It took PREP a year to convince the TSECS that the unutilised funds had to be returned. In 1997, the then Forum Secretariat, Energy Division advanced $1,000 to the TSECS to cover the local costs of installing a PV grid-connected project. An examination of the project showed that although the installation was completed with a substandard installation of the panels, it is estimated that some $800 is yet to be spent. The TSECS still remains accountable for this project through to completion and acceptance of the project’s final report.

- Inappropriate Banking Practices

TSECS’ bank accounts are kept with the NBT. It has one working cheque account, seven deposit accounts for each of the outer island branches and deposit accounts for each of its externally funded projects. Monthly rentals collected in the outer islands are paid to the respective Islands Executive Officers’ (IEO). The IEO is responsible for transferring the funds to the NBT. These are then deposited into each of the outer islands’ deposit accounts. Rentals paid by residents in Funafuti for their cousin’s lights in the outer islands are paid

Employed by the Ministry of Home Affairs to serve the respective Islands Councils
directly to the TSECS Head Office and are directly deposited into the working cheque account. The current practice is that all expenditures are paid out only from the cheque account thus transfers are always first made from the deposit and project accounts. It is noted that in replenishing the working account, transfers from the deposit accounts are made on the basis of their balances rather than based on a consistent policy, which is applied to all the deposit accounts. For instance, if TSECS wants $1,000 to be transferred to its working account, it will take out the most from the islands with the highest balances rather than equally apportioning the $1,000 among all the working systems in all the islands.

The above banking practice has enabled the management of the TSECS to be biased in its operation by making the islands with a good payment record subsidise the others who fail to pay. The single working account system has also enabled the TSECS management to abuse donor funds in two ways: (i) by using donor funds to cover the TSECS operational costs and (ii) by using receipts from expenses coming out of its own funds for the reporting on expenses from donor funds, thus leaving donor funds available for other purposes. Considering the level of bookkeeping expertise that has been available at the TSECS, the above banking practice has also made it difficult for the TSECS to be fully accountable to the BCs and to its donors since the transfers are not properly recorded and kept as a separate expenditure item. This is contrasted with a system where a single cheque account is used for each project, where the transparency of the books would outweigh the extra bank charges for holding multiple accounts.

- Inefficient and Ineffective Practices

The returns from the BTAs are sent to the Head Office at the end of each month. They come on specially prepared forms providing the identity number of each customer, their name, a receipt number, the date on which payments were made, the amount received, the month(s) paid for and comments. The forms are always accompanied by copies of the receipts issued to the consumers, copies of payment vouchers for the BTAs' wages and copies of receipts for any other payments made by the BTAs. Once the returns are received at the Head Office, they are checked for accuracy and are then entered onto a monthly rental payment record form. This form keeps track of each consumer’s payments and the months that they are in arrear, if applicable. A specimen of these two forms is provided in Annex 2.
In this system, there is still room for the BTAs to avoid issuing of receipts and pocket the monthly rentals since the consumers do not sign the receipts to show that they have actually paid their monthly rentals to the BTAs. In the above system, it is also noted that with a slight change to the forms in Annex 2, there would not be a need for the Head Office to enter the BTA's work into another separate form.

- Absence of Clear Financial Policies

The TSECS's major expenditures are the costs of running the office and the costs of the spare parts whereas its major revenue comes from the monthly rentals. There has yet to be a policy in TSECS stating how much of its revenue should go to the running of the TSECS office and how much should be reserved for maintenance and purchase of spare parts. Such a policy should be the basis for the formulation of annual estimates of income and expenditures budget for the TSECS.

- Absence of a Stock Control System

There is no exercise of stock control at the TSECS. There is virtually no record of donated PV systems that came to the cooperative and where they were installed. There is also no record of donated spare parts, others that were acquired with TSECS funds, spare parts that were sent to the BTAs and the recipient households where the spare parts were installed. TSECS also does not have a database of its customers. Such a database would not only be useful as a back up to the stock control system but it would also provide up-to-date planning information such as the payment records, assist in ordering of spare parts and how well they abide by the cooperative's service agreement.

- Misleading Auditing Reports

Annex 3 provides TSECS' income and expenditure statements and balance sheets for 1989 to 1995. It is noted that most of TSECS's solar systems have been donated through grant aid and have been capitalised to fixed assets and the corresponding credit reflected in a fixed capital reserve. The depreciation of assets does not differentiate between donated PV systems and those supplied by the TSECS, or other purchased assets such as computers, desks, building etc. This has distorted the accounts resulting in depreciation values of more than $100,000 and in annual expenditures being in excess over income, whereas, there should be balancing entries resulting in a neutral effect on the profit and loss account. It is
also noted that the general reserve is fixed and have increased after every two reporting periods rather than decreasing annually to reflect consumption of the donated assets, implying that the assets will still remain on the books after the assets have been written off. To ensure the neutrality of the donated assets, an entry should be added to income, called “benefits realised from donated assets”. That entry should exactly offset the depreciation of donated assets that are entered as an expense. This same amount would therefore be deducted each year from the capital reserve, to show the declining value that is left in reserve as the assets are consumed/depreciated.

The audited reports have failed on a number of occasions to make specific recommendations on the management practices exercised at TSECS and how best the books of the cooperative should be kept and maintained. Such recommendations should have avoided the signing of the cheques by the Manager and the bookkeeper and instead have the cheques co-signed by the Manager and a member of the MC. It has also largely failed to relate expenditures to specific decisions of the MC, terms and conditions of staff employment and the TSECS’s bye-laws. It is interesting to note that the TSECS’s audited balance sheets (Annex 3) show the salary advance to be a total of $1,385 from 1989 – 1994 whereas the investigations in May 1994 showed a total of $42,647.

**Poorly Staffed, Equipped and Disciplined TSECS office**

- Lack of trained and experienced local manpower

It is appreciated that in Tuvalu there is a lack of skilled and trained people and where they are available they are either employed by government or in the private sector where their terms and conditions of employment are slightly better than government's. In the outer islands, those who have completed high school have either become seamen or have migrated to Funafuti in search of a paid job.

- Improper Servicing of the MC

The TSECS has through the years been managed by 4 managers. Three completed their secondary education in Tuvalu and one commenced a diploma course at the University of the South Pacific but failed to complete the program. Of the four Managers, none have had any organisational management experience nor any management and/or accounting training. This lack of experience and training have not only affected the manner in which the TSECS

In 1994 & 95 when 265 systems were upgraded and rehabilitated.
has been run but it has also affected its servicing of the MC. The effectiveness of the MC is to a large extent dependent upon the quality of the materials tabled before it by the management of the TSECS. These materials should include the relationship of the anticipated maintenance costs in the proposed annual expenditure, to the anticipated fee collection rate and to the cooperative’s bank deposits. Such a picture should depict the overall financial status of the organisation thus leading the MC to deliberate and approve policy matters which would save the cooperative from bankruptcy and at the same time ensure that the solar lighting systems are well maintained and working. For instance, if the funds required for the annual systems maintenance is $15,000 and the other operating expenditures of the cooperative is expected to be $32,000 while the monthly fee collection is expected to be at $22,000 and the cooperative has $30,000 at the bank, a presentation of this overall picture would give the MC a range of policy issues to deliberate on and approve, since it is faced with an expenditure totalling $47,000 while it anticipates a total cash balance of $52,000. For instance:

* deliberate and approve an increase of the monthly fees;
* deliberate and approve that the maintenance be deferred to a later date;
* deliberate and approve to cut down or defer other costs of the cooperative; and
* deliberate and approve measures to offset the implications of drawing down the cooperative’s bank deposits.

- Insufficient Attention to the BTAs

The BTAs play a very important role at the TSECS. They act as technicians, public relations officers and debt collectors. Through these roles they are regarded as the most important members of the TSECS staff. Through them, the members of the TSECS are pleased or otherwise with the maintenance of their solar systems, which determines how faithfully they pay their monthly rental; and they are made more aware of their role and their importance to the survival of the TSECS. Unfortunately, while they are appropriately paid, they are however not recruited in a competitive and open manner; neither are they appropriately trained and guided. Their work was not closely monitored and in a lot of cases they misused the collected monthly rentals and became biased in the performance of their maintenance functions.

