



GOVERNMENT OF TUVALU



“Fakafoou – To Make New”

TUVALU INFRASTRUCTURE STRATEGY AND INVESTMENT PLAN



February 2012

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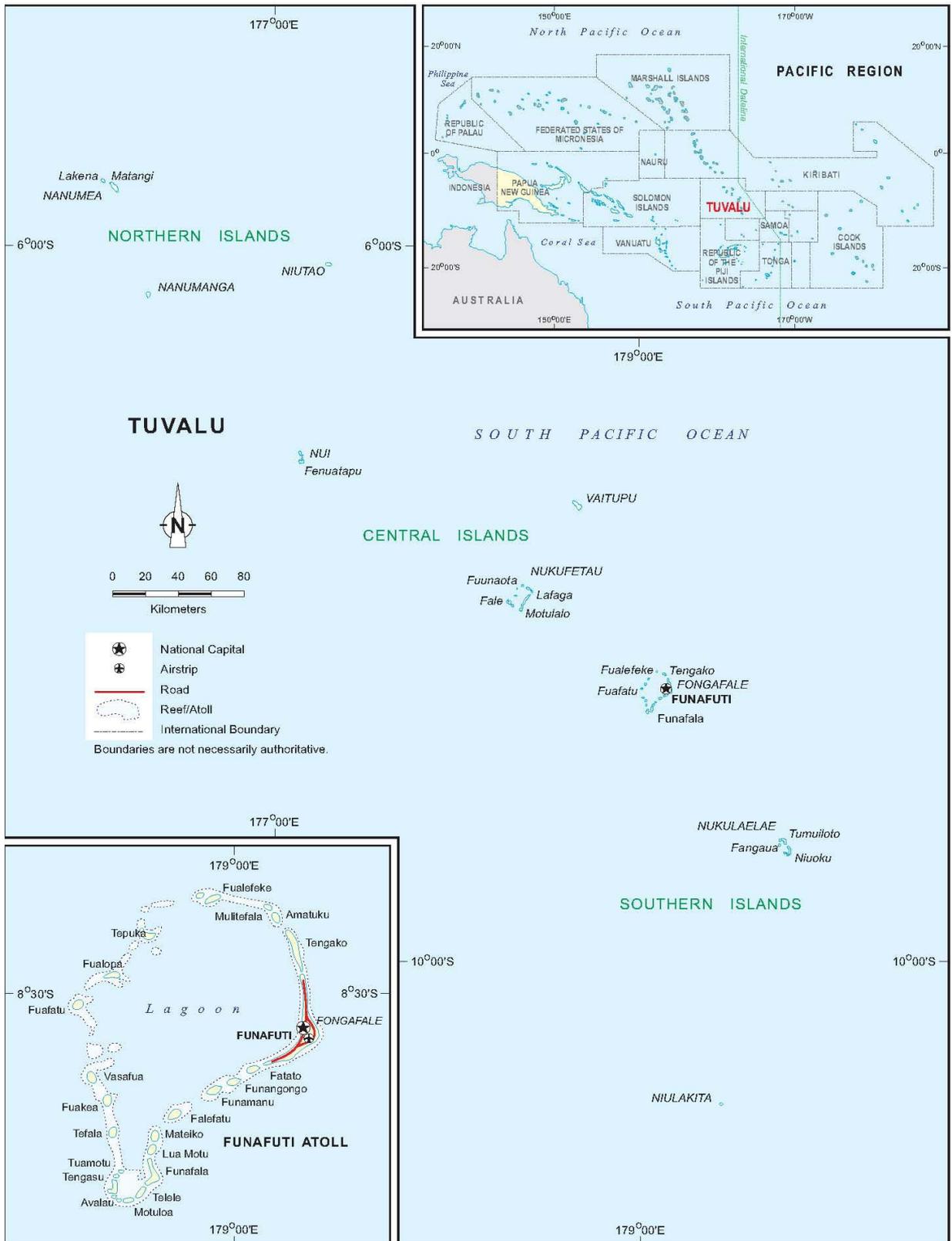


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Map of Tuvalu

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ABBREVIATIONS

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
DCA	Department of Civil Aviation
DME	Distance measuring equipment
DPB	Development Planning and Budget
GSM	Global System for Mobile Communications
ICAO	International Civil Aviation Organization
ICT	Information & Communication Technology
IT	Information technology
GoT	Government of Tuvalu
JICA	Japan International Cooperation Agency
MCA	Multi Criteria Analysis
MFED	Ministry of Finance and Economic Development
MPUCT	Ministry of Public Utilities, Communications and Transport
NDB	Non-directional beacon
NDC	National Development Committee
NSSD	National Sustainable Strategies for Development
NZAID	New Zealand Aid Program
O&M	Operation and Maintenance
PIAC	Pacific Infrastructure Advisory Centre
PIPI	Pacific Infrastructure Performance Indicators
PSTN	Public Switched Telephone Network
PWD	Public Works Department
REEEU	Renewable Energy and Energy Efficiency Unit
R/O	Reverse Osmosis Units
SOE	State Owned Enterprise
SOPAC	South Pacific Commission Applied Geoscience & Technology Division
SWM	Solid Waste Management
TA	Technical Assistance
TEC	Tuvalu Electricity corporation
TISIP	Tuvalu Infrastructure Strategy and Investment Plan
TK II	Te Kakeega II or the National Strategies for Sustainable Development
TMD	Tuvalu Media Department
TOR	Terms of Reference
TTC	Tuvalu Telecom Corporation

CURRENCY EQUIVALENTS

(as of February 7, 2011)

Currency Unit – A\$ (Australian dollar)

A\$1.00 = US\$1.07

\$1.00 = A\$0.93

EXECUTIVE SUMMARY

Introduction

Tuvalu is among the world's smallest nations on a population basis. Despite a small public service and limited private sector, there are high expectations to respond to both domestic and international policy and appropriate infrastructure regulatory and delivery requirements. The National Strategies for Sustainable Development 2005-2015, Te Kakeega II (TKII), reaffirmed Tuvalu's commitment to sustainable development and achieving the Millennium Development Goals (MDGs). It aims to achieve full employment, economic growth, improved healthcare, education and infrastructure, and continued social stability.

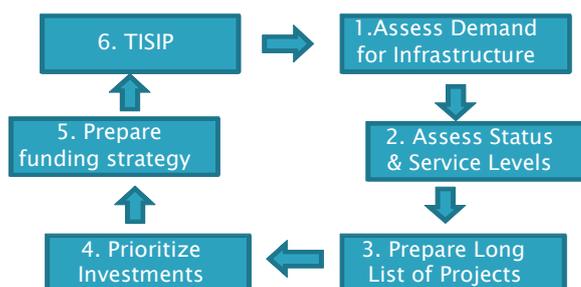
Objectives

The Tuvalu Infrastructure Strategy and Investment Plan (TISIP) represents a country led and prioritized investment plan for economic infrastructure for the next 5-10 years. The plan identifies the needs and priorities for investments in economic infrastructure and assesses the financial resources to support implementation. The TISIP aims at improving coordination in planning and financing of infrastructure development and maintenance between national stakeholders and international development partners and to strengthen the capacity of the Government to plan and manage the development of its economic infrastructure.

Methodology

The TISIP is closely linked to achieving the economic and social strategies of the NSSD or Te Kakeega II. It is based on sector policies, targets and standards and assesses the economic and social drivers that determine the demand for infrastructure. Simultaneously, an assessment of the current status and service levels in the various infrastructure sectors was carried out. This resulted in a long list of projects for each sector. A project prioritization tool using multi-criteria analysis has been developed and projects were ranked resulting in a short list of high priority projects. Short project descriptions and "whole of life" cost estimates of the prioritized projects were prepared, and based on this, a funding strategy has been developed. The methodology is schematically presented in the figure below.

Methodology

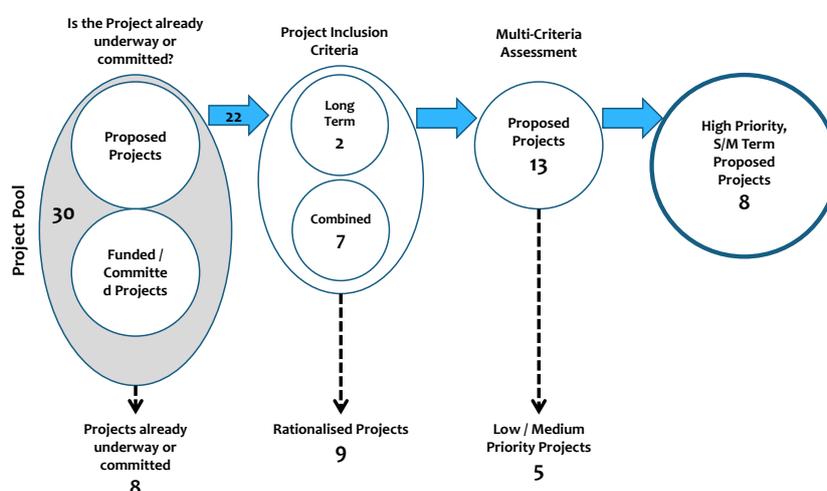


Tuvalu has the same basic infrastructure drivers as other countries. However, due to the isolation, smallness, fragmentation and lack of resources of this atoll country, which are critical in determining economic growth, the priorities for new infrastructure are somewhat different as compared to most other countries. Also, the dominance of aid to fund new projects means that Tuvalu must negotiate with development partners whose requirements may not always fully align with the goals of the government. The reality is that Tuvalu will continue to be very dependent on outside assistance to maintain the current standard of living let alone catch up with their bigger more resource rich neighbours. In addition, the country's dependence on highly volatile sources of revenue which includes fisheries licenses

and its sovereign wealth fund – the Tuvalu Trust Fund, has led to a call to broaden the economic base.

Project Prioritization

The process of project prioritization is presented in the figure below. Tuvalu’s PRIF Taskforce undertook an analysis of each of the infrastructure sectors, comparing performance with relevant plans and policy targets. A long list of 30 projects was identified across eight sectors that would address gaps and inadequacies and enhance Tuvalu’s capacity to achieve its TK II goals. The long list was rationalized, with some projects identified as already underway, others combined to enhance efficiency, and others removed due to their premature planning nature. The remaining list of projects was subjected to a multi-criteria analysis, which ranked projects based on their alignment with seven key selection criteria - policy, economic, financial, social, environmental, readiness, and maintenance. The draft list of priority projects was subsequently presented and discussed by the PRIF Taskforce which resulted in a final list of eight high priority actions and investments.



High Priority Actions and Investments

The following list of Actions and Investments were ranked as high priority, and prioritized for development in the next 5-10 years. They include (in no specific order):

Code	Short Name	Cost \$ Millions
W1	Water Consolidation	3.0
W2	Outer Island Sanitation	0.7
W3	Funafuti Sanitation	1.0
P2	Renewable Energy 2	15.0
P3	Renewable Energy 3	16.8
T1	Solar Telecom	0.9
T2	Outer Island Telecom	0.5
M1	Port Ancillary	2.0
TOTAL		39.9

Complementary Planning and Capacity Building

In addition to the priority investment program are a number of complementary planning and capacity building activities. These include:

- *Preparation of a Water and Sanitation Policy (including Building code revision)*
- *Finalization of a Renewable Energy Master Plan (with an emphasis on the use of solar power)*
- *Transport Sector Feasibility Study*
- *Assessment of SOE Reforms and Private Sector Facilitation*
- *10-year Infrastructure Strategy with rolling 3-year implementation plans to support the NSSD*
- *“Fakafoou” (to make new) - a proposed program of using south/south exchanges of maintenance supervisors, teamed with local labour, to change Tuvalu’s perspective and practice to maintaining, repairing and refurbishing infrastructure rather than replacing it.*

Funding Strategy

The government team then examined methods for scheduling and funding of the proposed high priority infrastructure investments and actions. Whole of life costs were calculated for all projects taking into account capital expenditure, up-front planning and design costs and lifetime operating and maintenance costs. Taking into account the current capacity of government to obtain funds, the priority investments were assembled into a comprehensive and rational investment strategy.

Current and committed projects were costed at close to \$32 million excluding full operation and maintenance costs. High-priority projects ranked in the TISIP total almost \$71 million, including planning and detailed design. When full maintenance is included for current, committed and proposed projects, the total demand for finance over five years is \$114 million. A more rational implementation period is over 10 years where the total demand for finance (including capital, recurrent and full O&M) averages \$15.9 million, of which, \$7.3 million is capital costs. This more closely matches the indicative development partner funding envelope of about \$15 million per annum. All these investments are scheduled over the next five years until 2015. With the inclusion of medium priority projects and calculation of whole of life costs until 2036, there is close to \$212 million worth of investment (including operation and maintenance) required in the infrastructure sector.

It is clear that Tuvalu does not have the capacity and capability to fund and manage existing infrastructure let alone new investments. TISIP therefore recommends placing an emphasis on programs to boost the maintenance of existing infrastructure as a first priority. The concept of the Fakafoou Program is seen as the way to cure the Pacific disease (of lack of maintenance and, in particular, lack of preventative maintenance). This will require development partner funding and systems to monitor and evaluate performance. The estimated cost per annum of the gap between existing and full maintenance is \$4.08 million. Project management, including monitoring and evaluation costs, would need to be added to this annual figure.

Ownership

The TISIP has been formulated at the initiative of the Government of Tuvalu and with support of the Pacific Infrastructure Advisory Center (PIAC). Its preparation has been managed by the Planning and Budget Division of the Ministry of Finance and Economic Development under the direction of the PRIF Taskforce consisting of senior officials of each sector, which has also been responsible for the initial prioritization of the projects. The TISIP has been developed in close consultation with government and private sector stakeholders who participated in a series of workshops conducted throughout its preparation. Cabinet and ministries have been briefed on various occasions throughout the process.

The Way Forward

The Government of Tuvalu intends to use the TISIP to improve coordination in planning and financing of economic infrastructure development among national stakeholders and international development partners. Oversight and regular monitoring (every two years) of the TISIP will be the responsibility of the National Development Committee (NDC) with the support of the Planning and Budget Division (PBD) of the Ministry of Finance and Economic Development.

The Government is committed to ensuring that the priority program is delivered as quickly and effectively as possible and is keen to enhance cooperation. The TISIP is a means for Tuvalu to streamline the development of economic infrastructure by providing a clear direction and information about its infrastructure development to its own departments, the private sector and the donor community.

I. INTRODUCTION

1. The Tuvalu Infrastructure Strategy and Investment Plan (TISIP) has been developed by the Department of Planning and Budget of the Ministry of Finance and Economic Development (MFED) of the Government of Tuvalu (GoT). It is being coordinated by the PRIF Taskforce, which has been established by the GoT and is chaired by the Ministry of Public Utilities, Communications and Transport (MPUTC) and comprises heads of relevant departments and key technical specialists. A Technical Assistance (TA) consultant team was provided by the Pacific Infrastructure Advisory Centre (PIAC) to assist with TISIP preparation.

2. The Plan was developed over a period of three months in late 2011, and comprises of an infrastructure stocktake, technical and economic analysis, and a prioritized list of infrastructure investments. In places, the plan follows the outline and draws upon methods used in other Pacific Island infrastructure plans, including the Nauru Infrastructure Strategy and Investment Plan (Government of Nauru, 2011), the Tonga National Infrastructure Investment Plan (Government of Tonga, 2010) and the Cook Islands Preventative Infrastructure Master Plan (ADB, 2006).

A. Background to the TISIP

3. Tuvalu is among the world's smallest nations on a population basis. Despite a small public service and limited private sector, there are high expectations to respond to both domestic and international policy; and appropriate infrastructure regulatory and delivery requirements. The National Strategies for Sustainable Development (NSSD) 2005-2015, *Te Kakeega II (TKII)*, reaffirmed Tuvalu's commitment to sustainable development and achieving the MDGs. It aims to achieve full employment, economic growth, improved healthcare, education and infrastructure, and continued social stability. Its framework and performance measures were re-assessed in 2008 (*TKII Revisited*, 2008) and again in October 2011¹.

4. The Government of Tuvalu established a PRIF Task Force among various departments involved in infrastructure development and service delivery in August 2009 to take advantage of the recently established PRIF mechanism. The Committee decided to work with PRIF on a project by project basis, submitting individual project proposals for funding to PRIF through PIAC. Although some projects were funded, PRIF partners were concerned that there was an overall lack of strategic prioritisation and technical justification across infrastructure sectors. Following a range of discussions with PIAC regarding "project" versus "sector" approaches, the Government of Tuvalu agreed to start preparations for the TISIP in February 2011. PIAC was requested to assist in the preparation of such a plan beginning in August 2011.

5. It is the intention of the government to fully integrate the TISIP with the TKII review and update. The TISIP will also be reviewed regularly (every two years) as part of the annual national planning and budgeting process in order to ensure its relevance for guiding sector planning and discussions with development partners. In order to do this, the TISIP preparation process focused on working closely with the PRIF taskforce and related Government agencies, applying the processes and tools and building capacity.