- Lack of Basic Supplies and Tools
The TSECS is essentially an organisation aimed at providing a technical service, yet it lacks the basic spare parts and tools required to carry out its services. During the review a visit to the TSECS office showed a lack of the basic spare parts such as lights tubes, ballasts, controllers and distilled water and tools, such as pliers, long noses, spanners, twin wire clips, meters etc. It is understood that the BTAs are no better equipped and supplied with spare parts than the Head Office.

- Poor Staff Discipline

The discipline at the TSECS office is quite low. In a lot of cases, the BTAs' performances are of a substandard level yet they continue to be employed. It is only when the losses became excessive that they were sacked. There were cases where the senior technician, in the absence of the Manager, approached the chairman of the MC for approval of expenses which would not normally be approved by the Manager.

**An ineffective MC**

- The Annual General Meetings

The MC was not very effective in running the TSECS, despite the average annual cost of A$5,000 to get the MC convened for its annual general meeting. Most of the members, while respected on social and traditional grounds, do not possess the basic business management and/or accounting skills to provide the appropriate guidance to the running of the TSECS. As earlier mentioned, the management of the TSECS did not provide the MC with the appropriate materials for its deliberations.

It was noted that there were no annual general meetings in 1992 - 94 and to an effective MC, this should have been a major sign of a disaster within the operations of the TSECS.

- Self-interests

Usually cooperatives are established as a profit making entity to help in improving the welfare of its members. The most common experience with cooperatives in the region is the retail

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The cooperative movement was very strong in Fiji in the late 1970s and the 1980s. Very few are still in existence due to mismanagement problems. Among the surviving ones is the Rewa Dairy, the major producer of dairy products in Fiji. The movement is presently very strong in Tonga where the village and family cooperatives join together to establish a Federation which owns one of the largest wholesale stores in Nuku'alofa and is a major exporter of agricultural and handicraft products.
stores in the rural villages. It is noted that the major difficulty with a cooperative setting, in an institution such as the TSECS, is that the members are the decision-makers and the consumers. They have therefore always voted against matters which would demand an extra contribution from the members, particularly an increase in the monthly rental and the recruitment of more qualified staff. This has been the case with the MC as they themselves are consumers and they would also like to maintain their popularity in their respective communities.

- Interference with the day-to-day Running of the TSECS

It is reported that at times, the Chairmen of the MC have interfered with the Manager’s day-to-day running of the TSECS.

- Selection of the Managers

The selection of the Manager has become a political exercise characterised by favouritism within the MC. For instance, two of the former Managers were dismissed for allegedly misusing the cooperative’s resources. If the dismissals were purely on disciplinary grounds, it is not understood why detailed investigations were not carried out and apply the necessary corrective measures to recover losses made to the TSECS. Further, it is interesting to note that the present Manager was dismissed when he was the Senior Technician but was later reinstated as Acting Manager. In the 1994 investigations, it was noted that the present Manager and the bookkeeper/secretary at the time were actively involved in the investigations, yet, later financial reports showed that to date, they owe the TSECS a substantial sum of money in salary advances.

The Non-observance of the provisions of the Cooperative Acts and the Bye-laws of the TSECS

- The Powers of the Registrar of Cooperatives

The Cooperative Act authorises the Registrar of Cooperatives to oversee the management of all cooperative societies. This is done through the tabling of the cooperative’s annual estimate of income and expenditure with the registrar and his approval of expenditures beyond that which was originally approved by the MC. The registrar is also authorised to
demand status reports from cooperative societies and to authorise any officer to get the needed information for him.

- The Annual Audit and the signing of the TSECS Cheques

The Act also spells out that the accounts of the TSECS are to be audited annually and that all cheques are to be signed by two persons each of whom shall be a member of the MC or some other officer of the TSECS. The provision for the signing of the cooperative's cheques by a member of the MC and an officer of the society was ignored for a number of years.

- The Dissolution of the MC

Section 40 of the Cooperative Act gives the registrar the power to dissolve the MC if in his opinion, the MC is not performing its functions properly. This is an action, which should have been taken right after the revelation of the misuse of the TSECS funds in 1994.

The abuse of the TSECS's financial resources by its first Manager and the alleged abuses by the two Managers that followed are the direct results of the non-observance of the above fundamental provisions of the Cooperative Act. It is also obvious that the continuous interventions of the Registrar through the exercise of his powers to demand status reports and annual audits of the cooperative's books have not been consistent throughout the 14 years life of the cooperative.

THE CONSIDERATION OF AN INSTITUTIONAL AND MANAGEMENT STRUCTURE FOR THE TUVALU SOLAR ELECTRIFICATION PROGRAM

The consideration of an institutional and management structure for Tuvalu's solar electrification program focuses on sustainability (technically and financially) as its main objective. To achieve sustainability, three areas must be accepted and vigorously pursued regardless of what the institutional and management structures would be. They are cost recovery, users pay and competition. The users (consumers) should pay for their electricity supply. The full costs of supplying electricity and all the services relating thereto should be recovered through the fee charged on the users and where, practically feasible, encourage competition for the services that are involved in the supply of electricity.
It is important to note that the Tuvalu government has a rural electrification policy in place. It is important that specific solar electrification policy guidelines be formulated to address the new institutional and management structure of the program. Such policy guidelines are to be read in conjunction with the rural electrification policy.

**Maintain TSECS**

To maintain the TSECS in its current structure, the following recommendations are made in order to sustain the program.

*Appoint Appropriately Trained and Skilled People in The MC*

This is a delicate matter because, under the democratic principle in which the establishments of cooperatives are based, the MC is to be selected by the members of the cooperative. Nevertheless, this is an exceptional case and it is very important that the government step in, through the exercise of the power of the Registrar of Cooperatives in Section 40 of the Cooperative Act, and dissolve the MC and make new senior position appointments for the management of the affairs of the TSECS. This new management group should be selected from people with proven business management record. It is also important that the Energy Planner be a full member in the group and that the Solicitor General be aco-opted member. The Energy Planner could assist on the policy issues and the coordination of donor-funded programs whereas the Solicitor General would provide advice on the recovery of funds owed to the TSECS, the amendments of the byelaws and the other legal obligations of the TSECS.

It is noted that management groups appointed by the Registrar of Cooperatives can only last four years before an MC is elected by the members. As mentioned below in the Amendments to the Bye-laws and Service Agreement, it is intended that the BC system be done away with such that the MC would not necessarily be representatives from each island.

*Recruit an Expatriate Manager and a Local Bookkeeper*

Under the current financial situation of the TSECS, it is not only important that a fresh management group be appointed to take over from the MC but also that the day-to-day management of the cooperative be handed over to an expatriate. Such expatriates are not to be paid by the TSECS although it may have to provide for the housing, water and electricity. Expatriates are available through the Japanese Overseas Volunteer Scheme (JOVC), the US
Peace Corps and from similar programs of Australia and New Zealand. The existing Manager position at the TSECS should be redesignated as Trainee Manager.

The services of the expatriate Manager should be available to the TSECS for at least three years. His/her prime responsibilities would be to tidy up the acts of the TSECS and to provide on-the-job training to the staff of the TSECS.

In addition to the Manager, it is very important that a bookkeeper be immediately recruited. The bookkeeper should be a local and someone who can prepare a statement of income and expenditure and the balance sheet of the TSECS. Details of the expatriate Manager and bookkeeper's job descriptions are attached as Annex 4.

**Raise a Rehabilitation Capital Fund of at Least $50,000 to Ensure Immediate Improvement in Service Delivery**

It is important that one of the priority tasks of the new management group of the TSECS is to raise a rehabilitation capital fund of $50,000 to ensure an immediate improvement in the service delivery of the cooperative. This capital is to be used for the provision of basic maintenance tools and spare parts to systems that need new batteries and light tubes, to keep as reserve all the refundable membership deposits and to upgrade the bookkeeping, record keeping and customer relations functions of the TSECS.

There are a few avenues for raising this capital rehabilitation fund and they are listed in their order of priority below:

- **Recover All Outstanding Liabilities to the TSECS**

It is understood that the staff unpaid salary advances and other unlawful personal use of the TSECS's resources amount to a total of approximately $60,000, sufficient to cover for this capital rehabilitation fund and for the TSECS to pay for its $4,000 debt to the Kiribati Solar Energy Company. Further investigations should be carried out on the abuse by former and current TSECS staff and civil charges laid against them to recover the cooperative's resources. Although this option would be quite complicated and lengthy, it is important as it

$10000 for maintenance (40 batteries @ $200 and 100 lights @ $20) plus $26400 being the refundable membership deposit of 528 members @ $50 and $13,600 for upgrading the office book keeping, record/filing and customer relations functions (computers, fax machine, photocopy, filing cabinets, etc). Stanely Manao ($42647), Timaio Auenga ($9277), Ketty Elisala ($5618), Ionatana Peleti ($550), Fiamalu Leupena (?) and Levolo Sakio (?)
will not only restore the faith of the cooperative members in the management of the TSECS, it will also send a clear signal to all existing and future staff of the TSECS that such actions are not tolerable. This option would not have an impact on the monthly rental fee.

- **Small Islands States (SIS) Development Fund or other Grant Aid Funds**

This option is available to the management of the TSECS and it would not have an impact on the monthly rental fee. It is noted that the TSECS office building was built with funds from the SIS Development Fund which is administered by the Forum Secretariat and it will take some convincing for the TSECS to be assisted twice from the same source of funds.

The Japanese International Cooperation Assistance (JICA), the Australian Aid Program (AusAID) and the French are presently actively involved in funding photovoltaic projects in the region. Of interest is the JICA aid program where they do not only supply the PV hardware but they are also providing vehicles, boats, office equipment such as computers, fax and photocopy machines and also short and long term consultants to work on their projects. JICA has unofficially mentioned the possibility of a PV project in Tuvalu. This project should be vigorously pursued and the package should not only be the PV systems but it should also include the much needed transport, office equipment and long term” consultants.

- **Long-term Soft Loan**

This option may be considered as the last resort should the above two options fail, as it would mean raising the current monthly rental fee. However, in order to minimise the impact on the monthly rental fee, consideration should be given to carrying this loan out simultaneously with that of recovering liabilities to the TSECS. The loan should be for at least ten years or more and is to be guaranteed by government. Alternatively, to ensure that the TSECS gets a very soft interest rate, government may directly make the loan and transfer the funds to the TSECS through a Memorandum of Understanding or such similar instrument rather than government making the soft loan and re-lending that soft loan to TSECS on a higher interest rate.

*Review the TSECS Bye-laws and Service Agreement*

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Short-term consultants are from a month to a year. Long terms ones are from 1.5 - 3 years.
Certain elements of the TSECS bye-laws and service agreement ought to be reviewed to reflect a sense of ownership of the system by the members and the increased responsibilities of the members to take good care of their systems.

- **The Refundable Membership Deposit**

This item is a membership fee, while in practice, it is used as a security deposit for the non-payment of the monthly rental. Consultations should be carried out with the members to solicit their consent that this particular item be amended so that while it would still remain to be a membership fee, it now becomes non-refundable.

- **System Ownership**

Under the existing service agreement, all the systems are owned by the TSECS. It is considered that to bring the TSECS as close as possible to an utility, the TSECS should own all the parts from the panels to the batteries. The wiring from the battery to and including the switches and to and including the lights would be the property of the members. The TSECS would then be responsible for the replacements of the parts that it owns and likewise the members would be responsible for the replacements of its parts.

*System Expansion*

The current bye-laws does not reflect on a situation where members can cover the costs of expanding their systems. It is noted that more and more people are interested and some has gone to the extent of buying inverters so as to enable them to use refrigerators, washing machines and videos. This particular aspect has to be addressed in the bye-laws particularly matters relating to ownership, safety and the level of the monthly rental fee.

- **The Branch Committee**

The BC has only made the whole organisation look well in cooperative terms but it has not made any effective contribution to the organisation. As mentioned earlier, the BC should be dissolved, as the MC need not necessarily comprise of representatives from each of the islands. By eliminating the BC, it becomes more obvious that the BTA's are directly responsible to the TSECS's Manager. With all the management and accounting control systems in place, the Manager of the TSECS should be able to recruit, discipline and dismiss
a BTA. The Manager must also be able to take a BTA to court for any abuse of the TSECS's funds and resources.

**Review and Streamline General Office Practices**

It is very important that the practices of the TSECS be reviewed and streamlined to ensure an effective and efficient delivery of service and the accountability of management and the MC to the members.

- **Stock Control**

The TSECS, according to the objects of its incorporation has functions of not only repairing the PV systems installed but that it also sells PV components. In the past, there was virtually no sale as the TSECS had the sole responsibility for the replacements of parts. In the above Amendments of the bye-laws, the households would own and be responsible for the wire from the batteries through the switches to the lights. This would therefore activate the sales responsibility of the TSECS. It is therefore important that the TSECS put in a stock control system to account for the components that go to its maintenance work and for the ones that would be on sale to its members.

- **Banking Practices**

The TSECS current banking practices and the manner in which TSECS's accounts are kept do not permit an easy check on the compliance of expenditures with the specific needs and purposes of donor-funded projects. It also does not permit accountability to the island communities because of the use of only one working account.

- **Setting up of Proper Accounts**

The existing accounting system is inappropriate. Regardless of the banking practice (single account as compared to multiple accounts), it is very important that each single project or account has a separate journal. This would ensure that all transactions in any single project are accounted for from the respective account or project fund as the case may be. The journals could also be used for reconciling the bank statements.
• **Customer Relations**

TSECS should ensure that it is always on good terms with its members and that any misunderstandings are resolved at the earliest possible time. It is therefore very important that the BTAs be properly trained and that the management of the TSECS maintains close contact with the communities through visits and meetings, newsletter, and/or regular radio programs. A good and effective customer relations program should result in an improvement in the members’ monthly rental payments. Besides good customer relations, it is very important for the TSECS not to be bias and implement its no-pay-disconnect policy.

• **Monthly Rental Fee**

The monthly rental fee should be reviewed in light of the change in the ownership of the systems, the staffing of the organisation, the level of services to be delivered and the tariff charged for diesel generated electricity in the outer islands. It was noted that on the island of Vaitupu, consumers are paying the island council $17 per month for their lights. The consumers pay this fee otherwise they are disconnected. Annex 5 provides a template for the calculation of the monthly fees and an explanatory note on how to use it. A diskette containing the template is also attached to this report. A need for an immediate review of the monthly fee is referred to below. It is therefore important for the TSECS to decide on its operation and maintenance costs and what it needs to set aside for the replacement components. These parameters can then be entered into the pricing template to determine what the monthly rental should be. Annex 5 shows an example where the monthly fee is calculated at $13.30.

• **Apportioning the Revenue Collected**

The TSECS operation should be very sensitive to the apportioning of revenue. There will obviously be the need to be very conservative with its expenses to ensure that sufficient funds are put aside to cover the costs of replacement components. For example, it may be considered that $2,400 per month is sufficient to cover the TSECS’s monthly operational cost and the balance used to cover the cost of replacement components. Under the current

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$1941 for staff wages and salary and $450 for electricity, phone, stationeries and transport. Annual salary scales of $6347 (Level 8 of the Tuvalu Civil Servants’ salary structure) for the Manager and $4764 (Level 9) each for the senior technician and the bookkeeper. Monthly wages based on $1/system plus $30 per month per BTA. Other operational costs (water, phone, electricity, stationeries, etc) estimated at $450 per month.
monthly rental fee and number of working systems (400), a residual amount of only $640 or $1.60/system/month would be available for the replacement of components, assuming a 100% collection rate. This is clearly insufficient for a sustainable program and therefore calls for an immediate review of the monthly fees and a strict enforcement of the no-pay-disconnect policy.

**A Tuvalu Solar Energy Company (TSEC)?**

In the region, two countries have preferred a corporation structure for the management of their solar electrification programs. These are Kiribati, which has established a Solar Energy Company (SEC) and the Marshall Islands where its Cabinet has approved the establishment of the Marshall Alternative Energy Corporation. Corporations are preferred since the membership of its Board of Directors is based on skills and experience rather than by virtue of their membership in the cooperative.

It is considered that a properly established TSEC could manage Tuvalu’s solar rural electrification program in a sustainable manner. For this to happen, the TSEC should have the following characteristics: an effective Board of Directors, a properly staffed, equipped and self-financing TSEC office with a strong commitment to maximising the efficiency of its service delivery and recovering the full costs of its services from its customers.