6. The TISIP balances the Government's objectives of providing improved economic infrastructure where rational, with improving social conditions in the country, particularly the

¹ An account of the TKII review is in section 2.c.

outer islands. It balances infrastructure that drives the economy with infrastructure that improves livelihoods and promotes efficiencies.

B. Tuvalu Infrastructure Strategy & Investment Plan (TISIP)

7. This Plan identifies the Government's needs, strategies, policies, and immediate priorities in the infrastructure sector as well as the financial resources to support their realization. The plan assesses current status and needs in each infrastructure sector, and uses this assessment to review proposed projects. The development of a project prioritization tool and investment and funding strategy will assist Government to regularly update (every two years) and utilize the Plan.

8. The TISIP includes the following key economic infrastructure sectors with a lower limit on individual project size of \$400,000:

- Water, Sanitation and Solid Waste Management
- Electricity and Energy
- Telecommunication and ICT
- Transport – Air, Road and Maritime

9. Tuvalu's planning, institutional and implementation arrangements are often haphazard. In most sectors, numerous studies and assessments have been undertaken in recent years, yet there is often political and development partner inertia to commit to sector master plans, let alone comprehensive infrastructure investments. This is often due to a lack of financial and technical resources and capacity in Tuvalu to plan, manage, operate and maintain current infrastructure, let alone new investments. To ameliorate this inertia, the TISIP was developed with the following principles:

10. **Integration with TKII** – TKII is Tuvalu's national sustainable development strategy. The TISIP will become the detailed implementation plan of the infrastructure components of the TKII.

11. **Funafuti and Outer Islands** – Infrastructure needs, costs and standards differ significantly between the populated areas of Funafuti, and the communities of the outer islands. For example, while environmental degradation already occurs in Funafuti, this has generally been avoided elsewhere; greater cost recovery is more likely in the cash economy of Funafuti, whilst the community cohesion yet remoteness of the outer islands places different demands on the mix and type of infrastructure delivery. Because of this, where it makes sense, the analysis of sectors and the presentation of projects has been undertaken differently for Funafuti versus the outer islands.

12. **Private Sector** – Where possible, private sector options are considered an integral part of infrastructure implementation and maintenance process. Where it makes sense, movement towards more commercial approaches of Government functions (such as power and telecom) is already happening, and this is encouraged. This is difficult to achieve in Tuvalu as it is remote and has a small population scattered across nine islands, reducing the ability for cost competitiveness and increased efficiencies.

13. **Realistic funding and maintenance** – Current infrastructure is often not maintained in accordance with economic or technical standards (often funded less than one-third of optimum), ensuring that deterioration of assets is accelerated. Maintenance funds need to be found for existing assets, while new and replacement infrastructure needs to be able to be maintained and operated within the current budget envelope or attract additional revenue. Whole of life costs are calculated for new infrastructure and compared with current required expenditures. The TISIP recommends a new approach to maintenance called "Fakafoou"

which makes use of the pool of skilled tradespeople in the region and under-utilised local labour to more effectively manage asset maintenance.

14. **Cross Sectoral Efficiency** – where there is ability to combine construction/maintenance activities across multiple projects/sectors/agencies; or develop infrastructure for multiple purposes, these have been noted and given relevant priority. This is particularly relevant in the outer islands, where cross sectoral projects are more effective and efficient due to cost and scale.

15. **Demand Driven** – a shift in focus so that infrastructure planning is motivated by demonstrated demand and improved cost recovery rather than just free supply. This has been demonstrated internationally, and with small island states, to improve sustainability through better care and maintenance, and service delivery in line with economic resources. A case in point is the move to cost recovery in the electricity sector in Nauru. This resulted in major savings through reduction in wastage and significantly reducing peak power demand to the extent that perceived needs for increased generating capacity were no longer valid. The reality is that resource constraints will always be a factor limiting the degree to which Tuvalu can manage the imported infrastructure that development assistance brings. Sitting down with development partners and talking this through should result in more appropriate infrastructure investment in the future that is within the capability of Tuvalu to manage with the assistance that is available from partners.

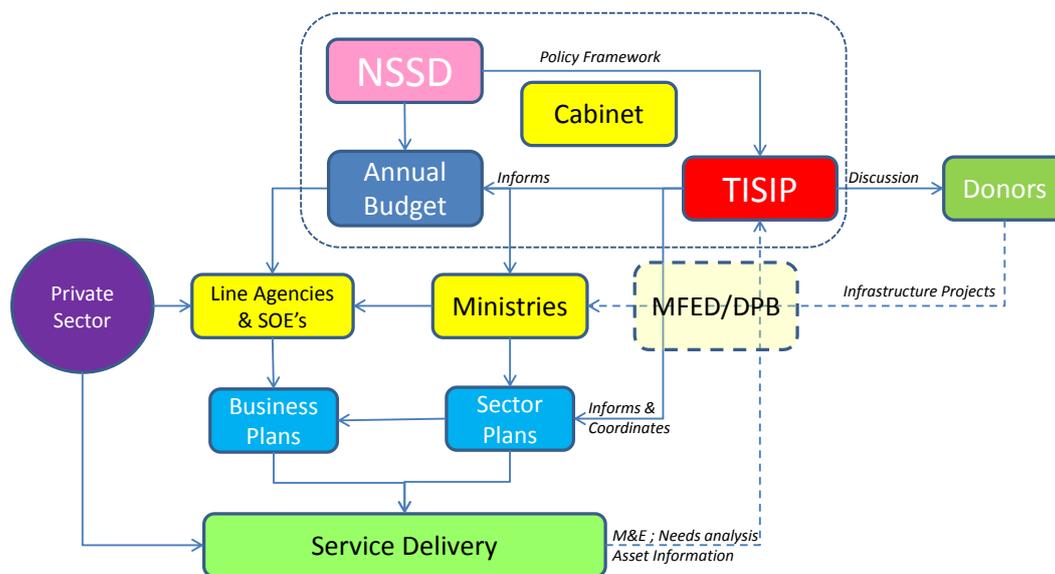
16. **Development Partnership** – enabling Government to determine its own development agenda and investment envelope so that it can move from being a development partner recipient to an equal partner in negotiating international development assistance.

C. TISIP and Tuvalu’s Planning Framework

17. Each of Tuvalu’s nine inhabited islands is based around a single village and has a distinct sense of community and identity. Traditional councils of chiefs work with the elected government and are the authorities on matters of custom. To ensure continuity of traditional customs, a council of chiefs operates alongside the official system at the local level. Under the *Falekapule Act 1997*, increased powers were given to the island councils to prioritise local development needs within the framework of the central government’s overall development objectives.

18. While the TISIP forms an integral part of the national planning and budgeting process, it also takes account of the different development and infrastructure needs of both Funafuti and the other eight islands. Overall, the TISIP provides an indication to development partners of the priority investments that Tuvalu wishes to pursue over the next 5-10 years. Figure 1 outlines how the TISIP fits within the overall infrastructure planning, policy and operational framework in Tuvalu.

Figure 1 : TISIP Role in Tuvalu Planning Structure



1. National Strategies for Sustainable Development (NSSD)

19. The 2005 NSSD (*Te Kakeega II* or TKII) has a clear focus for the infrastructure sector and how it relates to achieving the vision and objectives for Tuvalu’s sustainable growth. It also highlights the different needs of the outer island communities versus those of Funafuti. The NSSD is consistent with a number of internationally agreed development goals such as the MDGs, the Pacific Plan, and Paris Declaration, detailing key performance criteria that are monitored on a regular basis.

20. The Vision of the NSSD is that “*By 2015, guided by strong spiritual values enshrined in its motto - ‘Tuvalu mo te Atua’² - we will have achieved a healthy, educated, peaceful and prosperous Tuvalu*”.

21. The key development priorities for the NSSD are: good governance; economic growth; job creation; more economic opportunity; better health and education; improved basic infrastructure; social development (youth, housing, gender equality, sports and recreation); natural resources (agriculture, fisheries, tourism, environment); and social stability.

22. In order to achieve these priorities, the NSSD includes strategies grouped into eight key areas. Of these, four have particular relevance for economic infrastructure:

² Tuvalu for God; God for Tuvalu.

- Strategy 4 Outer Island and Fale Kaupule Development**
- *Provide better infrastructure (water storage, roads, jetties, causeways/bridges, seawalls, airfields, power, and other infrastructure, including renewable energy technologies, communications/internet, and sanitation).*
- Strategy 5 Employment and Private Sector Development** (including tourism, agriculture and fisheries)
- *Reduce subsidies to public enterprises.*
 - *Provide adequate, efficient and cost effective economic infrastructure - especially power, water, transport and communications.*
- Strategy 7 Natural Resources**
- *Develop and implement an urban and waste management plan for Funafuti.*
- Strategy 8 Infrastructure and Support Services**
- *Improve management, operation and maintenance of infrastructure and support services.*
 - *Provide additional infrastructure where it is economically viable.*
 - *Lower or eliminate subsidies to public utilities.*
 - *Seek out alternative providers of infrastructure and utilities within the private sector to create competition.*
 - *Improve quality, frequency and cost-effectiveness of transport services to the outer islands.*
 - *Improve international air service links.*
 - *Improve ICT services and extend ICT service nationwide, especially to schools, clinics and Kaupule.*
 - *Expand collection and storage of water for housing, businesses and other structures (especially in Funafuti).*
 - *Promote water conservation through education and awareness programmes.*

23. Furthermore, the TKII indicates that each sector should develop its own Strategic Plan; these would support a Corporate Plan for each Department; and allow an overall Public Sector Investment program to be developed.

24. The TISIP is being developed to integrate with the relevant NSSD goals (including relevant MDGs) and strategies; and incorporate approaches that ameliorate the key hindrances to infrastructure development. In setting priorities, projects that are closely aligned with, and contribute to, long term goals receive a higher rating.

2. Sector Plans and Studies

25. Over 65% of the foreign arrivals in Tuvalu comprise of development partner officials and technical assistance consultants. It is not surprising then that a multitude of studies have been undertaken. These are often in support of detailed funding proposals, but have not resulted in sector strategies. The exceptions to this are the telecom and energy sectors, which have detailed policies and strategies. The Tuvalu Electricity Corporation (TEC) is currently developing a sector master plan. A water resources policy is expected to be completed by early 2012 under SOPAC and IWRM guidance. A solid waste master plan is expected to be developed by the Solid Waste Agency of Tuvalu (SWAT) during the current EU assistance.

26. There are only two state-owned enterprises (SOEs) in the infrastructure sector - electricity (TEC) and telecommunications (TTC). Each has a detailed corporate plan. While there is a drive from development partners to allow independent management and economic pricing of these, the Government is wavering as the reality of realistic and economic pricing of services impacts on Government operations and community politics.³

27. The TISIP incorporates key elements of all plans developed in recent years in the relevant sub-sector needs analyses. In most cases, these have formed outline sector strategies as an interim measure prior to the development of detailed sector master plans.

3. Institutional Arrangements

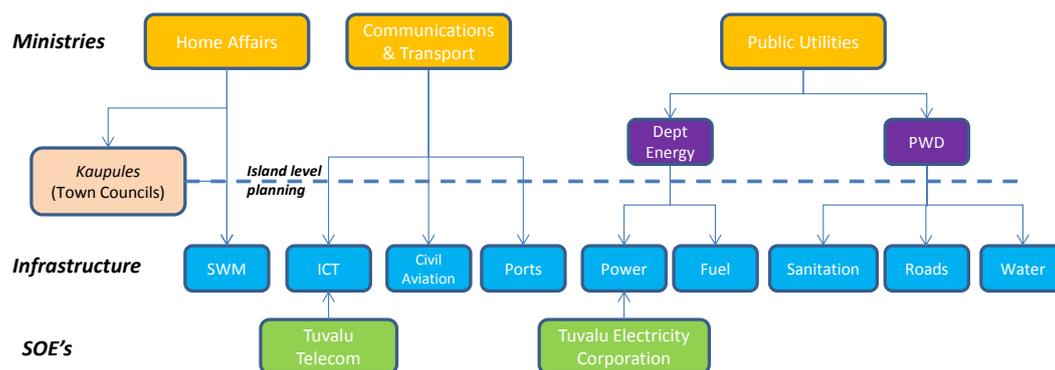
28. There are three main ministries involved in infrastructure provision. The Ministry of Public Utilities, Communication and Transport (MPUCT) has two divisions. The Public Utilities division is responsible for the Department of Energy (electricity and fuel) and the Public Works Department (water & sanitation, roads). The Communications and Transport division is responsible for communications and the Departments of Civil Aviation and Maritime. Solid waste management is the responsibility of the Solid Waste Agency of Tuvalu (SWAT) and the *Kaupules* (Island Councils), all of which are the responsibility of the Ministry of Home Affairs. The Ministry of Economics and Financial Development (MFED) oversees the budget, planning and aid management functions of Government. Figure 2 outlines the infrastructure responsibilities of its key Ministries, Departments and SOEs.

29. Tuvalu has a small private sector comprising mostly of service-based enterprises – retail and trade services. There are few private professional services, with most professionals either employed by Government or moving abroad. There is a lack of skilled tradespeople for constructing, maintaining and operating infrastructure. Private enterprise development is constrained by the small market and a lack of small-scale funding, onerous establishment processes, and often unfavourable Government (and development partner) policy and practices. By seeing itself as part of a regional market, Tuvalu has the challenge of increasing the use of regional resources, particularly in professional services, e.g., utilising communications technology such as the internet and Skype.

30. The Government (under an ADB TA) had an active policy (TKII) to corporatise infrastructure functions where possible; and to encourage private sector involvement. Until recently (November 2011), it was pushing for more commercial approaches for existing SOEs to stimulate economically rational management practices; and facilitate training and private sector capacity. Unfortunately, this process is currently being reversed, attracting significant development partner concern – and the future for the existing SOEs and further corporatisation is still unclear.

³ In November 2011, the Government voted to re-nationalise TEC. This process is still underway.

Figure 2: Institutional and SOE Infrastructure Responsibilities



D. Layout of the TISIP

31. The TISIP has been developed and organized as follows:

32. **Needs Analysis** – this section assesses the need for infrastructure in the context of Tuvalu’s national policy and economy; and outlines the key drivers of infrastructure in Tuvalu and its sector-wide needs.

33. **Sector Analysis & Investment Plans** – provides brief details about each sub-sector - policy, planning, financial and operational position. A gap analysis leads to a description of current and proposed projects and the proposed investment plans for each sub-sector.

34. **Prioritizing Infrastructure Investment** – outlines the details of the multi-criteria analysis (MCA) adopted by Government to rank projects and guide investment decision-making. A prioritized list of infrastructure is developed.

35. **Life Cycle Costs** – outlines the life cycle costs of infrastructure and the current situation in Tuvalu. It examines the current balance between maintenance needs and maintenance expenditure and contrasts that with the potential operational and maintenance implications of the TISIP infrastructure investment program.

36. **Funding Strategy** – outlines the projected demand for infrastructure-related finance; the capacity of Government and SOEs to address total costs; and the interventions that Government can make to improve the infrastructure financing environment.

37. **Sector Priority Programs** – the section combines the prioritization, timing and investment analyses, and outlines the key program requirements and necessary supporting activities for each sector over the coming 5-10 years.

38. **The Way Ahead** – outlines the key supporting activities that Tuvalu needs to undertake to plan, manage and deliver the infrastructure over the short- to medium-term.

II. INFRASTRUCTURE NEEDS

39. This section outlines the key drivers of infrastructure in Tuvalu and sector-wide needs.

A. Infrastructure Drivers

40. In order to develop a comprehensive infrastructure plan, it is necessary to understand the economic and social factors that drive the need for infrastructure in Tuvalu. This section assesses how infrastructure forms an integral part of the National Policy and is a positive driver for the economy. Each sub-sector is analysed for its linkage with policy and planning outcomes, relevant demand drivers, and potential investment directions.

41. Growth in demand for basic infrastructure capacity and services is typically driven by population growth and economic activity. Individuals want, as a minimum, for their basic needs to be met so that they have a good quality of life. In addition, the services delivered by economic infrastructure are an intermediate input into production and affect business efficiency and economic growth.

42. There is general international consensus that there is a positive correlation between infrastructure and economic outcomes and that investment in infrastructure is a major driver of productivity. More efficient, core economic and social infrastructure (transport, electricity generation, telecommunications, water and wastewater systems, solid waste management, and ICT) leads to the higher levels of productivity, particularly when delivered with increased efficiency and reduced service prices. However, it should be noted that there are constraints to productivity improvement in a small remote country like Tuvalu.

43. Inadequate infrastructure is a bottleneck to economic activity. Inadequacy can be due to a lack of assets or where there is diminution of service due to poor management and maintenance. Appropriate maintenance is a much more efficient approach to the effective use of infrastructure than capital expenditure. Poor maintenance results in the compromise of service coverage, pricing and quality. As a result, the TISIP focuses not just on physical infrastructure but also on the way that it is used and managed.