The only established solar corporation that is in existence in the region is the Kiribati Solar Energy Company (KSEC). The following are the characteristics of the KSEC:

* a government-owned corporation which owns all components of the PV systems except the house wiring and appliances which are the responsibility of the consumers;
* electrical service will be provided to users for a fee which fully recovers the cost of operating and maintaining the systems;
* a central office, sufficiently staffed with administrative and technical people;
* a Board of Directors consisting of senior civil servants and business people;
* trained field technicians who are positioned in the outer islands with PV systems; and
* a no-pay-disconnect policy.

It should be noted that KSEC has four distinct operations:

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$7.60 per system per month is used as the basis for this calculation.
* a service department, which covers its operations to provide electricity to its serviced customers in designated islands;
* a manufacturing operation which manufactures chargeldischarge controllers and AC/DC converters;
* imports solar equipment for direct re-sale; and
* the provision of system maintenance and design services on contracts,

The major differences between KSEC and the TSECS are briefly detailed below and are the underlying reasons for KSECS's current status and success as a solar corporation:

* KSEC has a more effective decision making body made up of senior civil servants and business people;
* KSEC has better trained and more committed staff;
* KSEC has a small components manufacturing and assembly operation which exports its products overseas; and
* KSEC has been able to supply its products and services to major donor and government-funded projects in Kiribati.

At the moment, there is insufficient expertise within Tuvalu to run a manufacturing operation for a proposed corporation. KSEC enjoys a unique arrangement with the South Pacific Institute for Renewable Energy (SPIRE) to assemble its controller design. It also receives special arrangements for its products to be used in regional projects and in projects in other places outside the region”. This unique and special arrangement is something that is not likely to be extended to Tuvalu and even if it were extended, Tuvalu would face difficulty in marketing its products against the bigger and better established manufacturers. It is not recommended that a corporation enter into a manufacturing operation unless the long-term security of a market is guaranteed.

A major feature of KSEC has been its ability to attract donor and government-funded projects, which use both its products and services. For instance, KSEC has been supplying and installing solar back-up systems in government offices and to a training institute with donor funding which has been channelled through government and with donor funding which has been send directly to KSEC.
To establish a TSEC, which could run the solar electrification program in a sustainable manner, certain essential steps would be required:

**Deregister the TSECS and transfer memberships, assets and liabilities to the TSEC**

Under the Cooperative Societies' Act, a society can be dissolved if the Registrar, after holding an inquiry and/or making inspection as to the affairs of the society or on receipt of an application made by three fourths of the members of a registered society, is of the opinion that the society ought to be dissolved and he makes an order for the cancellation of the registration of the society. Cancellation of registration can also be done when it is proved that the number of the members has been reduced to less than ten. Upon dissolution of the society, the Registrar may appoint a liquidator to, among other things, deal with any claim by or against the society.

The major financial impact of an immediate dissolution of TSECS would be the recovery of funds that are owed to the TSECS by its former employees, the refund of the membership deposit ($26,400) and the payment of the outstanding $4000 to the Kiribati Solar Energy Company.

In a TSEC, the membership system that is used in a cooperative is not required. People with solar systems would be just consumers and clients, as they are treated by the KSEC. Therefore, all assets and liabilities of the TSECS would be transferred to the TSEC, after the refund of the membership fees and the settlement of claims for and against the TSECS as a result of the dissolution process. It is also important that before the transfer, all systems are fully serviced with all maintenance carried out where necessary, to ensure that all systems are in good working order. This is necessary, as the transfer will involve a new set of rules regarding system ownership. Any remaining assets and funds of the TSECS, after the maintenance of the systems would be transferred to the TSEC and could be treated as the existing consumers' shares in the company.

For the existing TSECS technical staff at the Head Office, it is noted that they are just about the only trained people on PV systems in Tuvalu, therefore it is considered beneficial that they be transferred to TSEC after settling all their arrears to the TSECS. For the BTAs, their selection should be left to the new management of the TSEC. It is important that the BTAs terms and conditions of employment and their functions should be clearly stated.

SEC supplied the controllers to the Lome 2 PV Follow-up Program and also to some PV projects in Bhutan.
Register the TSEC as a government-owned corporation

It is important that the TSEC be established, as a government-owned corporation since this is a period where government's technical assistance is much needed. However, the long-term objective should be to run the TSEC as a private entity. There are certain important characteristics of the TSEC, which should be specifically spelt out in its Articles of Association:

- **A non-profit organisation with a limited liability**

  The TSEC should be registered as a non-profit organisation with a limited liability as opposed to a commercial company. As a non-profit organisation, the TSEC should be exempted from corporate income tax. The TSEC should also request the Tuvalu government that its solar systems and components be exempted permanently from all import duties and taxes, as is often granted to non-profit organisations established to provide a social service.

- **Unrestricted objects**

  It would be beneficial to incorporate the TSEC with an unrestricted object. While it is important that the TSEC be focussed on its role of supplying, installing, maintaining and selling PV systems, it is also important to be forward looking and allow maximum flexibility for the TSEC to accommodate future changes in structure and purposes as it evolves over time.

- **The relationship between the Board of Directors and the Manager**

  All too often corporations face administrative difficulties because the company's Articles of Association gives authority to the Board of Directors to deal with all management details of the company. These mostly relate to matters relating to staff where the board is also involved in the recruitment and dismissal of staff lower than the Manager. The board should only recruit and discipline the Manager since it is the Manager and the Manager alone who reports to the board. The board should of course determine the company's staffing structure and its manpower budget.

  It is important to note that the functions of the board are to approve and not to decide. It is therefore important that in board meetings, the Manager supplies the board with all the

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TSECS presently enjoys duty exemption on its imports of PV systems and parts.
necessary information, clear resolutions and directions so as to ease its deliberations and keep them focussed.

Raise a capital cash fund of at least $50,000

It is important that the TSEC be incorporated with a capital fund of $50,000 including any funds transferred from the TSECS. Below are possible avenues for raising this capital fund:

- Small Islands States (SIS) Development Fund or other Grant Aid Funds

This option is available to the board of the TSEC. It is noted that the TSECS office building was built with funds from the SIS Development Fund administered by the Forum Secretariat, and it will take some convincing for the Tuvalu government to be assisted twice from the same fund in the same area.

The Japanese International Cooperation Assistance (JICA), the Australian Aid Program (AusAID) and the French are presently actively involved in funding photovoltaic projects in the region. Of interest is the JICA aid program where they do not only supply the PV hardware but they are also providing vehicles, boats, office equipment such as computers, fax and photocopy machines and also short and long term consultants to work on their projects. JICA has unofficially mentioned the possibility of a PV project in Tuvalu. This project should be vigorously pursued and the package should not only be the PV systems but it should also include the much needed transport, office equipment and long term** consultants.

- Long-term Soft Loan

This option should be considered as the last resort should the above two options fail as it would have an inflating impact on the current monthly rental fee. The loan should be for at least ten years or more and should be guaranteed by government. Alternatively, to ensure that the TSEC gets a very soft interest rate, government may consider directly taking the loan and transferring the funds to the TSECS through a Memorandum of Understanding or such similar instrument rather than government taking the soft loan and re-loaning that soft loan to the company on a higher interest rate.

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Short term consultants are from a month to a year. Long term ones are from 1.5 - 3 years
Appoint appropriately-trained and experienced people in the Board of Directors

The Board of Directors of the TSEC should not be less than three nor greater than five and should be selected from business people and senior civil servants with business management experience and commitment to work for the development of the rural islands of Tuvalu. It is also important that the Energy Planner be a full member of the board, The Energy Planner would greatly assist on the policy issues and the coordination of donor-funded programs in Tuvalu’s energy sector.

Staffing of the TSEC

It is important to keep a tight control on the number of staff of the TSEC, as this will be a major cost item for the company. It is considered that the optimum number of permanent staff positions at the Head Office should be restricted to three; a Manager, a trainee Manager, a bookkeeper and a senior technician. TSEC should adopt TSECS's placements of BTAs in all the islands with PV systems. A staffing structure for the TSEC is as shown in Figure 3.