B. Key Economic Infrastructure Drivers

44. Tuvalu has the same basic infrastructure drivers as other countries. However, due to the isolation, smallness, fragmentation and lack of resources of this atoll country, which are critical in determining economic growth, the priorities for new infrastructure are somewhat different as compared to most other countries. Also, the dominance of aid to fund new projects means that Tuvalu must negotiate with development partners whose requirements may not always fully align with the goals of the government. Twenty to thirty years ago there was a widely held expectation among donor countries that developing countries including the atolls would become economically self-reliant at some point in the future. The reality is that the atoll countries will continue to be very dependent on outside assistance to maintain the current standard of living, let alone, catch up with their bigger more resource-rich neighbours. In addition, the country's dependence on highly volatile sources of revenue which includes fisheries licenses and its sovereign wealth fund – the Tuvalu Trust Fund, has led to a call to broaden the economic base.

45. From an economic point of view, an important step in developing a prioritized infrastructure program is to identify the main sectors of economic growth and social development over the relevant period of 5-10 years. But Tuvalu, like its near neighbours, is

not well placed to escape an aid dominated economy due to the constraints imposed by its location and atoll structure.

46. While the development of an export-focused fishing industry would seem sensible, there are many examples of previous attempts by Pacific island countries including Tuvalu to develop local fishing industries, only to fall well short of expectations because the risks cannot be adequately managed. Export of high value fish species requires excellent regular air connections to markets in Asia that are not possible for the foreseeable future for Tuvalu. Domestic on-shore processing facilities need to be large scale to be economically competitive. In addition, they require large amounts of fresh water – a scarce commodity in Tuvalu. Running fishing boats out of remote islands is relatively expensive compared with operating from a major regional base, as needed infrastructure is specialised and cannot survive on a small scale of operation. This situation leads to the critical need to ensure Tuvalu extracts the maximum out of fishing licenses. To do this, it needs the ongoing and increased support of development partners and other Pacific Island nations which share the resource.

47. Tuvalu's major resource is its people; and over time, the country's leaders have recognised this by pursuing a policy of exporting people to jobs within the region with the expectation they will make a contribution to the nation from afar. The Tuvalu Maritime Training Institute (TMTI) has been a key in training seafarers who take up jobs with merchant ships trading around the globe. For a variety of reasons, this avenue is likely to face declining demand as other nations capitalize on lower wage rates, better training facilities and cheaper logistics in placing seafarers. Tuvalu has also suffered a tarnishing of its reputation due to increased social issues arising from abuse of alcohol and drugs among seafarers. Given this situation and the limited potential for domestic job creation, it is particularly important that young Tuvaluans have the education and training to be internationally competitive.

48. Tuvaluans are filling senior regional positions in multilateral organisations and other PICs in numbers greater than Tuvalu's size would suggest. Such opportunities can be further exploited. In addition, seasonal works schemes in New Zealand and to a lesser extent in Australia, offer further opportunities with wage rates far exceeding that available at home. Infrastructure that would support external job creation includes better telecommunications including internet and better transport connections, both internal and external.

49. Local employment opportunities outside of government have been limited. The TISIP emphasises an increased focus on maintenance which has a two-fold benefit of providing jobs and circulating money in the economy rather than it going offshore to purchase new assets that have failed well short of their economic life.

50. Tuvalu offers a special tourist experience due to its remoteness, relatively untouched nature of the outer islands, and strong culture. Remoteness is also the major impediment to developing tourism into a significant generator of overseas funds and local employment due to the extra cost of travel. The culture, while very friendly and welcoming in general, does not have a strong service ethic. Sophisticated tourists who would be willing to pay the high marginal cost of visiting Tuvalu, compared with other well established Pacific Island tourist destinations, expect a high level of service that is not available in Tuvalu. At the other end of the scale, the backpacker sector would be put off by the extra cost of getting to Tuvalu. Despite many training courses, there is little evidence of service standards that are expected by tourists. Even the low number of tourists that do make it to Tuvalu are likely to be disappointed with the service they receive.

51. Tuvalu has been able to capitalise on its unique features in specialist areas. For example, the philatelic bureau offered overseas buyers a unique series of Tuvaluan stamps for a number of years before running out of ideas. The lease of Tuvalu's country internet domain name (.tv) was a major coup that continues to generate annual revenue. The Tuvalu Trust Fund (TTF) and *Fale Kaupule* Trust Fund (FTF) are vehicles for accumulating capital that is invested overseas; generating revenue for the national budget and local communities respectively. Tuvalu's success with their trust funds provides an opportunity to use the existing structures and administration units of these funds for a climate change fund. Government projects on climate change in the TISIP are primarily aimed at reducing Tuvalu's dependence on high priced fossil fuels using solar technology which has the benefit of mitigating climate effects even if it is on a tiny scale. There is also a need to fund adaptation projects at the community level. Tuvaluans over generations have learned to survive the vagaries of a tough physical environment including extreme climatic events such as droughts and cyclones. The expected increase in these extreme events will tax communities to the limit and external funding assistance will be necessary for life to continue on the islands with any sense of humanity. In the end, provision needs to be made for relocation of communities should life on the islands become impossible due to climate change. To make a climate change fund a reality, there will be a need to meet the high standards of management and accountability demanded by the UN, World Bank and IMF for such funds.

52. While growth in exports may be severely constrained, there are opportunities to make considerable savings on imports. A dollar saved on imports has the same value as a dollar gained on exports due to the opportunity cost of each dollar saved. The key catalyst for savings is to ensure consumers are faced with real prices for the services provided by imported goods. Subsidies ensure more is consumed than would be otherwise. A pertinent example is the price of water. If water was priced at the delivered cost, the demand for Reverse Osmosis (RO) water would plummet and people would ensure that every square meter of roof catchment was connected to a water storage tank – the much cheaper alternative. Tuvalu has adequate water resources even to cover drought situations. Unnecessary spending on expensive RO water means dollars are not available for other much needed infrastructure. This concept applies in many parts of the economy including ICT, energy and transport. Where subsidies are used there needs to be a clear price signal so people are aware of the real cost.

53. Over the long term, there may be mineral deposits that could be exploited; but there are many other places in the Pacific where the logistics of extraction and supporting infrastructure are far more attractive than Tuvalu. One example would be the Chatham Rise off the east coast of New Zealand.

54. The reality is that Tuvalu has relatively few options to increase economic growth based on international competitiveness. Development partner countries will continue to be the major contributors to infrastructure development. Over the last four years (including 2011) on average, domestic revenue has funded just under 40% of total Government expenditure (see Table 14). This would imply that any new infrastructure will have to be totally funded by development partners as the government is not in a position to fund current spending, let alone additional spending.

C. Key social infrastructure drivers

55. Population growth is the major social driver for infrastructure development. In addition to more people, the socio-demographic characteristics of the population are also important. On the outer islands, the usual population distribution is skewed as young men such as seafarers, leave their islands for work. This leaves much of the burden of community development to women and "old" men. In addition, the small size of communities means that

everyone is related in some way to everyone else. It also limits the ability of the private sector to function as it would in large communities without creating extra community tensions. For these reasons, there is a limit to the sensible commercialisation of service delivery. Of concern to the government is the continued movement of people from the outer islands to Funafuti.

56. The increase in population of Funafuti is stretching the basic infrastructure of water and sanitation to cope. The water lens has long been destroyed and increases in septic tank overflows are thought to have caused the recent algal blooms in the lagoon. During the current water crisis there have been calls from community leaders for people from the outer islands who are not contributing to the island's economy to go home. The island is overcrowded with squatter settlements along the surge wall on the eastern side of the main islet and new housing stretching out along the road in both directions from the main centre.

57. A government policy aimed at reducing the pressure on Funafuti is the decentralisation of some government services to Nukufetau and Vaitupu. Such a policy has significant implications for infrastructure, not the least, the need for much more reliable and faster transport options between these three islands.

58. Another key policy that could reduce or even reverse the flow from the outer islands to Funafuti is to increase employment opportunities for young people on the outer islands. Here, the *FaleKaupule* Trust Fund (FTF) has the potential to have a significant impact in the long term. The FTF was set up to provide a new source of development funds for the islands. Allowable expenditure includes development projects, wages, repairs and maintenance of island infrastructure, and local training. As the Fund grows, there will be increasing amounts of money available to the communities to improve life on the outer islands, thus reducing the pull of the brighter lights of Funafuti and beyond. Improved ICT would be a key component of such development, but it is a moot point as to whether this would act as a further pull factor or act to retain young people. As with Kiribati, Tuvalu children who go to high school must leave their islands to attend, in this situation, at either Vaitupu or Funafuti. Those who undertake higher education may only return to their island for holidays.

59. The FTF has a checkered history of fits and starts in respect to its contribution to outer island development. Over the first 12 years, there have been only four years when there were distributions. At the end of its first financial year ending 30 September 1999, the FTF had a capital of \$7.3 million. This was made up of a soft loan from ADB of \$4m to the Tuvalu Government plus \$3.3 million of contributions from the island communities that were matched dollar for dollar by the Government. The FTF made a good start and in 2000, there was a distribution of \$634,000 to the island communities. There followed a four year gap and the next distribution of \$1.9 million came in 2005. This was followed by distributions of \$1.8 million and \$2.3 million in the following two years. The global financial crisis has meant that there have been no further distributions to this day. Like the TTF, the outer island FTF is required to be maintained in real terms before a distribution can be made. At 30 September 2010, the maintained value was \$27.3 million; the result of capital growth and contributions from development partners. This is some \$3.5 million higher than the market value of \$23.8 million. Thus, there is still a gap of 15% to be recouped before another distribution can be made.

60. So far, the FTF has distributed \$6.4 million with some \$5.3 million allocated to island development. This equates to an average of \$55,000 spent per island per year (the balance of \$1.1 million is held in reserve by the communities). In theory, at its current size, the FTF

should provide around \$140,000 per island per year for outer island development.⁴ This equates to 14 projects at the average project size to-date of around \$10,000. The reality is that there will be no distribution for 2012, extending the gap since the last distribution to four years. Furthermore, in the present fragile, low growth outlook for the global economy, this could continue for another year or more. Thus, the expectation of a regular supply of money for outer island development from FTF is yet to be fulfilled.

61. The overall success of the management of the economy will determine the amount of money in people's pockets and thus, the demand for basic infrastructure such as electric power, transport and water. Increased use of vehicles reduces the time people take walking to places and without active recreation pursuits, there will be a reduced level of fitness in the population with consequent health issues. The "Greening" of the economy may see more people walking or cycling, although this is not readily apparent yet.

D. Review of the Country Development Strategy

62. The principal document guiding the country's development is the NSDS 2005-2015, more commonly known as Te Kakeega II (TKII). TKII which has been formulated by the government, civil society, development partners and other stakeholders, is currently under Mid-term Review. The review has been conducted by the Government and NGOs with a draft report being presented to the communities at a National Summit from 5-8 October 2011.

63. The purpose of the review is "to assess progress and achievements over the last five years and identify challenges in implementation and to provide the best way forward to achieve TKII ultimate goals." The framework of TKII has eight strategic areas on which the government is focusing development. Positive results are sought in more employment opportunities, higher economic growth, better health care, better education, improved basic infrastructure, and continued social stability in Tuvalu.

64. At the time of the review there were 148 strategies that were being implemented by the government, the private sector and NGOs. Of these, 32% are considered to have been achieved, 48% partially achieved, and 20% not achieved. The MFED has prepared an Evaluation Report (dated 21 September 2011) which identifies lack of skilled human resources, lack of funds and low priority given to some key result areas of operation as reasons for less than 100% implementation. In addition, an overwhelming influx of external advice and agendas, duplication of content, and a requirement to facilitate and cater to advisers has diverted local capacity from implementation.

1. TKII Review Evaluation

65. Most of the Summit's time was taken up with presentations by senior officials who presented the findings of an evaluation of TKII undertaken by the MFED.⁵ At the end of each sector statement, a panel of discussants (consisting of high-level, expatriate Tuvaluans brought back to Funafuti specifically for the summit and other prominent Tuvaluans) critiqued the evaluation. This was followed by questions and comments from the floor.

66. The main points made by the discussants and from the floor of the Summit are set out in Appendix D. Interestingly, there was no discussion of the key objectives set out in TKII, which implies that there is no change in the objectives that were set in 2005. Nor was there any apparent challenge to the high level strategy. Rather, the Summit focused on

⁴ This is based on an average real return of 4% real on capital of \$27.3m divided by the eight islands.

⁵ Te Kakeega II Evaluation Report, Ministry of Finance and Economic Development, 21 September 2011.

achievements, and non-achievements and the reasons so far. Also, little attention was given to the way ahead, also implying that it is business as usual for TKII. Most of the feedback from the Summit to government related to routine matters of the type that would be raised in question and answer sessions in Parliament.

67. In summary, the Evaluation Report provides a good assessment of progress on TKII so far; the Summit itself provided a networking opportunity for island community leaders, the government, civil society and expat Tuvaluans; but little substance at a strategic level in guiding the government for the remainder of TKII to 2015. Based on this assessment, one view that could be taken is that TKII has proven to be a robust strategic plan for the nation that at its half-way point is basically on track, with little need to change focus or direction. An alternative view would be that the Summit did more to create political capital for the government and did little to make advances on strategic issues.

E. Climate Change Considerations

68. The effect of climate change on low lying island countries such as Tuvalu can be significant. Envisaged climate change conditions include impacts from extreme events such as tropical cyclones, intense periods of rainfall or droughts and extremely high winds, or air temperatures. The effect of these impacts across a widely scattered group like Tuvalu means that normal conditions will change by exceeding the current “normal” extreme event occurrences. These maritime influenced conditions will contribute to an increased development of extreme events both during and outside current climate seasons, affecting already vulnerable areas and sections of society who reside on these islands.

69. The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (2003) outlined that for small island states in the Pacific region, the following scenarios could be identified with some confidence. The scenarios are:

- i. **Rise in sea level.** Sea level may rise 0.5 meter (in a best-guess scenario) to 1meter (in a worst case scenario) by 2100.
- ii. **Increase in surface air temperature.** Air temperature could increase 1.6^o-3.4^oC by 2100
- iii. **Changes in rainfall.** Rainfall could either rise or fall by about 20% from current rates in 2100 leading to more intense floods or droughts.
- iv. **Increased frequency of more El-Nino like conditions.** The balance of evidence indicates that El Nino conditions may occur more frequently, leading to higher rainfall in the central Pacific and northern Polynesia.
- v. **Increased intensity of cyclones.** Cyclones may become more intense in the future, with wind speeds increasing by as much as 20%; it is unknown whether cyclones will become more frequent.

70. Within the context of socioeconomic development, climate change thus has a profound impact upon current and future development initiatives. A wide range of scientific, technical, and research oriented initiatives have been undertaken over the past decade to try to better define what these effects could be and to quantify the cost of the impacts. Tuvalu is a vulnerable country already at risk from changes in social, political, economic, and environmental factors. Taking into account climate change exacerbates vulnerability under each of these risk areas.

71. Climate change risk reduction processes will be incorporated into current project design and development processes. Each step in the climate risk reduction process ensures that there is adequate information obtained to enable the level of the climate risk for each

project to be assessed; the project feasibility is examined; and project engineers and other experts identifying least cost solutions to address the risks. Quantifying the cost of climate change risk is an end result of the process.

72. Economic development in Tuvalu is at risk from both current climate conditions as well as changing climate conditions in the future. Each of the projects proposed in the TISIP will need to undergo further assessment once more project information is developed. The required assessment, called a Project Adaptation Brief provides for a preliminary detailed assessment of the conditions that could affect the project in the future over and above current normal conditions. The brief results in a term of reference for a climate expert to undertake detailed feasibility as part of a project feasibility team on the specific project, with resultant options or solutions available for modifying the proposed project to ensure climate impacts are minimized, reduced, or addressed. This resultant work “climate proofs” the project to an acceptable level of risk and least cost design and implementation.

73. Climate change risk reduction is already embedded into the estimated design and construction costs of the proposed projects.

III. INFRASTRUCTURE SECTOR ANALYSIS

74. Table 1 provides an overview of the current status, performance and needs of the infrastructure sector, followed by a brief analysis of each infrastructure sub-sector. The projects proposed are primarily those provided by existing reports and departments.

75. The analysis generally takes the format:

- National Strategy and Policy
- Demand, targets, standards
- Sector strategy
- Current sector performance
- Analysis of major gaps and needs
- Proposed investments and actions

76. Projects are listed at the end of each sub-sector analysis, and are based on identification by the relevant departments and through the infrastructure stocktake process. Their status is listed as Funded (and in progress); Committed (for funding by Government or development partners); Planned (by departments); or Identified (at concept level). Proposed project costs and timing are outlined, with certainty increasing the closer the project is to being funded and implemented. Development partners are identified where known.

A. Population

77. The 2010 end-of-year resident population of Tuvalu was 11,145 as reported in the 2011 Biannual Statistical Report.⁶ Between 2002 and 2007, the population increased at an annual rate of about 2.7% from 9,561 in 2002. This was caused largely by the return of former employees of the Nauruan Phosphate Commission (NPC) and their families who were repatriated in 2005-2006. Since then, total population has remained almost constant.