In trying to get the TSEC up and running, it is not only important that an experienced Board of Directors is in place but also that the day-to-day management of the company be given to an expatriate, The expatriate is not to be paid by the company although it may have to provide for the housing, water and electricity. Expatriates are available through the Japanese Overseas Volunteer Scheme, the US Peace Corps and from similar programs of Australia and New Zealand. The existing Manager position at the TSECS should be redesignated as Trainee Manager.

The services of the expatriate Manager should be available to the TSEC for at least three years. His/her prime responsibilities is to get the TSEC established, set its procedures and policies for doing its functions, service the Board of Directors’ meetings and provide on-the-job training to the staff of the TSEC.

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Position of Manager trainee is to be terminated as the Manager position is localised.
In addition to the Manager, it is very important that a bookkeeper be immediately recruited. The bookkeeper should be a local and someone who should be able to prepare the statement of income and expenditure and the balance sheet of the TSEC. Details of the TSEC staff's job descriptions are attached as Annex 6.

A full cost recovery fee

The service fee charged to the TSEC consumers would be the most important determinant of its sustainability. It is important that the TSEC try to minimise its costs and that all the costs of its services be recovered from its consumers (see Annex 5 for the tariff template). Equally important, the TSEC would have to apply a very strict no-pay-disconnect policy.
**Merge TSECS with TEC**

The Tuvalu Electricity Act does permit for a merge of the two institutions. At the moment there is no competition between the two organisations, solar can be installed in places which already have power from TEC, however, no one else is to generate electricity from diesel generators in the TEC designated areas. TEC designated areas include Funafuti, the Amatuku Maritime School and the Motufoua Secondary School.

TEC is presently being run as a corporation and has been subsidised by the Tuvalu government. It is considered inappropriate to merge TEC and TSECS now, as one would be subsidising the other. On the other hand, the idea of merging should be relooked at when both are operating on a user-pays and full cost-recovery basis.

**Put the management of the solar program under a government Ministry**

This option is not considered practical. Firstly, this would be contrary to government's public sector reform program. Secondly, the solar rural electrification program would become a very small neglected operation in a much larger organisation. The program would be subjected to bureaucracies in the government system rendering the delivery of services inefficient. Further, as a small operation in a much larger government ministry, the program would not be able to be accountable to its members or consumers in a timely manner. Experiences with similar programs around the region have shown that the inability of the concerned government offices to provide timely and up-to-date financial reports to the rural communities has negatively affected people's willingness to pay their monthly fees. Similarly, monthly fees deposited with government do not earn interest and is an area of major concern to the rural communities.

**CONCLUSION AND RECOMMENDATION**

The current management and operation of the TSECS has not worked well for the sustainability of the Tuvalu solar rural electrification program. The program has gone through years of poor financial and business management practices, resulting from an ineffective management committee; a lack of commitment from the Registrar of Cooperatives and the Audit Department; a poorly staffed and equipped Office; and the non-observance of the provisions of the Cooperative's Act and TSECS bye-laws.
It is possible to make the program sustainable under the cooperative structure and also under the form of a solar energy company. While there are small differences in the institutional and management set-up (the Cooperative Act as opposed to the Company Act), the actions recommended for both are basically the same.

These recommendations include the appointment of appropriately trained and skilled people in the management committee or Board of Directors who are capable of running the program on a commercial basis. There is a need to recruit an expatriate Manager to provide training to the local staff and that the Head Office be adequately staffed, equipped and disciplined. The program is effectively bankrupt and there is therefore an immediate need to raise a rehabilitation capital fund of $50,000 to ensure that basic services are delivered and that the solar systems are well maintained. Finally, the program has to operate on a full cost recovery basis. To fully recover the costs of running the program, there is a need for improvement to service delivery, the maintenance of healthy customer relations and the streamlining of office practices in order to improve efficiency and customer satisfaction.

The options of merging the TSECS with the TEC and putting the management of the program under a government ministry are both considered impractical.

Merging the TSECS with TEC right now would either become an additional financial burden to government or for one institution to subsidise the other. On the other hand, putting the management of the program under government would subject the program to government bureaucracy, which would result in inefficient delivery of services and unhealthy utility-customers relations.
ANNEX 1

Various Projects Concepts and Lessons Learnt in the Pacific

Aid-funded, government installed, village cooperative owned and maintained individual home systems with government technical support.

This model has been used in Fiji in 1982 -84. Village co-operatives were formed with the tasks of monthly fee collection and self-maintenance. The program consisted of 100 systems each with a single 42 Wp panel, a 45AH gel-cell battery, a discharge controller with "D" cell Ni-Cd charging capability, and two 12V DC fluorescent lights. After installation, the Fiji Department of Energy was available to the cooperatives for technical assistance and spare parts.

The experience with this program has not been satisfactory. There were design flaws in the systems and parts failed within the first year. Most of the Ni-Cd "D" cell batteries were also lost, damaged or destroyed within six months of installation. Many Ni-Cd chargers failed due to general misuse. Fee collections were good at first and soon became sporadic and in the end, government made virtually all purchases of replacement parts and most systems were abandoned.

Aid/government funded, government installed, government owned, basic maintenance by owner with energy office technical assistance on call.

This model has been used in a few countries in the region. Systems used a single panel between 40 and 50 Wp capacity. Batteries ranged from inexpensive open cell lead acid batteries to expensive ones specially designed for PV systems. Most had charge/discharge controllers, some did not have any and others had only charge control. Lamps used were in the range of 13 - 18 W. Fees were charged on the users.

The experience with this model has not been satisfactory. Systems have been abandoned, are operational at reduced capacity or have had maintenance problems. While the intention was for the users to do the maintenance, government effectively provided nearly all the maintenance though often after long delays. Systems were damaged through ignorance of the users and the fee collections ceased after a few months.

Commercially installed, user financed, owned and maintained with commercial maintenance available on call.

This model has been used in a few countries. The customers are mostly the religious institutions and well-off individuals while the suppliers were private businesses, PV being a very small part of their undertakings. The experience with this model has not been satisfactory. Inferior equipment has been sold to customers and both customers and the private businesses were not fully knowledgeable of PV system designs, installations and maintenance.

Commercially installed and owned, commercial maintenance on call.

This model was used in Fiji in the period of 1983-1985 where a foreign owned private company claims to have installed 200 systems under a leasing arrangement. For a basic lighting system with a single panel and two lights, a monthly fee of F$15 was charged and it included maintenance which were to be carried out by local field agents. This business failed as a result of poor collection rate and the inefficiency of the local agents.
Commercially installed and owned, commercial periodic maintenance, pay as you use system

This model used a "key access" system where it was necessary for the user to buy a plastic key and by inserting the key into a receptacle in a box and then turning it until it broke off power was provided for a 24 period. This business failed largely as a result of a collapse in the financing arrangements for the project.

National co-operative owned and installed, periodic maintenance and fee collections by the cooperative

This model is a private, commercial enterprise charged with implementing and managing household solar lighting projects. The enterprise does not have direct links with government though government through the Cooperative Act regulates it. The enterprise also has access to external resources through a government agency, which provides services to cooperatives. The major undertaking of the enterprise has been to install grant aid funded projects, sell spare parts and carries out the maintenance for a fee. The enterprise operates on the fees collected.

This model has faced problems. Management has embezzled funds of the enterprise. The Board of Directors has not been very efficient in the performance of their tasks. Field agents have not been very effective and the fee collections have declined dramatically.

Corporate owned and installed, periodic maintenance and fee collections by the corporation.