78. Of the total resident population, 47% resides on Funafuti; followed by 17% on Vaitupu; and approximately 4-7% (450-780 people) on each of the remaining 6 islands, except for Niulakita with only 41 people (0.4%). There is a high proportion of children (35% aged 0-14) amongst the resident population. Many 20-34 year olds are absent from the outer islands, moving to either Funafuti to join the civil service, at sea on merchant ships or move overseas for education. There are a large number of 30-50 year olds who, together with increasing life expectancy due to improved health care, may result in the resident population rising slightly over the next decade.

79. Visitors totalled 1,684 in 2010, a slight increase over previous years. The majority (over 65%) were on business, development officials or technical consultants. About 20% of visitors were tourists (360 people) and 11% were expatriates returning to visit family. Anecdotal evidence suggests that the average stay is approximately one week, resulting in an average daily visitor population of 32.

80. The TISIP is based on a projected 2020 population of approximately 11,800 people reflecting an annual increase of 0.6% due to increased life expectancy. Based on the 2002 census and an average of 6 persons per household (5.8 in rural and 6.2 urban areas), this equates to approximately 1,970 households.

⁶ 1st Biannual Statistical Report, 2011, Central Statistics Division, Ministry of Finance and Economic Development. Tuvalu

81. ADB estimates that in 2010, 26% of the population lived below the basic needs poverty line.⁷ Table 1 provides a brief description of current economic infrastructure in Tuvalu.

Table 1 : Overview of Economic Infrastructure in Tuvalu		
Sector	Brief Description of Key Infrastructure	2010/11 Performance <small>(unless indicated)</small>
Water	<p><u>Funafuti</u> Water Tanks and associated infrastructure on every household/public building (est. 27,800 m³ capacity) Reverse Osmosis (RO) plant 65 m³/day Rainwater/RO water storage 25 tanks (various sizes) = 2,470 m³ 2 Tanker trucks (1x 10 m³; 1x 5 m³)</p> <p><u>Outer Islands</u> 98% of households with water tanks. Package RO Unit on each island (following 2011 drought) Solar powered ground water pumps (broken)</p>	<p>98% population access to improved water</p> <p>RO max 90% efficiency (55 m³/day) RO water cost of production is estimated \$10/m³ Delivery charge (all bulk water) \$3.50 / m³</p>
Sanitation	<p><u>Funafuti</u> Public buildings and civil service housing (~300) have septic tanks across all islands 20 compost toilets on Funafuti (plus 20 under construction) Sludge truck (not operating)</p> <p><u>Outer Islands</u> VIP latrines and pit toilets constructed</p>	<p>Average 84% population access to improved sanitation (88% Funafuti, 81% OI's)</p>
Solid Waste	<p><u>Funafuti</u> 3 dumps. 1 closed; 1 under rehabilitation, 1 operation. 2 open bed trucks 1 backhoe</p> <p><u>Outer Islands</u> Nothing formal</p>	<p>100% Collection on Funafuti Poor fee collection</p> <p>No regular collection on outer islands</p>
Power	<p><u>Funafuti</u> 3 x 750 kVA generators = 500 MWh 40kW Solar (grid connected) 115kV underground reticulated transmission</p> <p><u>Outer Islands</u> Each island 148-220Kw generating capacity 46kW (non grid) on Vaitupu (school)</p>	<p>100% Access to power in Funafuti 420kWh demand per year Cost of Production \$1.05/kWh Average price paid \$0.48/kWh</p> <p>Outer islands have 12-18 hours supply per day. Outages are due to lack of fuel, maintenance</p>
Information & Communication Technology	<p><u>Funafuti and Outer Islands</u> Fixed line on Funafuti (1000 subs) and outer islands (300) by Tuvalu Telecom (SOE) with satellite linkage. Mobile services by TTC on Funafuti, Vaitupu and Nukulaelae. AM radio broadcast and satellite TV service are accessible on all islands.</p>	<p>85% of households connected by fixed line on Funafuti 1,300 mobile phone subscribers (incl. dead sim cards) nationwide. Estimated that 25% of people have access to mobile and internet connections.</p>

⁷ Key Indicators for Asia and the Pacific 2011, ADB. Manila

Airports	<p><u>Funafuti</u> 1 International Airport with 1530m x 30m asphalt runway with 2 aprons. Small terminal and control tower DME/VOR equipment</p> <p><u>Outer Islands</u> Un-maintained grass strips on 2 other islands</p>	<p>2 international departures total per week 3,480 passenger arrivals per year (average 33/flight) No ICAO oversight Runway has significant soft spots and repairs.</p>
Maritime	<p><u>Funafuti</u> 1 small harbour with two finger wharfs with drive on/off access 1 x 1500m² container shed 6400 m² gated container storage yard (unsealed) 1 Container trailer and tractor Machinery workshop</p> <p><u>Outer Islands</u> 1 port in Vaitupu Small reef entrances marked and maintained on each island 2 x inter island barges with breakers and 40 adapted containers</p>	<p>4 containers / hour handling capacity Single level container storage 120,000 tonnes cargo per year. Minimal security of cargo area No container cleaning equipment 235 international passenger arrivals (by boat per year)</p> <p>Estimated 4440 domestic passengers per year The interisland barges - Nivaga II and Manu Falou in poor condition, require major maintenance</p>
Roads	<p><u>Funafuti</u> 22kms 2 coat chip seal construction using coral aggregate Edges of heavily trafficked areas maintained by concrete No drainage</p> <p><u>Outer Islands</u> Limited formed Coral roads, small areas sealed.</p>	<p>Condition of roads = good Basic levels of maintenance Lack of drainage causing further issues</p>

B. Water and Sanitation

82. The Tuvalu development strategy for water as outlined in the NSSD is to expand collection and storage of water for housing, businesses and other structures (especially on Funafuti) and to promote water conservation through education and awareness programmes. Improved sanitation is promoted as a means to protect the environment from further degradation.

83. The key agencies in the sector are the Public Works Department, within the Ministry of Public Utilities, and in particular the Water & Sewage Division. Additionally, the *Kaupule* in each of the outer islands are responsible for community water storage and long term planning and facilitation of water security. The *Kaupule* are supported by the Ministry of Home Affairs.

84. Tuvalu is currently developing a National Water Resources Policy under the Integrated Water Resource Management (IWRM) Project and the Pacific Adaptation to Climate Change (PACC) Project, which are sponsored by the Global Environment Fund/SOPAC; it is expected to be completed in early 2012.

85. Government water planning has established a target of between 50 and 100L of water per person per day accounting for drinking water, cleaning, community and cultural activities. This target will be realistically clarified by the forthcoming Water Policy development process and the PIAC supported water security consolidation project design. Business and commercial use is not calculated, as they are responsible for their own rainfall water supplies.

86. There are two natural sources of water in Tuvalu. The first is the freshwater lens that forms under a typical coral island due to the lower density of freshwater relative to saltwater. The second is rainwater, collected and stored primarily at the household level. Both of these sources are used on all of the outer islands.

87. Over \$6.1 million has been provided by Development partners to the water sector over the past 10 years, mainly in the form of household and community water tanks, RO units and household systems. Rotomould has established a tank manufacturing plant on Funafuti, providing 1,000 m³ tanks for distribution under various development partner programs.

88. To try to minimize further degradation of groundwater quality, Tuvalu is piloting the use of composting toilets and trying to improve the treatment of sewage sludge from septic tanks. The current sludge truck on Funafuti is disabled, and septic tanks are leaking into groundwater and the ocean/lagoon. The composting toilet trials (20 units) by SOPAC have been a huge success, with a long list of households (42% of Funafuti) signing up for future toilets. This demand is strong as they are currently fully subsidised, are located in individual households (versus community) and having the appearance of modern flush facilities. However, at a cost of \$5000 per unit, this is not sustainable. SOPAC believes that with a toilet unit-cost of approximately \$30 (bulk supply from Asia), the installed and housed price can be reduced significantly. The main benefit of the toilets is the reduction in scarce household water supplies by an estimated 30%.

1. Water in Funafuti

89. Rainwater harvesting is the principal source of freshwater on Funafuti. Every household has been supplied with water tanks and associated plumbing fittings, although not all roof space is utilised for harvesting. Groundwater resources on Funafuti are now non-potable due to seawater inundation and pollution from septic tank effluent. A small number of household wells are used by their owners as a secondary water supply only. With water in short supply due to varying rainfall, government has renovated and expanded the system of water storage and catchment in recent years. Government and community storages supplement household storages during dry conditions and a desalination plant are utilised to refill the government storage when this storage falls below one third capacity. However, in times of prolonged dry periods, the desalinated water is also distributed to households and businesses.

90. The 65 m³ desalination plant can produce about 55 m³ per day based on a 90% operational capacity. Real production has been closer to 40 m³ per day. Government cisterns are replenished by both RO (desalinated) water and rainwater. Theoretically, RO water is only produced when storage falls below 30%; however the reality is that it is constantly produced due to demand from households for subsidised tanker-delivered water. Water is delivered on demand to replenish household storage supplies at a cost of \$3.50 per m³. Cost of production and delivery has been estimated by PWD at \$6 per m³, with the remainder subsidised by Government. Delivery is by two tanker trucks (1x 10 m³ and 5 m³).

91. The 2011 drought became a state of emergency in September 2011. The development partner response was immense, with the provision of RO plants (including a 100 m³ plant from the Pacific Environment Community Fund, PEC), bottled and bulk water. At the conclusion of the emergency, the exact water production capacity is still unclear. Some RO units used during the drought are being withdrawn; and others are still being delivered. It is expected that overall there will be a 5-10 m³ RO unit on each of the outer islands; and a 200-250 m³ per day RO capacity on Funafuti.

92. Government storage on Funafuti is estimated at 3,200 m³ of water, as shown in Table 2. A number of communities also have established harvesting and storage facilities on their meeting halls and churches with an estimated total volume of 2,600 m³. Total household storage in 2011 is estimated at 23,400 m³. PWD has estimated that water storage capacity stands at between 64 and 127 days based on respectively 50-100 L per person per day standard.

No	Water Reserves	Max Vol (m³)
1	Old Hospital Cistern	276.64
2	Vaiaku Fusi	161.50
3	Marine Cistern	197.93
4	New Marine Cistern	603.03
5	PWD Complex T1 (Welding)	38.93
6	PWD Complex T6 (Plumbing)	57.71
7	PWD Complex T7(Plumbing)	38.93
8	NGOB(North)A	902.52
9	NGOB(South)B	740.83
10	20 x 9.5 m3 PWD Tanks	190.0
	Total	3,208 m³

93. Tuvalu has reasonably high rainfall spread evenly throughout the year. Seasonal changes do occur and periods of dry weather are regularly experienced with severe drought occurring about every 11 years. 1950 had the longest dry period of 109 days and 2,613 mm rain for the year. The lowest recorded rainfall was in 1971 with 2,226mm. A state of emergency was declared in 1999 when only 2,408mm fell, and again in 2010 and 2011. It is suggested in many studies⁸ that with adequate household and community storage, well-maintained catchments (roofs and gutters) and judicious use during periods of drought, Tuvalu households could be fully reliant (including non-animal subsistence agriculture) on rainfall with a 50-100Lpd water consumption target except in cases of extreme drought.

94. Daily household water needs have steadily increased over the years in conjunction with an improved economy and community hygiene. Although PWD monitors household storage and harvesting ability, households are left to manage their own supplies and usage. Improvements to household catchments have been undertaken by maintaining leaking gutters and providing extra gutters to roofs. The aim is to maximize rainwater harvesting at the household level. Despite this, household re-supply of water from Government reserves (especially RO) is often continuous, with the desalination plant working constantly to maintain supplies. Estimates made during the 2010 drought show that 44% of all tanks (including Government and community storage) were not collecting water due to poor maintenance, lack of guttering and dirty intakes. Most tanks had not been cleaned in years. Evidence from the 2011 drought would indicate that the situation has deteriorated further.

95. Household water management is a key requirement throughout Tuvalu. This includes maintenance of gutters (leaks, leaves); use of all roofing area for rainwater harvesting; connection and maintenance of all storage tanks; conserving water by repairing pipes, and reducing toilet flush volume. The Department of Meteorology provides warning of

⁸ Reserve Water Storage in Tuvalu, Greg Wolff, PWD 2009; Water Resources in Tuvalu, UNDP, 2010.

forthcoming drought events, often months in advance, allowing households to reduce their usage and conserve water in advance of extreme events. SOPAC is trialling composting toilets which can significantly reduce water use by up to 30%. Many (or all) of these measures could be mandated in a revised building code.

96. If Government is confident that households have adequate water catchment and storage capacity, then it can begin to use the pricing of RO water for re-supply as further incentive to conserve. Increasing the price towards cost-recovery levels will further ensure water conservation measures are undertaken except in extreme circumstances.

97. Given the international discussion of climate change, there is a common perception that rainfall will vary significantly. While rainfall may increase in some years, droughts are also expected to be longer. This highlights a need for further Government and community storage of rain water to ensure supply can be accommodated throughout the longest predicted drought period. PWD studies in 2009 suggested that there be an additional 3,000 m³ of Government storage to ensure reserve supply during extreme droughts.

98. RO water production is, theoretically, only required in times of extreme drought. Japan is providing a solar RO plant that will produce 100 m³ per day for Funafuti and two 10 m³/day portable solar RO units for outer island use. Four more solar RO units have been provided during the drought and their usage (and maintenance) is still being assessed.

2. Outer Islands

99. Regular access to safe drinking water also poses an ongoing challenge in the outer islands. Only three of seven outer islands possess fresh water lenses. Nukufetau, Vaitupu and Nanumea are considered the only islands with sustainable groundwater supplies.

100. Rainwater collection is still the most efficient and sustainable source of fresh water throughout the outer islands. The existing storage in the outer islands is approximately 29,000 m³. Storage and household collection has been mapped under a recent SOPAC initiative, and contained in a GIS database.

101. The EU is currently supplying household rainwater tanks (10,000L) and guttering throughout the outer islands to boost supply.

102. Table 3 outlines the current and proposed water and sanitation projects for Tuvalu. The Water security consolidation project (W1) is planned to be designed under the current PIAC TISIP project to consolidate investments in the sector, particularly following the 2011 drought. It is expected that it will comprise limited additional investment in community tanks, and a focus on regulatory, educational and pricing reforms. The two composting toilet projects are an extension of the current SOPAC initiative and seek to balance sanitation provision with a demand based approach. On Funafuti in particular, it will be fully integrated with the water consolidation project.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
	EU Envelope B - Risk Reduction Project (water.)	0.90	F	EU						
	Solar Power RO Units & Solar Energy	4.00	F	Japan / PEC						
W1	Water Security Consolidation	3.00	P	U						
W2	MDG Outer Island Sanitation	0.70	P	EDF 10						
W3	Composting Toilets program & Septic Pump Out	1.00	P							

Note: F – Funded; C – Committed; P – Planned; I – Identified; U - Unfunded

C. Solid Waste Management

103. The Tuvalu Government has placed a strong emphasis on solid waste management over the past decade. The TKII specifically highlights the objective to “develop and implement an urban and waste management plan for Funafuti.”

104. Solid waste management has traditionally been delegated to the *Kaupule*. During the 1990’s integrated waste management was also undertaken by the Department of Environment, often in parallel with the *Kaupule*. As one of the requirements under the Act (Waste Operation and Services Act 2009), the existing waste management project became a department in 2010 within the Ministry of Home Affairs and was given a new name Solid Waste Agency of Tuvalu (SWAT). The Agency works closely with the *Kaupule* for each island to work within its jurisdiction; relevant government departments such as environment and health to be engaged in monitoring and production of standards; NGOs (especially TANGO) for community outreach program; Taiwan and Ministry Agriculture for composting; and also private sector waste management groups such as recyclers and equipment maintenance. This arrangement ensures that special initiatives, such as composting and recycling, can be outsourced to the private sector, and greater coordination can be achieved in planning and managing the establishment of tariffs and charges.

105. An integrated waste management plan (IWMP) has been prepared with ADB assistance in 2005. Both EU and AusAID have been instrumental in supporting the sector over the past decade, mainly with equipment, technical assistance and operating costs. There is still a lack of environmental enforcement of the IWMP, and there are plans to update the Environmental Management Act to provide a policy base for the sector.

106. The AusAID funded waste management project in 2000, undertook a range of waste production estimates. Final estimates were 0.43 kg per person per day and consisted of over 50% biodegradables; 10% each of metals, paper, plastic and bottles; and the remainder are construction, textiles and hazardous wastes. Based on the 2000 Funafuti population, a compaction ratio of 2:1 with the exclusion of biodegradables (for compost), metal recyclables and hazardous items (<1%) – Funafuti households would generate approximately 800m³ of waste each year. Allowing for the 30% increase in Funafuti’s population, and an increase in the waste stream due to enhanced lifestyle, it is now estimated that over 1,100m³ would be required per year. With outer island households having smaller populations, relying more on locally produced goods and using less packaging, it is expected that their waste disposal needs are significantly less.

107. Although there is no sorting of wastes at source (households) there are a number of opportunities for reducing the waste stream. There is a successful private sector recycler, who has in the past been actively recovering steel from the waste stream at the dump site. With some additional training, it is expected that this business can expand into other recyclables, in addition to being contracted to handle (and export) some hazardous

materials. The Republic of China (Taiwan) demonstration farm project has a shredder and is actively sourcing material for composting. This would be more effective if the material was separated at source for collection rather than going to the dump as is often the case now. Additional chippers will be provided to the farm for the production of quality compost to be used in the garden and continue selling to the public for home gardening.

1. Funafuti

108. Waste on Funafuti is collected weekly utilising two trucks (depending on maintenance). Previous projects facilitated the subsidised distribution of household wheelie bins and small commercial skip bins (although these are now in poor repair), which are lifted onto, or emptied into the trucks. After waste is collected it is driven to the north of the island for disposal.

109. There are three dumpsites at the northern end of Funafuti. All are simply the borrow pits excavated during World War 2 to construct the runway. One site has been completely filled, compacted and closed (not sealed) with vegetation allowed to cover it. This was undertaken by the AusAID project in 2000, who then established the northern large borrow pit as the main recipient of waste. Although the waste was originally dumped within the pit and partially compacted, it is now neither compacted nor covered. Vectors are not as significant an issue as before as it is far removed from most residences. As the pit has filled, trucks have been forced to dump along the roadway, and this is now piled up for over a 1km of road. The main dump has therefore been closed to allow operators to work on the site and a small borrow pit just to the south of the northern dumpsite has been opened to accept waste.

110. The EU EDF 10 will be providing rehabilitation of the dump site on Funafuti; provision of waste management material to the *Kaupule*, increasing the size of the composting shed at ROC and provision of material to shred green waste.⁹ SWAT will also rationalise and better manage the northern main dumpsite. This will include pushing all rubbish into the pit; clearing the road and surrounding areas (including the rehabilitation of the AusAID dumpsite to the south); compacting the rubbish; and sourcing cover material (e.g. earth/vegetation). The project will also enhance the capacity of the private sector recycler to accept metals, bottles and some hazardous waste. The ROC (Taiwan) agricultural demonstration project has also indicated that it will accept all biodegradable materials collected and diverted from disposal site to the designated composting site, shredded (by ROC (Taiwan) Project), composted and sold. Equipment will be provided and managed by SWAT, with maintenance of all machines to be outsourced to PWD or the private sector. Apart from establishment costs, the SWAT operations (throughout Tuvalu) are proposed to be funded through a minimal import levy, which is expected to yield \$400,000 per year and fully cover all operations and maintenance. It is expected that these initiatives combined will ensure that the dumpsite will be able to accept Funafuti's waste stream well beyond 2025.

2. Outer Islands

111. Communities in the outer islands produce significantly less non-recyclable waste than Funafuti. Their dump space requirements are minimal, and normally consist of a small pit that may have been used as source for earlier construction. Handling equipment is minimal and often in poor repair. The *Kaupule* on each island are responsible for managing waste, and they will now be overseen by the SWAT.

⁹ This aspect is still being designed, with clarity still to be reached on who the material and equipment purchased will belong to (maintenance responsibility) and payment of waste collection services

112. The EU EDF 10 project will also be providing a tractor/trailer, bins and a chipper to manage solid waste on each of the outer islands. Operation and maintenance, in addition to privately outsourced repairs, will be funded through the proposed import levy.

113. Table 4 outlines the only SWM project (under the EU EDF10) that is currently being prepared and implemented in Tuvalu.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
	EU – EDF 10 SWM Component	0.40	F	EU						

F – Funded

D. Power & Energy

114. Tuvalu has a policy to provide adequate, efficient and cost effective economic infrastructure to its population, including electricity. It aims to improve the provision and quality of services to the outer islands, and ensure more efficient and less subsidized services overall. The Tuvalu National Energy Policy (TNEP) was formulated in 2009 which clearly defines and directs current and future energy developments. The TNEP highlighted an ambitious target of 100% Renewable Energy for power generation by 2020. Seven strategic areas were identified to ensure that the objectives of the policy improve the livelihood of the people. In implementing the TNEP, an Energy Strategic Action Plan was developed as a guide to ensure that the target of TNEP can be achieved by 2020. Presently a detailed renewable energy master plan is being developed to guide and facilitate the development of the sector towards the 100% renewable energy target.

115. The energy sector is managed by the Department of Energy within the Ministry of Public Utilities. The Government established the Tuvalu Electricity Corporation (TEC) in 1991 and in 2010 became a fully State Owned Enterprise (SOE), with the responsibility for managing and operating grid connected systems on eight Islands. At the end of 2011, the Government began to re-nationalise TEC due to concerns over security of power supply. The impact on TEC, and the response from development partners to this situation is still to be determined. The scale and scope of Community Service Obligations (CSO) expected of SOEs in Tuvalu is considerable. Aside from the well-documented issues of scale, the established pattern of requiring SOEs to provide subsidized service poses a major challenge to the sustainability of infrastructure services. The de-corporatization of TEC in part because of non-payment of Government accounts is a reminder that commercial operations face substantial challenges and there may need to be consideration of less conventional service provision models in Tuvalu.

116. Bulk fuel storage in Tuvalu is owned and operated by a private supplier. There are bulk supplies in Funafuti, and drums are transported to the outer islands. Although the Department of Energy oversees demand and supply, it intends following Government policy and leaving operations and logistics in the hands of the private sector.

117. Over 98 per cent of the population of Tuvalu has access to electricity, which is very high by Pacific standards.¹⁰ With diesel fuelling the bulk of generation, power costs are very sensitive to increasing fuel prices. Despite substantial development partner subsidy, Tuvalu now has the third highest energy costs per person in the region, which are to a degree a function of the small size and dispersed nature of the island group. Costs are estimated at a distributed rate of \$1.05 per kWh, two thirds of which comprises the generation cost

¹⁰ The outer islands only have supply 12-18 hours per day.

(\$0.70/kWh). Of the generation cost, more than 50% (\$0.40/kWh) is the subsidised fuel. Current tariffs are set at \$0.29/kWh for the first 50kWh (the so-called 'lifeline tariff'), \$0.38/kWh for the next 50kWh, and \$0.55/kWh thereafter and for commercial and government users. Average revenue is \$0.48 per kWh. Without the subsidy, and utilising current generating systems, Tuvalu may soon have the highest energy costs in the Pacific.

118. Because of rising fuel prices, Tuvalu began seriously working towards increased renewable energy in 2006. Various studies and demonstration projects have been undertaken, and the renewable energy target of 100% by 2020 was established with rational economic justification and technical analysis. The country is now in the early stages of a program to implement the 100% renewable energy project, subject to on-going development partner support.

1. Funafuti System

119. The generation system on Funafuti comprises a recently installed (JICA 2007) power station comprising three 750kVA diesel generators with 11kV operating voltage. Total power output is 1,800kW. This is backed up by the old generators that have remained offline (1920kW) but are still able to be used as necessary. The new generators are run using diesel that is substantially subsidised by approximately 40% of the annual fuel consumption through the Japan Non Project Grant Assistance (NPGA). It is not expected that these funds will be sustained over the coming years. There is also a grid-connected 40kW solar system established by the E8 and Japan Government through Kansai Electric Company (Japan) in 2008 on Funafuti that also contributes 1% of production. Since commissioning the new diesel power station, the island of Funafuti has not experienced any power black outs.

120. Power generated from the two systems (generators and solar) is transmitted through an 11kV underground ring main system before distributing it to homes at 415V for three phase system and 230V for single phase users. The underground transmissions and distribution have recorded only 7% system losses since the JICA upgrade (2007) and provide reliable electricity throughout the island. Maintenance problems are still high due saltwater corrosion at substations and house connections.

121. Funafuti residents have been estimated to demand 420kWh of electricity per person per annum. The bulk of electricity is utilised on refrigeration (34%) followed by air conditioning (30%). Electronics, mechanical and light requirements equally (~12% each) comprise the remaining demand. For Funafuti this results in a total demand in 2010 of 4.7MWh, well within the supply envelope of TEC (5.0MWh). With the small projected population growth and the energy-saving and efficiency projects that are currently occurring under NZ funding, demand is not expected to rise significantly over the 5-10 year planning horizon.

2. Outer Islands Systems

122. Seven of the eight outer islands are powered by 48-80 kW diesel generators with a total generating capacity per island averaging 176kW, apart from Vaitupu with 208 kW and Nukulaelae with 144kW. Niulakita is powered by individual DC home solar systems. The diesel generators run for 12-18 hours per day to save fuel and maintenance, and are reported to be in reasonable condition. However, it is expected that extreme salt environments will take their toll over the coming years, and result in them requiring replacement by 2020. The generators in the outer islands are oversized, and thus consume more diesel fuel than necessary, making them inefficient to operate. Blackouts are a regular occurrence, more often from a lack of diesel fuel and spare parts than mechanical breakdown.

123. A stand-alone 46kW battery storage solar system was installed in 2009 on Vaitupu Island to provide electricity supply to the Motufoua Secondary school. It has been used as demonstration project to assess the benefits of non-grid-connected power in the outer islands. It is currently being repaired under NZ- Aid Programme funding.

3. Electricity Sector

124. The major issues presently facing the power sector include the high power losses from generation to distribution, a dependency on imported fuels, the high cost of generator maintenance in a marine environment and the need for capital to finance the outer island power infrastructure requirements. TEC is also suffering from insufficient revenues from tariffs to meet operating and maintenance costs, requiring additional subsidies from Government.

125. The Government is currently implementing the Tuvalu Renewable Energy and Energy Efficiency Unit (REEEU). It has bilateral assistance from New Zealand for 18 months to operationalise the REEEU and capacity building for TEC staff to be able to manage and maintain renewable energy projects. The assignment coincides with an EU funded project of AUD\$3.3million to provide grid connected solar power to Nukufetau, Nukulaelae and Nui.¹¹

126. The New Zealand assistance is crucial to update earlier plans and kick start the process towards Tuvalu's 100% renewable energy targets. The unit is exploring opportunities for demand side reductions including improving existing air conditioning, refrigeration and lighting systems in Government buildings¹² and providing demonstration programs to consumers on ways to reduce electricity consumption. Consideration is also being given to increasing the import duty on inefficient electrical appliances so that their true cost is realised; the tax being used to fund additional renewable energy capacity. The consultant is also training TEC staff to manage the program over the remaining eight years (2013-2020).

127. Apart from energy efficiency improvements, the REEEU is assessing potential investments in solar and biofuel energy projects in order to reach the 100% RE target. They are utilising various existing studies on wind and solar generation that showed that these technologies are economically and technically feasible and expect to have a program developed by the end of 2011. Earlier estimates for achieving the 100% RE target were in the order of \$40million over 10 years. These have now been revised to over \$70million (including project management costs) by the TA.

128. A recent peer review of the REEEU project suggests that there needs to be an increased emphasis on capacity building outcomes within TEC and a whole of system approach to sector planning and design. It is expected that these reforms will be incorporated under the current project.

129. Other sectors have also included solar power projects as part of their development plans, most notably TTC (telecom) and PWD (RO water). These projects will be overseen in a coordinated manner by the REEEU in TEC. As they will not be grid-connected, this will require a change in the mission of TEC to oversee all Government supplied power systems in Tuvalu.¹³

¹¹ This project is on hold due to the de-corporatization of TEC which calls into question the sustainability of the project.

¹² Government buildings consume 30% of Funafuti power generation.

¹³ Presently TEC is charged with only managing grid-connected power to consumers.

130. Table 5 outlines projects the Tuvalu Electricity Corporation (and the REEEU project) is planning for its program for achieving the NSSD and corporate goals. The phases are described in more detail in the project profiles in Appendix B and still being finalised, but are designed to incrementally and consistently improve RE capacity on each of the islands such that it is within overall O&M capability limits.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
	Energy Efficiency measures	0.50	F	TEC						
P1	RE 2012	4.45	P/F	various						
P2	RE Phase 2 (2013-14)	15.00	P	U						
P3	RE Phase 3 (2015-16)	16.80	P	U						
P4	RE Phase 4 (2016+)	30.90	I							

F – Funded; P – Planned; U – Unfunded; I – Identified

E. Information and Communication Technology

131. Tuvalu is reliant on good information and communications technologies (ICT) to remain in touch between its islands and the outside world. Therefore, Government strongly supports the ICT sector in its national strategy. In particular its objective is to improve and extend ICT services nationwide, especially to schools, clinics and Kaupule. It aims to do this by improving the efficiency of operations and considering increased privatisation and competition where viable.

132. ICT falls within the Ministry of Transport and Communications, particularly the Department of Communications. Apart from limited information technology (IT) services provided within Government, the majority of ICT infrastructure and operations is controlled by Tuvalu Telecom Corporation (TTC) – a fully state-owned enterprise (SOE) established in 1994 under the Tuvalu Telecommunication Corporation Act. With the Governments Public Enterprises (Performance and Accountability) Act passed in 2010, the TTC has been the focus of recent ADB technical assistance to improve its corporate operations in order to comply with the new legislation.

133. TTC has developed its own corporate strategy and business plan. Its aim is to profitably provide Tuvalu with ICT that supports community development, social wellbeing and foster economic growth. It is attempting to balance improving its financial operations through expansion and better Governance. There is also a need to maintain 24 hour telecommunication systems in the outer islands in the advent of emergencies (such as cyclones).

134. TTC is a local distributor of Fiji TV service (Sky Pacific satellite television service) and 300 fixed line telephone services across the outer islands. These services are limited by electricity supplies, which are normally 12-18 hours per day. Mobile phone service is available on Funafuti, Vaitupu and recently established in Nukulaeale. This supplements the copper land line access to almost every household (1000) on Funafuti. Internet is provided to households, business and to some Government's departments through a DSL service over the copper lines and via satellite to a limited number of TTC internet cafes on the other islands. Government has its own internet link, while other subscribers using TTC services have to pay a monthly fee. Services were disrupted by a lightning strike in 2007 which damaged both the TTCs main PSTN switch and the GSM network for over two years; only recently being restored to its original capacity at a cost of \$2.3 million. Technology upgrades and maintenance of existing equipment in a marine environment are extremely expensive.

135. Government is following its strategy of encouraging privatisation and has sought other operators to increase competition. Digicel was recently approached, but negotiations failed as Digicel demanded a monopolistic status (an overall take-over of TTC) due to a limited market to sustain two operators. This is a realistic assessment by Digicel. The question is whether a monopolistic private sector supplier of services will be more efficient and effective than a government monopoly. With appropriate controls and international benchmarking it is likely to be the former.

136. JICA's recent re-commissioning of Tuvalu Media Department's AM radio transmitter on Funafuti replaced TTC FM radio service to the outer islands, and so freed up satellite bandwidth for mobile services. The Government is being encouraged to use (and pay for) TTC internet service so that TTC can improve its revenue and to meet its community services obligations. Under the ADB SOE TA, TTC is improving its corporate governance and operations, with the intent of being financially independent by 2013.

137. TTC is trying to improve the reliability and efficiency of its outer islands services through the provision of solar power systems for all its Very Small Aperture Terminals (VSATs) and its Funafuti base. This would enable the telecommunication network on the outer islands to be operational at all times and reduce operating (electricity) costs. It is also trying to extend its subscriber base by extending the GSM network to two other islands by the end of 2012.

138. Table 6 outlines the ICT projects that are being proposed in line with the NSSD and TTC's corporate plans and strategy. T1, to ensure all switching and telecom units are solar powered, is separate to, but will be managed by, the TEC-run REEEU. T2 aims to expand internet services to the outer islands such that island communities can have reliable access to online education and services. T3 has been included due to aspirations for the GoT to follow other neighbouring countries that have/are establishing submarine cables to boost internet and telecom coverage and speed.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
T1	Solar Power ICT (Outer Islands and Funafuti)	0.90	P	U						
T2	Expansion ICT to Outer Islands	0.50	P	U						
T3	Tuvalu Fiji Submarine Cable	33.00	I	U						

P – Planned; I – Identified;

F. Civil Aviation

139. Tuvalu, as a remote island nation, relies heavily on air transport to afford access to international destinations. Services are currently unreliable, and aviation infrastructure improvements are required if tourism and time-critical exports are to be increased. Reflecting this, the TKII highlights the need to improve international air service links. It also places an emphasis on improving quality, frequency and cost-effectiveness of transport services (such as air services) to the outer islands. The strategy outlines that infrastructure, including new domestic and international air services, are to be provided where it's economically viable; and current infrastructure should be supported by improved management, operation and maintenance.

140. The Department of Civil Aviation (DCA) within the Ministry of Transport and Communications has its own strategic plan, which aims for Tuvalu to have one of the safest and efficient civil aviation industries in the South Pacific. This is to be undertaken by

complying with agreed International standards. Its objectives revolve around improving safety standards, increasing capacity and training of its staff and ensuring coordination with international legislation so that it may one day be able to join the International Civil Aviation Organisation (ICAO).

141. Tuvalu has only one international airport located on Funafuti. It consists of a 1,535 m long by 30 m wide asphalt runway with two aprons, that was originally constructed using coral aggregate (from island borrow pits) in World War II. The sub-base layer is 8 cm thick coral gravel, surfaced with a 1-2 cm asphalt chip seal. It was last resurfaced in 1992 under EU funding. Originally rated at 50 tonnes landing capacity, it is now reduced due to sub-surface water, sub-grade deterioration and lack of surface maintenance to 20 tonnes. It is under constant repair and has numerous soft spots that are of concern to aircraft. It has no fencing or runway lighting, restricting operations to daylight hours only.