This model has been used in Kiribati. It is a private enterprise with a charter to act as a retail outlet for PV systems and to provide technical assistance where needed for their installation and maintenance. During the period of 1984-89, about 270 PV lighting systems were sold to private from the enterprise and despite grants and a regional approach to the private sale and support of PV RE systems, by 1989 the enterprise was effectively bankrupt. A diagnosis of the enterprise recommended that it be changed from a sales oriented organisation to a service organisation based around a rural electricity utility concept. A recent review of the enterprise pointed to a need for the enterprise to immediately obtain grant aid funds for a new project and/or to review the existing monthly fees charged on its customers. There was also a need for the enterprise to improve on its fee collection rate. While this model has been reported to appear sustainable, it should be noted that in the medium term strategy of Kiribati, the private sector is to take over the operations of the corporation.
ANNEX 2 - BTA RETURN FORMS
### ANNEX 2

The Bta Return Forms (Existing)

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Rec'd #</th>
<th>Date</th>
<th>Amt Paid</th>
<th>Month Paid</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0201</td>
<td>Isaia Taape</td>
<td>1234</td>
<td>12/1/97</td>
<td>7.60</td>
<td>Oct '96</td>
<td>2 lights working</td>
</tr>
<tr>
<td>0202</td>
<td>Sione Lei</td>
<td>1235</td>
<td>12/1/97</td>
<td>7.60</td>
<td>Jan '97</td>
<td>2 lights working</td>
</tr>
<tr>
<td>0203</td>
<td>Tame Hui</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0204</td>
<td>Mele Nau</td>
<td>1236</td>
<td>12/1/97</td>
<td>7.60</td>
<td>Jan '97</td>
<td>2 lights working</td>
</tr>
</tbody>
</table>

TOTAL: 22.80

Less BTA wages\(^1\) 10.00
Less transport\(^1\) 2.00
Less rent\(^1\) 1.00
Balance: 9.80
Deposit with IEO: 9.80

\(^1\) = fictitious numbers only

---

**Monthly Rental Payments Record Form (Existing)**

<table>
<thead>
<tr>
<th>Name</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isaia Taape</td>
<td>Oct '96</td>
<td>Nov '96</td>
<td>Dec '96</td>
<td>Jan '97</td>
<td>$7.60</td>
<td>Dec '96</td>
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<td>Rec1238</td>
<td>Rec1240</td>
<td>Rec1239</td>
<td>Rec1241</td>
</tr>
<tr>
<td></td>
<td>12/1/97</td>
<td>12/2/97</td>
<td>14/3/97</td>
<td>12/4/97</td>
<td>14/3/97</td>
<td>12/4/97</td>
</tr>
<tr>
<td>Sione Lei</td>
<td>Jan '97</td>
<td>Feb '97</td>
<td>Mar '97</td>
<td>April '97</td>
<td>$7.60</td>
<td>Jan '97</td>
</tr>
<tr>
<td></td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
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<td>Rec1239</td>
<td>Rec1239</td>
<td>Rec1239</td>
<td>Rec1239</td>
<td>Rec1241</td>
</tr>
<tr>
<td></td>
<td>12/1/97</td>
<td>14/3/97</td>
<td>14/3/97</td>
<td>14/3/97</td>
<td>14/3/97</td>
<td>12/4/97</td>
</tr>
<tr>
<td>Tame Hui</td>
<td>Dec '96</td>
<td>$7.60</td>
<td></td>
<td></td>
<td>$7.60</td>
<td>$7.60</td>
</tr>
<tr>
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<td>Rec1241</td>
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<td>12/4/97</td>
<td></td>
<td></td>
<td>Rec1242</td>
<td>12/4/97</td>
</tr>
<tr>
<td>Mele Nau</td>
<td>Jan '97</td>
<td>Feb '97</td>
<td>Mar '97</td>
<td>Apr '97</td>
<td>$7.60</td>
<td>Jan '97</td>
</tr>
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<td>Rec1242</td>
<td>Rec1242</td>
<td>Rec1242</td>
<td>Rec1242</td>
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</tbody>
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RECOMMENDED FORMS

Monthly Rental Payments Record Form

Deposited to Account No:...012-010-7260  Branch:...Vaitupu

<table>
<thead>
<tr>
<th>Name</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isaia Taape</td>
<td>Oct '96</td>
<td>Nov '96</td>
<td>Dec '96</td>
<td>Jan '97</td>
<td></td>
</tr>
<tr>
<td>0201</td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
<td>$7.60</td>
<td></td>
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<td>12/2/97</td>
<td>14/3/97</td>
<td>12/4/97</td>
<td></td>
</tr>
<tr>
<td>Sione Lei</td>
<td>Jan '97</td>
<td>Feb '97</td>
<td>Mar '97</td>
<td>April '97</td>
<td></td>
</tr>
<tr>
<td>0202</td>
<td>$7.60</td>
<td>Rec1235</td>
<td>Rec1239</td>
<td>Rec1239</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12/1/97</td>
<td>14/3/97</td>
<td>14/3/97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tame Hui</td>
<td></td>
<td></td>
<td>Dec '96</td>
<td>Jan '97</td>
<td></td>
</tr>
<tr>
<td>0203</td>
<td></td>
<td></td>
<td>$7.60</td>
<td>$7.60</td>
<td></td>
</tr>
<tr>
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<td>Rec1241</td>
<td>Rec1243</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12/4/97</td>
<td>12/5/97</td>
<td></td>
</tr>
<tr>
<td>Mele Nau</td>
<td>Jan '97</td>
<td>Feb '97</td>
<td>Mar '97</td>
<td>Apr '97</td>
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<td>Rec1236</td>
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<td>Rec1242</td>
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<td>12/4/97</td>
<td>12/4/97</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Collected 22.80
Less expenses 13.00
Deposited IEO 9.80

TO BE COMPLETED BY THE HEADQUARTER STAFF ONLY

1. Total Collected 22.80 7.60 30.40 38.00
2. Less arrears paid 7.60 7.60 7.60 30.40
3. Less advance payments - - 7.60 -
4. Total paid for the month 1-(2+3) 15.20 - 15.20 7.60
5. Total for the month (4@$7.60) 30.40 30.40 30.40 30.40
6. Amt in arrears for the month (5-4) 15.20 30.40 15.20 22.80
7. Last month’s Acc. Arrears less paid ones (7-2) 22.80 30.40 53.20 38.00
8. Total in arrears as of end of the month (5+6) 38.00 60.80 68.40 60.80
# BTA TECHNICAL CHECKLIST AND MAINTENANCE FORM

**Branch:** Vaitupu  
**Month:** January  
**Date:** 12/1/97

<table>
<thead>
<tr>
<th>Name</th>
<th>Panels</th>
<th>Batteries</th>
<th>Lights</th>
<th>Controllers</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isaia Taape 0201</td>
<td>Cleaned</td>
<td>Top up water</td>
<td>Cleaned</td>
<td>Re-set</td>
<td>Cleaned</td>
</tr>
<tr>
<td></td>
<td>Cut Shades</td>
<td>Greased</td>
<td>Changed</td>
<td>Cleaned</td>
<td>Re-sealed</td>
</tr>
<tr>
<td></td>
<td>Greased</td>
<td>SG reading</td>
<td>Moved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sione Lei 0202</td>
<td>Cleaned</td>
<td>Top up water</td>
<td>Cleaned</td>
<td>Re-set</td>
<td>Cleaned</td>
</tr>
<tr>
<td></td>
<td>Cut Shades</td>
<td>Greased</td>
<td>Changed</td>
<td>Cleaned</td>
<td>Re-sealed</td>
</tr>
<tr>
<td></td>
<td>Greased</td>
<td>SG reading</td>
<td>Moved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tame Hui 0203</td>
<td>Cleaned</td>
<td>Top up water</td>
<td>Cleaned</td>
<td>Re-set</td>
<td>Cleaned</td>
</tr>
<tr>
<td></td>
<td>Cut Shades</td>
<td>Greased</td>
<td>Changed</td>
<td>Cleaned</td>
<td>Re-sealed</td>
</tr>
<tr>
<td></td>
<td>Greased</td>
<td>SG reading</td>
<td>Moved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 3 - TSECS INCOME & EXPENDITURE FOR THE YEAR ENDING
## TSECS Income & Expenditure for the Year Ending