142. The airport has access (not control) of two aging (unserviceable) fire trucks provided by the Police force. The control tower was built in the early 1980's and has minimal VHF radio and air services equipment. NavAids include an operational Non-Directional Beacon (NDB), and an inoperative Distance Measuring Equipment (DME).¹⁴ There are limited supplies of jet A1 fuel provided by a private firm. The terminal was constructed by AusAID in 1994 and has limited capacity for passenger and baggage handling, and inadequate security measures. All equipment and buildings are in a poor state of repair, and lack adequate maintenance as DCA has no control over ancillary services (fire & meteorology) and maintenance (PWD).

143. Limited air services have been provided by numerous airlines over the years, including sea planes to the outer islands. One of the longest serving was Air Marshall Island operating an HS748 with a passenger load of 55, which was ended in 1999. The service was replaced when Government purchased a share of Air Fiji in 2001. This gave Tuvalu greater control of its airline access and therefore the potential to develop tourism. The recent adoption of the route by Air Pacific caused Air Fiji to halt services. The current schedule of flights is twice weekly from Suva to Funafuti and return using an ATR-42 500 with a capacity of 42 passengers and cargo. The service is subject to numerous break downs and schedule changes as the aircraft is also used on the Fiji domestic routes and other regional routes.

144. The current runway and associated infrastructure is in a poor state of repair and only capable of handling turbo-prop ATR type aircraft. The development strategy is for additional capacity added by having more flights arriving instead of accommodating larger aircraft. There is a potential for expansion of the service for a third flight per week to be added during peak times (November to March) when there are waiting lists and passenger demand sometimes cannot be met. Currently, Air Pacific does not have aircraft available to provide this service however.¹⁵

145. The World Bank has recently approved an airfield upgrade under its Pacific Regional Aviation Investment Project. The \$11 million funding will be used to strengthen and resurface the existing runway; an extended Airport terminal to allow separation of arriving/departing passengers, improved baggage handling and security measures; and, a new control tower with adequate radio and air services equipment to meet minimum ICAO standards. Government expects that improving the airport (although not fully to ICAO standards) will facilitate the provision of increased air services.¹⁶ It is critical that the DCA also have the

¹⁴ NavAids were procured under government funds at the cost of A\$400,000.00

¹⁵ Although Air Pacific may not have the capacity for this, discussions should be undertaken with AP and other carriers / private operators.

¹⁶ Tuvalu is not a member of ICAO at this time

capacity and recurrent funding to regularly maintain the runway and associated infrastructure over the long term. This will be addressed under the World Bank financed project.

146. ADB is also funding TA 7684-REG: Institutional Strengthening for Aviation Regulation to the Pacific Aviation Safety Office and its member countries. This TA may support DCA in updating legislation/regulation after conducting a needs analysis in early 2012.

147. Air services are difficult to influence. With limited numbers and no competition, tickets are expensive, limiting the attractiveness of Tuvalu as a destination or a competitive exporter. The runway will not allow jet aircraft to land (except in emergencies) which limits the number of passengers and volume of freight that can be carried. This further impacts on prices and also the ability to export time-critical freight such as seafood products. The government would like the runway extended to accommodate larger planes and thus encourage tourism and fish exports. This would require either significant relocation of houses or a completely new location. Even if the runway was to be expanded to allow B737, there is no certainty that the route would be serviced. There is a need for Government to justify this level of investment given the current lack of evidence that it would be economically effective.

148. Tuvalu is facilitating increased economic traffic between its outer islands, resulting in higher levels of cargo and passenger traffic. Its strategy is to also increase the ability for tourists to access the islands, further improving the economy. There are 2 disused grass airstrips on Nanumea and Nukufetau that could be re-furbished, although there are still significant land issues that would need to be addressed. Seaplanes were used in the past for outer island traffic, but did not prove sustainable because of low demand at the real cost of providing the service. Helicopters and high speed boats are used in similar situations around the world (such as the Maldives). At present, there is little evidence to show that there is the local or tourist demand to support this financially or economically in Tuvalu.

149. While Government has flagged a need for a study to assess the options for servicing the outer islands, an examination of all domestic transport needs (maritime and air) may be more appropriate. This would examine cargo and passenger (local and tourist) demand; and perhaps point the way to a balanced and planned investment and expansion of services.

150. Table 7 outlines current and proposed projects in the air transport sector.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
	Airport Upgrade (runway, control tower, terminal)	11.00	F	WB						
	Navaid refurbishment	0.40	F	GoT						
	Institutional Strengthening for Aviation Regulation to the Pacific Aviation Safety Office	U	F	ADB						
A1	Domestic Air services (outer island runways etc)	TBD	I	U						
A2	New International Airport	TBD	I	U						

P – Planned; I – Identified; U - Unfunded

G. Roads and Public Works

151. Tuvalu Government policy is to provide adequate infrastructure where economically feasible and maintain existing infrastructure. Although transport is highlighted in the TKII, this primarily relates to marine and air. Most roads in Tuvalu were constructed when the funds from the dot.tv sale were released over 10 years ago.

152. The PWD in the MPUCT is responsible for the management and maintenance of all roads in Tuvalu and has an annual budget (for roads) of about \$20,000. The department only has limited equipment and materials at its disposal. The PWD is also responsible for Government vehicles, housing and infrastructure maintenance in addition to managing water and sanitation programs.

153. There are about 18 km of paved roads on the island of Funafuti which are in good condition. This is mainly due to the small volume and weight of traffic rather than the quality of maintenance. They were constructed with a crushed aggregate base course stabilized with cement, topped with two-coat asphalt and coral-chip seal. None of the roads are adequately drained and water often inundates the sub-grade, softening the surface and causing pot holes. Erosion of the road edges is repaired with concrete and potholes are filled with cold-ready mix asphalt. All repairs and maintenance only occur either when limited funds are available or when absolutely necessary. Road user vehicle licences are all collected by the *Kaupule* and therefore there is a lack of cost recovery measures put in place for maintenance of roads.

154. The outer islands only have unpaved roads. The *Kaupule* have limited ability to maintain roads and no funds.

155. PWD has identified that there is private sector capacity and capability on Funafuti (and to a limited extent on other islands) to undertake reasonable quality repairs and maintenance and that it conforms with the TK II private sector objectives, including the updated TK II objectives matrix for the current review. It also ensures PWD can focus on its core functions. There is potential to further develop capability in the private sector to undertake limited works, equipment repair, plumbing and electrical repairs and maintenance. An ADB vocational education team is currently examining ways to coordinate private and public sector formal and informal approaches to improving technical skills in Tuvalu (and the region). Additional funds could be used to facilitate workshops and training.

156. Table 8 identifies the proposed project being considered in the road sector. It is at a preliminary stage only, and is based on utilising the construction equipment that will be on the island during the airport runway re-paving. It has not been considered as part of the TISIP at this time.

Table 8 : Current & Proposed Road & Public Works Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
R1	Road Maintenance	TBD	I	U						

F – Funded; I – Identified; P – Planned; U - Unfunded

H. Maritime

157. Tuvalu’s National Strategy highlights the importance of maritime transport to Funafuti and the outer islands. In particular, it emphasises the need to improve the quality and frequency of transport services to the outer islands in an efficient and cost effective manner.

158. Maritime transport is managed by the Department of Marine and Port Services, which owns and operates the port in Funafuti and the two vessels that are used for inter-island and international shipping services. The Department is part of the Ministry of Transport and Communications and is managed by a Director. The other port at the island of Vaitupu (Nukufetau) is unable to handle containerized shipping and is owned, operated and

maintained by the local government. There are recent moves under the ADB SOE project to corporatise maritime, particularly its port operations in Funafuti.¹⁷

159. The main focus for shipping is domestic and international trade. The outer islands are reliant on delivery of cargo and passengers by sea from Funafuti, and this has suffered severely due to poor maintenance of facilities and vessels. As a result, large sums are expended just to keep the inter-island services afloat and without the capacity to address the deferred maintenance problem. Fishing is seen as an important driver of future economic growth and will require improved ports and shipping services.

1. Funafuti

160. Funafuti harbor consists of a dredged basin and two finger wharves that have drive-on and -off access. One wharf was constructed by AusAID in the 1980s and is dedicated to the handling of dangerous goods (such as fuel). The other wharf, recently constructed by JICA, provides domestic services and for general traffic. The port was constructed with a 1,500 m² fully-enclosed, concrete-floored stevedores shed combined with a large in-ground water tank. Surrounding the shed is a 6,400 m² container storage yard constructed of packed coral (unsealed) that is unable to accept stacking of containers. Adjoining the yard there is a small administrative office (which can only accommodate three personnel) and machinery shed.

161. There are approximately 235 passenger arrivals internationally each year by boat, and an estimated 4,000 domestic passenger movements. A total of 120,000 tonnes of cargo in 20 ft containers are handled each year. This was assessed by the JICA design team (prior to the reconstruction) as adequate for expected growth over the next 25 years.

162. The port operator indicates that it has a handling capacity of 4 containers per hour, taking roughly 10 hours to unload one ship. The port charges customers \$117 per container to unload and move 50 m to the container storage area. The process is hindered by only a single tractor-trailer which is often subject to urgent repairs due to lack of regular maintenance schedule. Further container handling delays occur due to the inability to stack containers, while spaces are juggled to manage. Often, wet weather severely delays processing as the handling machinery cannot traverse the softened-coral container storage area and potholes place undue pressure on the limited equipment. There are no container-washing facilities, with shipping companies charging \$236 per container to clean on return. Some shipping navais and the port maintenance workshop also require refurbishment.

163. International shipping services are also tenuous and very expensive. The Kiribati Shipping Service is filling a vital gap but the company is operating at a loss and it is questionable if the service is sustainable over the longer-term. The ship on the service is also in a bad state of repair and the on-board crane can only lift 10 tonnes which limits the type of freight and volume that can be carried.

2. Outer Islands

164. The outer islands can only be accessed by sea. The Nivaga II and the Manu Folau are the two vessels used for the scheduled domestic transport of both people and cargo, with the Nivaga II undertaking the occasional international run to Fiji as well. The posted sailing schedule is not always followed, and delays are common. The two vessels are both in a bad state of repair, despite JICA repairing the Mano Folua in 2011. JICA has been requested to repair or replace the Nivaga II in 2012.

¹⁷ Draft proposal for corporatizing the Port was completed in June 2011.

165. There are existing access channels on each of the seven outer islands, with Vaitupu consisting of a small but functional port. Jetties in each of the islands are in poor repair, and a lack of maintenance is also impacting reef growth and sedimentation of the channels. Navigation aids are poor, and channels are often unmarked. NZ Aid Programme is undertaking a project to broaden and deepen the reef channels for 6 of the 7 outer islands to facilitate navigation. The project will also provide some limited navigation aids, turning basins, alternate channels and minimal cargo handling facilities (breakers and containers). AusAID has been approached to co-fund the project (through PRIF), which is currently subject to an EIA.

166. The Government has also identified the need to finalise handling facilities at the Funafuti wharf (Project M1). This would include a crane, paving the container holding area, an additional container tractor (with potential lifting/stacking capability), and a container wash using recycled water. They have also identified the need for the refurbishment and construction of new jetties and cargo handling facilities on each of the outer islands (excluded from the NZAID project) as a priority to ensure safe handling (M2). To date, the outer islands have been “getting by” with minimal cargo handling facilities as the cost per island of upgraded facilities at an average of over \$6 million per island has not been able to be justified on a cost-benefit basis. Project M3 is the development of a fisheries harbour to safeguard the small recreational and subsistence fishing fleet and perhaps accommodate visiting (paying) yachts.

167. Table 9 presents a list of current and proposed projects in the Maritime sector.

Table 9 : Current & Proposed Maritime Transport Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
	Tuvalu Ship to Shore Transport Project (TSSTP)	8.00	F	NZ/ Aus						
M1	Funafuti Port Amenities	2.00	P	U						
M2	Outer Island Ports Upgrade	TBD	I	U						
M3	Fisheries Harbour	2.50	I	U						

F – Funded; P – Planned; I – Identified

I. Overview of Planned Investments

168. A list of current and planned investments is contained in Table 10. Note that the red coloured cells denote projects that have been considered and ranked under the current TISIP review.

Table 10 : Current and Planned Infrastructure Investments in Tuvalu

Tuvalu Infrastructure - Major Proposed Projects												
Ref	Project	Cross Sectoral	Estimated Cost (\$m)	Status	Funding Source	Proposed Timing 2012-2016						2017-2021
						11	12	13	14	15	16	
WATER & SANITATION												
	EU Envelope B - Risk Reduction Project (water, sanitation)		0.90	F	EU							
	Solar Power RO Units & Solar Energy	P1	4.00	F	Japan / PEC							
W1	Water Security Consolidation		3.00	P	U							
W2	MDG Outer Island Sanitation		0.70	P	EDF 10							
W3	Composting Toilets program & Septic Pump Out		1.00	P								
POWER & ENERGY												
	Energy Efficiency measures		0.50	F	TEC							
P1	RE 2012		4.45	P/F	various							
P2	RE Phase 2	W1	15.00	P	U							
P3	RE Phase 3		16.80	P	U							
P4	RE Phase 4		30.90	I								
SOLID WASTE MANAGEMENT												
	EU Envelope B - Risk Reduction Project (waste)		0.40	P	EU							
Information & Communication Technology												
T1	Solar Power ICT (Outer Islands and Funafuti)	P2	0.90	P	U							
T2	Expansion ICT to Outer Islands		0.50	P	U							
T3	Tuvalu Fiji Submarine Cable		33.00	I	U							
AIRPORTS												
	Airport Upgrade (runway, control tower, terminal)		11.00	P	WB							
	Nav aids refurbishment		0.40	P	GoT							
	Institutional Strengthening for Aviation Regulation to PASO		?	F	ADB							
A1	Domestic Air services (outer island runways etc)		TBD	I	U							
A2	New Airport		TBD	I	U							
ROADS & PWD												
R1	Roads Maintenance	A1	TBD									
MARITIME												
	Tuvalu Ship to Shore Transport Project (TSSTP)		8.00	F	NZAID/ AusAID							
M1	Funafuti Port Amenities	M3	2.00	P	U							
M2	Outer Island Ports Upgrade		TBD	I	U							
M3	Fisheries Harbour	M1	2.50	I	U							
OUTER ISLAND DEVELOPMENT												
O1	Outer Island Development Project	M2, T, P, W	1.00	I								
<p style="text-align: center;">Index</p> <p style="text-align: center;">I Identification / Concept C Committed P Planned U/F (Un)Funded</p> <p style="text-align: center;"> Ranked Funded Unranked </p>												

IV. PRIORITIZING INFRASTRUCTURE INVESTMENT

169. The full list of infrastructure investment projects for the next five years includes 30 projects totalling more than \$188 million (excluding the aviation sector developments). Of these, \$31 million are already underway or committed, and an additional \$157 million of proposed projects for which funding is not confirmed. While it is estimated that existing infrastructure is underfunded by about \$3 million per year (lack of maintenance and repair), there is an additional \$3 million of recurrent funding required for operation and maintenance of the projects that are currently funded and underway.

170. It is unlikely that it will be possible to fund all of these proposed projects within this timeframe from resources available to Government. Therefore, priorities need to be set. This part of the TISIP brings together the results of the analysis of infrastructure needs and challenges, planned investments and supporting measures to identify a set of initiatives that Government sees as priority areas for development of the economic infrastructure sector over the next 5-10 years. It uses a tool called Multi-Criteria Analysis (MCA) to assist in the setting of priorities.

A. The Project Ranking Process

171. The multi criteria analysis is a tool that can be used to rank projects across sectors. The objective of this tool is to enable quick prioritization of projects in the “absence” of a detailed national economic policy being in place. It is a rapid approach in lieu of a full social and economic Cost Benefit Analysis (CBA). It is not a project feasibility evaluation tool.

172. The MCA is intended to be used for the development of the TISIP, but also as a tool that the MFED can use on a regular basis to update the plan and coordinate its comments on the annual budget. Because of this, the MCA needs to be simple but not simplistic, with only the minimum but necessary criteria to achieve agreed results. In order for it to be sustained in the future, it must also be easy to apply, able to be improved, transparent and repeatable. It needs to be a tool that is owned by the stakeholders.

173. The Project Ranking process includes steps shown in Table 11:

Table 11 : The Project Ranking Process	
i.	Initial screening to separate those that are underway or committed, from those that are in the planning stage;
ii.	Criteria selection - Develop, outline and discuss weighting for key criteria
iii.	Scoring - Key Stakeholders individually score (1-4) each project using Q&A matrix.
iv.	MCA Rating - Each project achieves a final Project Rating of High, Medium or Low based on the banding of scores.
v.	Sanity checking - the final list is subject to a group discussion of scores, bands and ranking as a sanity check.

1. Initial Screening

174. The prioritization focused on screening the planned investments to identify those that align strongly with national priorities and deliver significant benefits to the Tuvalu people, the

economy and the environment. The overall pool of projects (funded, committed, proposed, identified) is first split into two components:

- Those that are funded and underway or have been committed to by development partners.
- Those that remain – planned and identified.

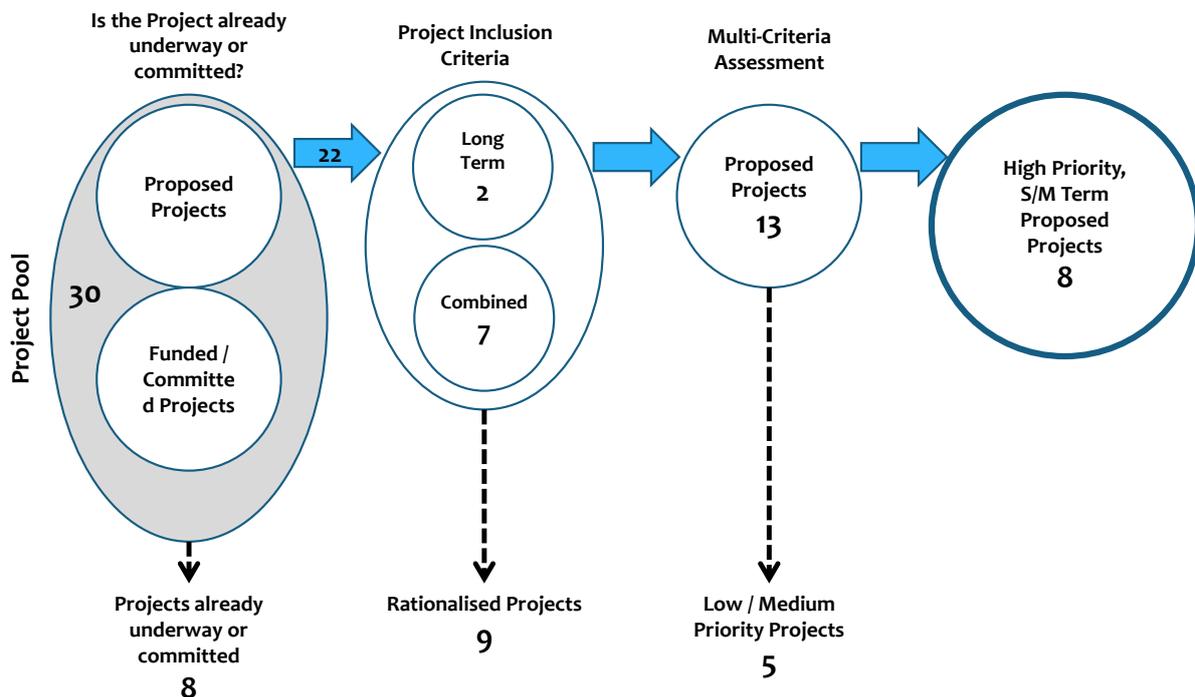
175. The immediate priority of Government is to complete investment projects already underway or committed. Therefore, those projects automatically become part of the TISIP priorities. Of the 30 originally proposed projects, 8 are already underway or funded, leaving 22 projects that were further screened.

176. The 22 planned and identified projects were then progressively screened and rationalized to identify projects that have the ability to proceed in the next five years. Additional screening criteria included:

- Deferral until after comprehensive master plan
- Long Term (10 + years)
- Combined with other projects

A further 9 projects were rationalized, leaving 13 projects to proceed to ranking. These are outlined in detail on project data sheets contained in Appendix B. Figure 3 outlines the Project Ranking process

Figure 3: The Project Ranking Process



2. Criteria Selection

177. The key criteria for the MCA include seven thematic areas:

- *Policy* – Link with NSSD existing plans
- *Economic* – Contribution to growth
- *Financial* – O&M costs, ability to pay, financial return and investment

- *Social* – Basic services, level of service, living standards
- *Environmental* – Protecting or improving environment
- *Readiness* – Level of preparation
- *Maintenance* – Adequate

178. The criteria are assessed using a number of questions to inform an average ranking for those criteria. The detailed questions are outlined in Table 12.

179. Although the criteria can be subject to weighting to enable more emphasis to be placed on one versus another, the Government determined that each of the 7 criteria should be weighted evenly, given there was already an emphasis on financial, economic and readiness factors.

Table 12 : The MCA Tool

<p>1. Policy - Will the project contribute towards meeting long term National Sustainable Development Plan goals?</p> <ul style="list-style-type: none"> • Addresses Long Term Goals • Addresses Short Term Goals
<p>2. Economic - Will the project contribute to national economic development and growth?</p> <ul style="list-style-type: none"> • Does it add to Exports – Foreign Exchange • Potential to enhance private sector activity and jobs • Is this project critical to continuing an existing essential service? • Does the project contribute to other sectors?
<p>3. Financial - Will the project contribute to national revenue?</p> <ul style="list-style-type: none"> • Is there potential for user charges to cover full cost of service? • Does the project cover the costs of O&M? • Have all other refurbishment and repair options been exhausted for this service?
<p>4. Social - Will the project lead to improved living standards?</p> <ul style="list-style-type: none"> • Contributes to meeting minimum level of service standards • Does it enhance service delivery? • Does it lead to health improvements
<p>5. Environmental - Will the project contribute to a better environment?</p> <ul style="list-style-type: none"> • Directly improves the physical environment • Has no negative environmental impacts
<p>6. Readiness - What is the Project's readiness?</p> <ul style="list-style-type: none"> • How advanced in the planning stage? • How advanced is identification of a development partner. • Are there land or social owner impacts
<p>7. Maintenance will be adequate?</p> <ul style="list-style-type: none"> • Is there the current technical capability to maintain infrastructure? • Is there an appropriate organizational structure to maintain infrastructure? • Is there the financial capacity to maintain infrastructure?

3. MCA Scoring Process

180. The scoring process was through the use of a modified Delphi Technique. This utilizes individual scoring, compiled into anonymous results. This is followed by group discussion of results where there are major outliers (e.g. one respondent scored one criteria outside 1 standard deviation). When fully discussed, the process is repeated until results are smoothed – representing consensus.

181. The PRIF taskforce was the scoring group. It comprised the director from each of the infrastructure sectors; a planning, an economic and a Cabinet representative; and 2 significant private sector representatives (such as TANGO and Chamber of Commerce). Full details are outlined in Appendix E.

182. Each project was first presented to the group. Each member then scored the project by providing a number (1-4) against each question in the criteria. The score of 1 meant the

project did not satisfy the question in any way. A score of 4 indicated that it fully or strongly satisfied the question. Scores of 2 and 3 indicated less confirmation, with no allowance for a middle score. To work consistently, each member needs to score each question for each project.

183. The final scores were entered into a spreadsheet and then averaged across all respondents for each question. The average scores for each question were then averaged for each of the seven thematic criteria resulting in 7 scores for each criterion under each of the 13 projects.

184. Within each criterion, the range between maximum and minimum scores across the projects were assessed and divided by three – allowing for a high, medium or low band. Each project's criteria were then identified in which band they fell. This allowed for project ranking to be smoothed and minimized amplification of minimal differentiation between tightly clustered projects. Projects were then ranked by the number of high, medium and low scores it received.

4. Sanity Check

185. To complete the modified Delphi technique, the ranking process and results were reviewed by the participants. The standard deviation across aggregated and averaged scores was presented to indicate where there were significant differences of opinion. Scores were discussed by the group as a whole, to ensure that everyone understood the questions and was happy with the resultant score. The final ranking was discussed as to whether it made sense within their understanding of the needs of Tuvalu.

186. The final list of projects was ranked into high, medium and low categories. Appendix E contains a report from the initial ranking process; followed by the TISIP Taskforce report with the final ranking and justification.

187. The final ranking of projects by the PRIF Taskforce is as follows:

1. P2: Energy Sector 2013-2014
2. P3: Energy Sector 2015-2016
3. T1: Outer Islands Solar Telecom
4. M1: Port Amenities
5. W1: Water Consolidation
6. W2: Outer Island Compost Toilets
7. W3: Funafuti Compost Toilets
8. T2: Outer Island Telecom
9. A2: International Air Port & Services
10. T3: Submarine Cable
11. O1: Integrated Outer Island Infrastructure Project
12. M2: Outer Island Ports Upgrade
13. M3: Fisheries Marina

B. Options Development

188. The final ranked projects were then subject to timing and funding implications. Some projects have significantly longer lead times (planning and design) than others. Some required significant funding commitments, while others could be spread over numerous years. Government agreed that only the top eight ranked projects would be prioritised over the TISIP's 5-10 year planning period due to these funding and timing implications. Figure 4 shows the potential project timing for the highest ranked projects over 5 years.

Figure 4: Potential Timing of Priority Projects over 5 years

Code	Short Name	Cost \$ Millions	2012	2013	2014	2015	2016	
W1	Water Consolidation	3.0	■	■				
W2	Outer Island Sanitation	0.7	■	■				
W3	Funafuti Sanitation	1.0		■	■			
P2	Renewable Energy 2	15.0	■	■	■			
P3	Renewable Energy 3	16.8		■	■	■		
T1	Solar Telecom	0.9	■	■	■			
T2	Outer Island Telecom	0.5		■	■			
M1	Port Ancillary	2.0	■	■	■			
	TOTAL	39.9						
							Key	
							■	Development Partner ID
							■	Planning
							■	Implementation

189. Requirements for funding options and investment strategies were then developed, and are outlined in Chapters V and VI.

V. PROJECT FINANCING

190. This section outlines the life cycle costs of infrastructure and the current situation in Tuvalu. It examines the current balance between maintenance needs and maintenance expenditure; and contrasts that with the potential operational and maintenance implications of the TISIP.

A. Whole of Life Costs

191. The costs associated with new infrastructure do not end with the purchase or construction. It is one step in the life cycle of an asset that begins with the initial identification of needs through to the disposal of the asset at the end of its useful life. The stages of the asset life cycle are set out below. Each stage requires planning and coordination; and involves costs and time.

- **Concept and planning:** the costs and time involved in planning and investigations, development of the design concept, and associated studies such as environmental impact and climate change assessments.
- **Detailed design specification:** the costs and time required for preparing detailed designs and/or specifications and contract documentation.
- **Construction/supply:** includes an allowance for contingencies and cost escalation over the period of supply. For a major infrastructure project, the combined duration of planning, detailed design/specification, contracting and delivery can amount to several years to over a decade.
- **Contract supervision:** includes the technical, financial and legal costs to ensure that the work is carried out to the required standard and in compliance with contract requirements.
- **Operation and maintenance:** operating costs over the life of an asset include labour, energy and consumables. Maintenance costs are required to keep it in good condition. This includes small scale routine activities to minimize wear and tear, and larger scale activities such as the routine replacement of moving parts to maintain operational status. The economic life of infrastructure can range from 5-10 years for plant and equipment to 100 years for major civil works.
- **Disposal/decommissioning:** costs include demolition or dismantling and removing the asset from the site and disposing/recycling materials. Significant environmental costs may occur such as removal of toxic wastes.

192. When all these costs are combined, the total may be more than double the cost of the initial purchase/construction price. This fact is often overlooked in decision making on new assets, particularly in developing countries. The outcome is under-budgeting of on-going costs, with key maintenance not being undertaken, resulting in a much shorter life than expected. This is wasteful of scarce resources and imposes an unnecessary burden on future budgets where money could be better utilized elsewhere. Typical lifecycle costs are shown in Table 13. This table shows the additional costs that may be associated with an initial \$100 of capital expenditure depending on the type of investment.

Stage	Rate (%) ^a	Construct/ Supply only	+ other up front	20 year Operating & maintenance ^e
Concept & planning	2-5		\$2-5	
Detailed Design Specification	5-10		\$5-10	
Construction/ Supply		\$100	\$100	
Contingency/ escalation	10		\$10	
Contract supervision	2-5		\$2-5	
Operating ^b	0-20			\$0-400
Maintenance – Routine ^c	0-5			\$0-100
Maintenance – Periodic ^d	5-10			\$10-20
Disposal & Decommissioning ^e	0-100			\$0-100
TOTAL		\$100	\$119-130	\$10-620

- Notes:
- a. Based on typical infrastructure costing parameters.
 - b. Varies from zero (e.g. for buried pipes) to 20% p.a. for mobile plant and equipment.
 - c. Varies from zero to 5% p.a. for routine maintenance of assets such as roads
 - d. Based on 20 year asset life with periodic maintenance every 7 years.
 - e. Varies from zero to 100% (e.g. clean-up of toxic chemical sites).

B. Current Operating and Maintenance Expenditure

1. National Recurrent Budget

193. The concept of life cycle costs appears new to Tuvalu; at least it does not appear to enter into current thinking at household, business or government levels. It will take some years and a concerted effort to change old habits in Tuvalu where the expectation is that development partners will provide new infrastructure and when it breaks down they will replace it. This expectation is largely reinforced by development partner behaviour, which often does exactly that – repairs or replaces broken infrastructure.

194. In the present environment, budgeting for life cycle costs beyond the initial capital purchase or construction is not given the necessary priority; mainly because experience shows development partners will come to the party if they think it is important enough. Short term considerations over-ride medium to long term thinking in most cases, with each new development partner generation seemingly unable to learn from the past. This is not to say that there are not genuine attempts by development partners to ensure that operating and maintenance costs are factored into aid projects. All too often, however, for whatever reason, grant funded projects are not maintained.

195. Information to assess overall government current allocations to operating and maintenance (O&M) expenditure is contained in the 2008 to 2011 National Budgets. The Budget does not include SOEs. There are two infrastructure related SOEs: the Tuvalu Electricity Corporation (TEC) and the Tuvalu Communications Corporation (TCC), which are analysed separately.

196. Table 14 shows government revenue and expenditure, comparing the budget with the actual outturn over the last four years to 2011. During this time, total budgeted and actual expenditure has increased by 37% due to increased development partner funding. The 2008 budget would have been formulated prior to the onset of the Global Financial Crisis (GFC), the depth of which occurred in August 2008 when financial markets bottomed out. Over the three-year period from 2008 to 2010, domestic revenue fell by 9% while grants

increased by 28%. If the current year is included, based on the projected outturn for the current year, domestic revenue will have fallen by 2%, while grants will have risen by 87%.

Table 14 : Tuvalu Government Budget 2008 – 2011

Year ending December	2008 Budget	2008 Actual	2009 Budget	2009 Outturn	2010 Budget	2010 Outturn	2011 Budget	2011 Projected
A\$'000								
Revenue								
Domestic Revenue	16,790	19,895	18,775	20,698	17,962	18,023	20,088	19,444
Grants	27,967	19,179	32,940	20,904	35,231	24,539	40,350	35,862
Total Revenue and Grants	44,757	39,074	51,715	41,602	53,193	42,562	60,438	55,306
Expenditure								
Staff	10,452	9,930	11,704	10,641	11,855	11,428	12,126	11,559
Operating*	5,293	5,711	5,543	7,595	6,229	6,175	5,419	6,013
Maintenance	1,001	1,109	1,164	1,262	1,299	1,532	1,191	1,350
Loan repayment	614	646	754	569	454	360	448	448
Interest	0	0	50	81	50	105	70	70
Not elsewhere included	6,931	8,748	6,894	8,065	8,935	10,955	8,760	9,552
Total Recurrent	24,291	26,144	26,109	28,213	28,822	30,555	28,014	28,992
Special Devt Expenditure	2,196	1,822	6,965	4,966	3,787	5,898	5,305	4,586
Capital Exp (Development partner F0088)	20,861	13,031	24,040	10,312	28,281	17,075	30,690	26,657
Total Expenditure	46,876	40,997	54,914	43,491	60,889	53,527	64,010	60,235
Dom. Rev/Tot. Exp. %	35.8	48.5	34.2	47.6	29.5	33.7	31.4	32.3
Adj Rec Sur/Def	1,871	2,067	1,162	-1,889	-3,161	-6,429	1,145	-212
Cash Reserves (Yr ending)		2,123		-944		7,787		3,787
NBT O/D						431		
CIF Balance						7355		

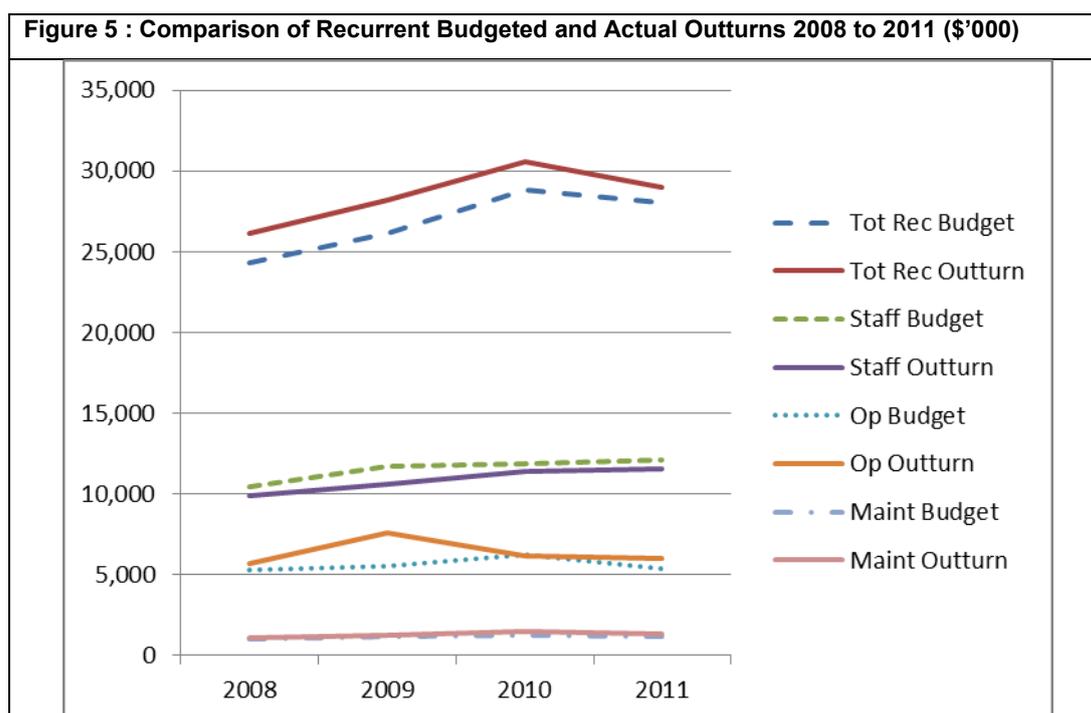
Source: Ministry of Finance and Economic Development
 Note * Sum of Goods and Services, Fuel and Oil and Other Expenses

197. A comparison of recurrent budgeted and actual outturns for the four years to 2011 shows a remarkable consistency within years and across years (see Table 15 and Figure 5). Total recurrent expenditure outturn is consistently higher than budgeted, with a high reached in the election year 2010. A key reason for this is the blow-out in expenditure on the Medical Treatment Scheme. "Staff" actual outturn is consistently less than budgeted.