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Equipments</td>
<td>15475.00</td>
<td>25625.00</td>
<td>3438.20</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
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</tr>
<tr>
<td>EEC Imprést</td>
<td>2187.00</td>
<td>91.05</td>
<td>3143.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fees Received</td>
<td>16657.05</td>
<td>15335.03</td>
<td>4873.77</td>
<td>8055.33</td>
<td>13319.35</td>
<td>32706.84</td>
<td>36769.38</td>
</tr>
<tr>
<td>Fees Accrued</td>
<td>4353.10</td>
<td>4407.56</td>
<td>351.05</td>
<td>391.05</td>
<td>351.20</td>
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<td>0.00</td>
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<tr>
<td>Commission Received</td>
<td>451.99</td>
<td>225.33</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tr>
<tr>
<td>Interest Accrued</td>
<td>553.36</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Interest Imprést</td>
<td>62.64</td>
<td>169.69</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tr>
<tr>
<td>IBO</td>
<td>4970.04</td>
<td>526.41</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Fixed Deposits</td>
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<td>4604.83</td>
<td>7014.36</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Savings Account &amp; Fudt</td>
<td>341.16</td>
<td>292.07</td>
<td>177.79</td>
<td>85.09</td>
<td>32.30</td>
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<td>0.00</td>
</tr>
<tr>
<td>Interest Accrued - IBO</td>
<td>3064.56</td>
<td>3553.37</td>
<td>1912.28</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tr>
<tr>
<td>Sundry Income</td>
<td>150.50</td>
<td>156.95</td>
<td>3245.45</td>
<td>35.50</td>
<td>0.00</td>
<td>0.00</td>
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<td>Salary Advance</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Sales of Acid, Batteries etc</td>
<td>514</td>
<td>900</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Add unidentified revenue</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Benefits from donated assets</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>TOTAL INCOME</strong></td>
<td>27401.32</td>
<td>26877.42</td>
<td>171245.53</td>
<td>47905.89</td>
<td>20909.29</td>
<td>32888.18</td>
<td>37202.79</td>
</tr>
</tbody>
</table>

## LESS EXPENDITURES

| DEPRECIATION | 28432.75 | 28422.16 | 50097.72 | 22304.46 | 50097.72 | 131985.88 | 133144.61 |
| Salary & Wages | 10923.51 | 16559.08 | 15971.12 | 13951.39 | 15233.68 | 13235.91 | 21140.20 |
| TFF Contributions | 795.96 | 778.17 | 639.96 | 745.15 | 637.56 | 972.59 | 34.65 |
| Bank Charges | 120.00 | 138.20 | 101.75 | 175.69 | 176.64 | 34.65 | 34.65 |
| Transport | 357.17 | 188.82 | 157.50 | 31.74 | 303.00 | 105.95 | 178.95 |
| Solar Coop Tarawa | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pol Product (Fiji) | 36.60 | 48.30 | 78.50 | 35.89 | 623.54 | 755.00 | 1037.24 |
| Rent & Electrically | 383.00 | 485.30 | 112.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| EEC Imprést | 120.57 | 0.00 | 112.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| BankPay | 1410.45 | 2923.68 | 1684.45 | 138.61 | 892.93 | 750.91 | 0.00 |
| Travelling and Postage | 493.45 | 470.55 | 400.55 | 20.65 | 141.35 | 300.89 | 604.77 |
| Office Expenses | 420.44 | 426.65 | 958.71 | 1875.05 | 786.44 | 0.00 | 0.00 |
| Stationary & Office Equipment | 1040.43 | 1826.46 | 1017.52 | 225.59 | 0.00 | 1569.29 | 529.75 |
| Repair & Maintenance | 474.74 | 710.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Audit Fee | 640.75 | 1300.00 | 850.00 | 1000.00 | 1000.00 | 0.00 | 0.00 |
| Miscellaneous | 549.12 | 284.91 | 195.80 | 312.50 | 0.00 | 83.00 | 0.00 |
| Loss on Fixed Asset Disposal | 45.85 | 2494.24 | 52454.33 | 6353.18 | 0.00 | 0.00 | 0.00 |
| Identifiable Loss (Woll) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Accountant Fee | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Membership Fee | 10.00 | 37.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| AGM | 2552.85 | 1706.66 | 3293.01 | 426.00 | 0.00 | 0.00 | 5290.75 |
| Leave Pay | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sick Leave | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Wages & Tax | 402.15 | 72.34 | 72.34 | 675.17 | 415.60 | 205.58 | 327.96 |
| **TOTAL EXPENDITURE** | 47659.69 | 57595.13 | 75907.09 | 68853.91 | 75053.17 | 153138.00 | 166112.36 |

| INCOME OVER EXPENDITURE | -20258.37 | -28178.71 | 95330.44 | -31049.31 | -34864.07 | -120265.67 | -129508.72 |

Source: TSECS
<table>
<thead>
<tr>
<th>TSECS BALANCE SHEETS</th>
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</thead>
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<tr>
<td><strong>FIXED ASSETS</strong></td>
</tr>
<tr>
<td>Solar Equipment</td>
</tr>
<tr>
<td><strong>INVESTMENT</strong></td>
</tr>
<tr>
<td>Fixed Deposit</td>
</tr>
<tr>
<td><strong>CURRENT ASSET</strong></td>
</tr>
<tr>
<td>Sundry Debts</td>
</tr>
<tr>
<td>EEC Interest</td>
</tr>
<tr>
<td>Commission Accrued</td>
</tr>
<tr>
<td>Cash in hand (outside)</td>
</tr>
<tr>
<td>Cash in hand (HQ)</td>
</tr>
<tr>
<td>Petty cash</td>
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<tr>
<td>Cash at Bank</td>
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<tr>
<td>Current A/C</td>
</tr>
<tr>
<td>Savings A/C</td>
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<tr>
<td>Penta Full Fund</td>
</tr>
<tr>
<td>Audit Fee</td>
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<tr>
<td>Suspense Account</td>
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<tr>
<td>Salary Advance</td>
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<tr>
<td>Accrued Rentas</td>
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<td>Accrued Interests</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Less Current Liabilities</td>
</tr>
<tr>
<td>Membership Fees</td>
</tr>
<tr>
<td>Audit Fee</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
| Long Term Liability   
| Barclays Loan          | 25000.00  | 25000.00    | 25000.00    | 25000.00  | 25000.00    | 25000.00    |
|                         | 120150.55 | 215036.39   | 157427.95   | 97679.90  | 57445.35    | 499797.56   |
| THIS IS REPRESENTED BY |
| Accumulated Net Income | 108485.31 | 79702.00    | 148756.13   | 64660.71  | 29796.64    | 507077.05   |
| Prior Year Adjustments | 3064.60   | 550.00      | 261.00      | 0.00      | 12500.00    | 54850.05    |
| Excess of Expend over Income | -3877.71 | 9533.64     | -510.48     | -54664.07 | 120142.02   | -124369.72  |
|                         | 76702.00  | 172996.84   | 97989.72    | 29795.64  | 90797.95    | 432417.33   |
| General Reserve        | 43443.55  | 43443.55    | 67283.26    | 67283.26  | 67830.30    | 67830.23    |
|                         | 120150.55 | 215036.39   | 155462.38   | 97679.90  | 57445.35    | 499797.56   |

Source: TSECS
ANNEX 4 - JOB DESCRIPTION
ANNEX 4

Job Description

Manager

The Manager directly reports to the Management Committee and will be responsible for the day-to-day management of the operations of the TSECS. Specifically he/she will be responsible for:

- Servicing the meetings of the management committee as secretary;
- Ensuring that the TSECS is run and managed in accordance with its byelaws and the Cooperative’s Act;
- Implementing measures to improve efficiency in service delivery and to make the TSECS a self-sustaining commercial entity;
- Identifying local and grant aid funding for the expansion of the TSECS’s solar electrification program;
- Supervising the staff of the TSECS to ensuring the efficient and cost effective implementation of projects and the timely submission of reports to the program’s funding sources; and
- Providing of counterpart on-the-job management and technical training to the Trainee Manager and to other staff of the TSECS.

Qualifications

The appointee must have at least a degree in renewable energy engineering or a degree in a similar related field such as appropriate/rural technology, rural development, etc. He/she must have at least five years of management experience in a utility-type organisation and in developing, remote and island environments.

Bookkeeper

The Bookkeeper (BK) will be responsible for all the secretarial and book keeping works of the TSEC and will report directly to the Trainee Manager. Specifically he/she will be responsible for:

- maintaining the office’s filing system;
- the word processing works of the office;
- ensuring the efficient flow of both outgoing and incoming correspondence;
- maintaining an up-to-date record of the assets and financial resources of the office;
- maintaining a record of customers payments and the recommendation of service disconnection;
- the timely preparation of the financial records of the office;
- ensuring the smooth inflow of revenue and the timely execution of payments; and
- providing training to the BTAs on their fee collection and recording functions.

Qualifications

The appointee must have at least a diploma in accounting with at least two years of working experience in Tuvalu or a pass in the NZ School Certificate with at least 6 years of bookkeeping or office manager working experience. Earlier working experience in an utility would be a bonus.
ANNEX 5 - CALCULATION OF MONTHLY FEES
ANNEX 6 - TSEC STAFF JOB DESCRIPTIONS
ANNEX 6

Job Descriptions of the Staff of the Tuvalu Solar Energy Company

Manager

The Manager directly reports to the Board of Directors (BOD) and will be responsible for the overall management of the operations of the TSEC. Specifically he/she will be responsible for:

- Servicing the meetings of the BOD as secretary;
- Ensuring that the TSEC is run and managed in accordance with its Articles of Association, the Company's Act and the decisions of the BOD;
- Formulating policies to improve efficiency in service delivery and to make the TSEC a self-sustaining commercial entity;
- Identifying local and grant aid funding for the expansion of the TSEC’s solar electrification program;
- Ensuring the efficient and cost effective implementation of projects and the timely submission of reports to the program's funding sources; and
- Providing of counterpart on-the-job management and technical training to the local staff.

Qualification

The appointee must have at least a degree in renewable energy engineering or a degree in a similar related field such as appropriate/rural technology, rural development, etc. He/she must have at least five years of management experience in a utility-type organisation and in developing, remote and island environments.

Trainee Manager

The Trainee Manager (TM) directly reports to the Manager and will be responsible to the day-to-day supervision of the works of the Book Keeper, the Senior Technicians and the Branch Technical Assistants. While the overall management of the TSEC would be with the Manager, the TM would act as Manager in the absence of the Manager and will take on the full authority and responsibilities of the Manager.

Qualification

The appointee must have at least a diploma in management, commerce or other related field. He/she must have at least five years of management experience in Tuvalu.

Bookkeeper

The bookkeeper (BK) will be responsible for all the secretarial and book keeping works of the TSEC and will report directly to the Trainee Manager. Specifically he/she will be responsible for:

- maintaining the office's filing system;
- the word processing works of the office;
  - ensuring the efficient flow of both outgoing and incoming correspondence;
- maintaining up-to-date record of the assets and financial resources of the office;
Qualification

The appointee must have at least a diploma in accounting with at least two years of working experience in Tuvalu or a pass in the NZ School Certificate with at least 6 years of bookkeeping or office manager working experience. Earlier working experience in an utility would be a bonus.

Senior Energy Technicians

The Senior Energy Technicians (SET) reports directly to the Trainee Manager (TM). They will be responsible for supervising the works of the BTAs and carrying out all the technical functions of the TSEC. Specifically they will be responsible for:

- the implementation of renewable energy projects and the timely submission of installation reports;
- carrying out grass root national training program on the maintenance of PV systems;
- carrying out technical training of the BTAs;
- ordering of spare parts; and
- maintaining an up-to-date record on the movements of equipment bought for and/or supplied through the TSEC, their performance and the maintenance works carried out on of each PV system.

Qualification

The appointees must be Tuvaluan nationals who have sat for the NZ University Entrance examination with good passes in maths and science.

Branch Technical Assistants

The Branch Technical Assistant (BTA) reports directly to the Senior Technicians. They will be the on-site representatives of the TSEC in its areas of service. Specifically he/she will be responsible for:

- monitoring the performance of the PV systems, carrying out all the necessary maintenance works in the process and carrying out the disconnection of service to consumers who fail to abide with the policies of the TSEC;
- safekeeping of spare parts and equipments that are required for his/her monitoring and maintenance functions;
- collecting of the monthly rental fees and the transmission of the fees to the TSEC main office;
- assist in the installation of projects; and
- liaising between the communities and the TSEC management.

Qualification

The appointees must be Tuvaluan nationals who have sat for the Tuvalu School Certificate examination with good passes in maths and Science.
ANNEX 7 - TOR PROVISION OF BUSINESS MANAGEMENT ASSISTANCE TO TSECS
ANNEX 7

TOR for the Provision of Business Management Assistance to the Tuvalu Solar Electric Cooperative Society (TSECS)

A. Introduction

Solar Photovoltaic (PV) systems were first introduced in Tuvalu in 1979 to power the inter-island telecommunication systems. In 1984, the Save the Children Federation (USA) began planning a process for implementing solar electrification on outer islands of Tuvalu. The institutional design chosen was based on the recommendations of the Fiji Director of Energy who had the only prior experience in the region with a similar project. As a result of this effort, the Tuvalu Solar Electric Cooperative Society (TSECS) was formed in 1984 to provide small solar PV lighting kits to outer island households, which at the time were illuminated exclusively by kerosene lamps.

In June 1988 after completing its initial objective, Save the Children Federation withdrew its administrative support from TSECS. The cooperative then became an independent, locally owned and operated commercial enterprise - covering its operating and maintenance expenses from fees paid by its members. From 1993 to the present, TSECS has been haunted by various institutional problems, which had directly and adversely impacted, on the sustainability of its solar electrification program.

B. Objective of the Assistance

The objective of this assistance is to assess the institutional and management aspects of the operations of the TSECS and to make recommendations on means of improving the capability of the Tuvalu government to better manage and operate its PV programs in a sustainable manner.

C. Scope of the Assistance

Having regard to the objective of the assistance, the Consultant will be required to:

(i) assess the accounting and business management, record keeping and business planning practices that are currently being adopted by the TSECS;

(ii) assess the adequacy and role of the management and institutional frameworks in the realization of program's, institution's and government's objectives;

(iii) provide on-site advice on the issues identified in (i) above;

(iv) provide recommendations on measures to fully address the issues identified in (i) & (ii) above;

(v) provide recommendations regarding follow-up measures that might be pursued on a regional basis as Phase 2 of this assistance.

D. Methodology

The Consultant will be required to visit Tuvalu and the TSECS to carry out an in-depth assessment of the current accounting and business management, record keeping and
business planning practices that are currently in use in the program. The assessment and related recommendations should have regard to the current best practices in business management.

The Consultant will be required, during the course of the assessment visit, to provide on-site advice on issues identified in section c(i) above which could readily be implemented by the TSECS.

The Consultant shall be required to carry out an extensive study of the adequacy and role of the management and institutional frameworks of TSEC in meeting the program’s, institution’s and government’s objectives and giving due consideration to the long term sustainability of the PV programs.

The Phase 2 follow-up measures are to further address the issues identified in the assessment report and are expected to involve one or more of (but not restricted to) the following approaches:

- preparation of a business management manual for TSECS
- a sub-regional workshop for Solar Utility managers and financial accounting staff
- further on-site advice and training at TSECS.

E. Reporting

The Consultant shall produce a report covering the areas identified in Section C of this terms of reference. The draft report shall be available by the first half of April.

F. Time Schedule

The site visit is planned for 3-13 March and it will include a visit to some of the outer islands with PV.
ANNEX 8 - PEOPLE CONSULTED DURING THE REVIEW
## ANNEX 8

### People Consulted during the Review

1. Mr Semu Taafaki  
   Secretary for Works, Energy and Communication
2. Mr Lutelu Faavae  
   Secretary for Finance and Economic Planning
3. Mr Levi Telii  
   Acting Secretary for the Public Sector Reform Commission (PSRC)
4. Mr Terry Heap  
   Consultant, PSRC
5. Mr Ionatana Peia  
   Manager, National Bank of Tuvalu
6. Mrs Patricia Vakafua  
   Accountant General, Ministry of Finance
7. Mr Bill Teo  
   Aid Coordination Officer
8. Mr John Howe  
   Director of Economic Planning
9. Mr Robert Simpson  
   Manager, Tuvalu Electricity Corporation
10. Mr Steve Fakalupe  
    StockController, Tuvalu Electricity Corporation
11. Mr Laloniu Samuelu  
    Samuelu Builder Co. Ltd
12. Mr Isaia Taape  
    Energy Officer, Ministry of Works, Energy & Communications
13. Mr Timaio Auenga  
    Manager, TSECS
14. Mr Kapuafe Lifuka  
    Senior Technician, TSECS
15. Mr Fiamalu Lupena  
    Former Manager, TSECS
16. Mr William  
    Crown Counsel, Prime Minister’s Office
17. Mr Feleti Penitala  
    Attorney General, Prime minister’s Office
18. Mr Seve Lausaveve  
    Secretary for Home Affairs
19. The Vaitupu  
    Branch Committee
20. The Funafuti  
    Branch Committee
21. Outer Islanders