Table 15 : Comparison of Budgeted and Actual Outturns 2008 to 2011 (\$'000)

	2008	2009	2010	2011	Av 2008-11
Tot Rec Budget	24,291	26,109	28,822	28,014	
Tot Rec Outturn	26,144	28,213	30,555	28,992	
Staff Budget	10,452	11,704	11,855	12,126	
Staff Outturn	9,930	10,641	11,428	11,559	
Op Budget	5,293	5,543	6,229	5,419	
Op Outturn	5,711	7,595	6,175	6,013	
Maint Budget	1,001	1,164	1,299	1,191	
Maint Outturn	1,109	1,262	1,532	1,350	
Op /Tot Rec % Budget	21.8	21.2	21.6	19.3	21.0
Op /Tot Rec % Outturn	21.8	26.9	20.2	20.7	22.4
Maint/Tot Rec % Budget	4.1	4.5	4.5	4.3	4.3
Maint/Tot Rec % Outturn	4.2	4.5	5.0	4.7	4.6

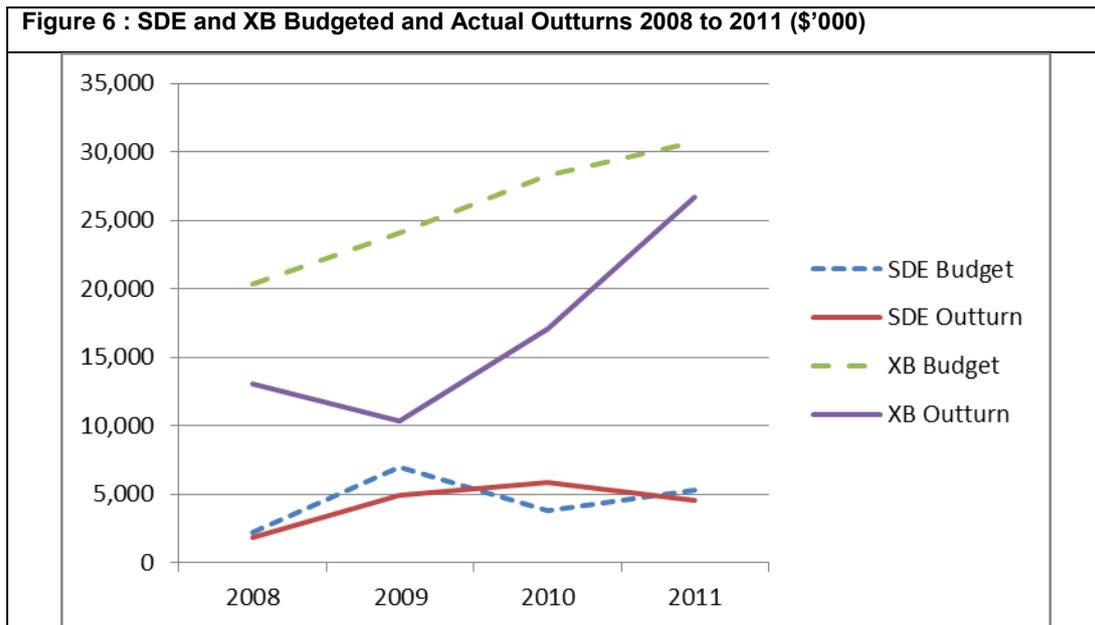
Source: Tuvalu Ministry of Finance and Economic Development



198. Actual outturn operating expenditure is consistently higher or equal to budgeted, and maintenance expenditure outturn varies little compared with budgeted expenditure. Budgeted operating expenditure as a percentage of total recurrent expenditure varies little year to year at an average of 21.0% over the period. The actual outturn of operating expenditure as a percentage of total recurrent expenditure is higher than budgeted at an average of 22.4%.

199. Maintenance expenditure varies little year to year and between the budgeted and the actual outturn at an average of 4.3% and 4.6%, respectively. This consistency between budgeted and outturn expenditure on maintenance indicates that departments are actually undertaking the maintenance they budget on. This is encouraging; however, the question is whether it is enough to do the job. Anecdotally, it would seem not. For example, during the water crisis a visual inspection of guttering and down pipes on certain government buildings showed a lamentably low level of maintenance.

200. The major variation in total expenditure comes from variations in XB (development partner funding). The government consistently budgets on a higher level of XB expenditure than is actually delivered (see Figure 6). The other major area of non-recurrent spending is on Special Development Expenditures (SDEs). SDEs started out at a low level in 2008, budgeted at \$2.2 million (actual \$1.8 million) increasing to \$7.0 million (\$5.0 million) in 2009 and then remaining at about this level through to 2011. It is somewhat surprising that the government has maintained a high level of SDEs during this period of the GFC. It is also noteworthy that the government has maintained a high level of SDEs when expenditure on maintenance is consistently low. This appears symptomatic of the widely held view in Tuvalu that the maintenance of development partner funded infrastructure is the responsibility of development partners and not the government.



201. In recent years, Tuvalu governments have increasingly emphasized the difficulties in funding recurrent expenditure. Development partners are beginning to respond with a trend towards direct budgetary assistance. This started with the Republic of China (or Taiwan), followed by New Zealand (through the CIF) and now ADB, Australia and the EU have signalled a move in this direction. Whether the Tuvalu Government recognizes that this move means there will be less money available for project orientated aid is not clear. However, development partners typically have an envelope of assistance country by country, so an increase in budgetary aid will inevitably mean a reduction in project aid. In other words, there is a clear opportunity cost associated with every dollar – it’s one or the other, not both.

202. There is a danger in moving aid to budgetary assistance if there is a chance it will be cut off. There will be considerably more pain associated with a falling recurrent budget compared with reduced project funding. In addition, budgetary aid implies an increasing dependence on aid for the day to day provision of government services. If such budgetary aid is targeted to provide a higher level of maintenance for existing infrastructure, then, this will be a good use of the funds. However, if it goes towards inflating civil servant salaries and per diems then that may be less desirable.

203. Given that development partners have been supporting the merits of preventative maintenance for many years, it is a moot point whether performance will ever improve. Wherever one looks in the Pacific there is little evidence of a preventative maintenance culture. Maybe it is time that this was recognised and development partner funded projects in Tuvalu routinely include provision for maintenance that remained the explicit responsibility of development partners. This would require a rethink by development partners as to their long term relationships with PICs beyond the typical five year time horizon for projects. It would clearly signal the continuing economic dependency that is a reality for PICs and result in a significant improvement in the efficient use of capital. An alternative approach would be for development partners to make the provision of new infrastructure, conditional on demonstrated improved performance by PICs on the maintenance of existing infrastructure.

C. Future Operating and Maintenance Expenditure

204. At the beginning of Section II, reference was made to short-term thinking. As well as the government, development partners also need to take a longer term view and make specific provision for whole of life costs. There are several possible approaches to this issue.

205. In Tuvalu, where the Budget is severely constrained, life cycle costs should be a serious consideration in all capital purchases. If life cycle costs cannot be accommodated within the budget for a particular capital asset, then consideration should be given to down grading the functionality and/or sophistication of capital expenditure until these costs can be accommodated. If this is not done then lack of maintenance will inevitably be perpetuated in the future.

206. Development partners are increasingly turning from project based aid to direct budgetary support. Typically, such funding would go into the consolidated revenue account and be co-mingled with the rest of the government's revenue. Alternatively there is an opportunity to provide specific increased funding for maintaining existing infrastructure. Increased funding could be conditional on verification of agreed maintenance programs being carried out to an acceptable standard.

207. A bonus would be contracting out this work to the private sector. This not only provides jobs, it results in greater efficiency in the use of scarce capital and keeps money circulating around the economy rather than coming in and going straight out to purchase new infrastructure. Much of the maintenance does not require advanced technical knowledge. It is exactly the work seafarers could do when waiting for their next ship and it would help soak up a proportion of young people who are currently without work. Typically the skills required would be similar across most sectors and include basic trades such as carpentry, painting, plumbing, electrics and electronics.

208. The extent that it is practical and cost effective to implement should be tested with a pilot project that covers at least three sub-contracts to ensure the concept is given a fair test. The idea is to use experienced regional trades people on period contracts as supervisors tasked with maintaining specific infrastructure (e.g. Funafuti's rain water catchment and storage systems, the power distribution network, RE systems, etc). They would work in the region, but not their own country. This would break the social obligations and social hierarchy traps. They would manage a budget that would cover management, training, parts, materials and labour and be accountable for outcomes. For example, they could be on annual contracts and if they don't perform, their contract is not renewed. They would form teams of young people both skilled and unskilled to do the work; thus making a significant contribution to a major Pacific problem – youth unemployment.

209. This approach would result in money circulating in the local economy and providing jobs rather than the money coming in and going straight out to buy new infrastructure. Extending the life of infrastructure frees up money for other uses. On the coral atolls, in particular, there are few opportunities to generate foreign exchange – but a dollar saved on imports has the same value as a dollar generated from exports. Donors are moving into direct budgetary assistance and some of these funds could be allocated specifically to these programs. Tuvalu has a word "Fakafoou" which means to make new. It is to do with repairing, as well as refurbishing or even to build a new structure altogether. This word could be used to highlight (brand) a new program of using south/south exchanges of maintenance supervisors.

210. Under project-based aid, the government is often expected to provide for the ongoing maintenance of capital items. Usually, there will be provision for initial training and one or two years of spare parts in the aid package. However, once these are consumed, all too

often that is the end of maintenance until the item stops working. This may be less than half the economic life of the item if properly maintained. Regional skilled people on annual contracts could manage maintenance, replacing the use of high priced contractors. Consultants could be replaced by regionally-sourced, experienced and competent people who understand the harshness of the island environment.

211. There is already a trend evident of development partners sourcing regional technical specialists (e.g. Tuvalu providing the Financial Secretary for Nauru) and skilled people (e.g. PNG providing a technician to maintain hospital equipment in Tuvalu) to provide effective services in the Pacific. Much more could be made of this modality, particularly for maintenance. The need is for an ongoing focus on maintenance, continual training and unrelenting attention to the preventative approach. Once out of the context of their own island community, Pacific Islanders are freed from the pressures of political and social obligations that often are part of the problem.

212. Both external and internal factors will have potential impacts on the TISIP. External forces, including global economic cycles, will continue and impact negatively on Tuvalu at times. Improving the resilience of the economy to these shocks is very dependent on the development partners continuing to assist Tuvalu at least to the extent of recent years. Better management of assets will ensure that the scarce capital Tuvalu has access to, will give the greatest economic and social return.

213. Ensuring that new infrastructure is engineered to the needs of Tuvalu will be a good start. It should be functional and recognise that Tuvalu does not have a culture of maintenance. Changing that culture to one that recognises the benefits of preventative maintenance and timely and regular maintenance will take some time and will take a concerted effort at all levels. In the meantime, the approaches outlined above can make a real difference. A focus on maintenance will create local jobs and free up money for other high priority purposes instead of being wasted by replacing items well before the end of their economic life.

VI. FUNDING STRATEGY

214. The funding strategy outlines the projected demand for infrastructure-related finance; the capacity of the Government and the SOEs to address total costs; expected development partner funding for infrastructure; and the interventions the Government can make to improve the infrastructure funding environment.

A. Demand for Infrastructure Finance

215. The overall demand for financing infrastructure is divided not only between financing new projects and maintaining and operating these projects, but also the full maintenance of existing infrastructure. Table 16 shows the total projected demand for infrastructure financing over the next five years, covering full maintenance for existing infrastructure, projects that are underway or committed, and high priority investments identified by the MCA process. Total demand for finance over the next five years amounts to \$113.95 million, of which 12.6% is for full maintenance of existing infrastructure, 8.8% is for maintenance of new capital, 8.1% is for operating expenditure on new infrastructure and 70.5% is for new capital expenditure. Over the 25-year lifecycle of new infrastructure the O&M costs, including full maintenance of existing infrastructure will rise to 78.0% of total funds required.

Table 16 : Projected expenditure by activity over 5 years – from MCA (\$ million)

		Lifecycle	5 year	2012	2013	2014	2015	2016
Existing capital - increase to "full" maintenance								
	Recurrent Budget	73.50	10.50		1.50	3.00	3.00	3.00
	TEC	0.16	0.16		0.16			
	TTC	26.46	3.78		0.54	1.08	1.08	1.08
	Total	100.12	14.44		2.20	4.08	4.08	4.08
Committed and Funded								
	Capital	34.96	32.40	15.90	8.43	4.03	4.03	
	Maintenance	31.40	4.65	0.09	0.97	1.12	1.20	1.27
	Operating	54.04	6.66	0.07	0.80	1.57	1.93	2.30
	Total	120.40	43.70	16.05	10.20	6.72	7.16	3.57
High Priority								
	Capital	48.28	47.88	4.28	13.30	11.60	9.35	9.35
	Maintenance	76.14	5.34		0.13	1.04	1.75	2.43
	Operating	32.93	2.58		0.09	0.53	0.86	1.11
	Total	157.35	55.80	4.28	13.51	13.17	11.95	12.89
	TOTAL	377.87	113.95	20.33	25.92	23.97	23.20	20.54
Note * Capital includes concept planning and detailed design plus supervision and contingency escalation								

216. When the demand for infrastructure finance determined by the MCA process is matched against the likely supply of funding from development partners, averaging around \$15 million per annum (see Table 17), there is a shortfall of \$5-\$10 million per annum.

Table 17 : Funding Envelope

	Likely Allocation to Infrastructure (\$m)									
	2012		2013		2014		2015		2016	
	allocated	unallocated	allocated	unallocated	allocated	unallocated	allocated	unallocated	allocated	unallocated
ADB	2.29									
	0.29									
AusAID	2.50	-	2.50	-	-	2.50	-	2.50	-	2.50
EU	2.50	-	2.50	-	-	2.50	-	2.50	-	2.50
Japan	4.00		10.00	-	-	-	-	6.00	-	-
NZAP	2.50		2.50		1.50	1.00		2.50		2.50
RoC Taiwan										
World Bank	3.00		3.00		3.00		3.00			3.00
TOTAL	17.08	0.00	20.50	0.00	4.50	6.00	3.00	13.50	0.00	10.50
TOTAL COMBINED	17.08		20.50		10.50		16.50		10.50	
Average	15.02									

Source: Donor meeting, 7.11.11, Suva.

217. A schedule that more closely aligns with the supply of funds results in a 10-year implementation period (see Table 18). Here, the total demand for finance averages \$15.9 million per annum compared with an average of \$22.8 million per annum over five years. This schedule spreads the planned investments over ten years instead of five years. The consequences of doing this will be a program that is more closely aligned with the availability of funding for projects and the capacity and capability of Tuvalu to implement them.

Table 18 : Projected expenditure by activity over 10 years (\$ million)

	Lifecycle	10 year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Existing capital - increase to "full" maintenance												
Recurrent Budget	73.50	25.50		1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
TEC	0.66	0.66		0.16	0.16	0.16	0.16					
TTC	26.46	9.18		0.54	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
Total	100.62	35.34		2.20	4.08							
Committed and Funded												
Capital	34.96	32.40	15.90	8.43	4.03	4.03						
Maintenance	31.40	11.00	0.09	0.97	1.12	1.20	1.27	1.27	1.27	1.27	1.27	1.27
Operating	54.04	18.15	0.07	0.80	1.57	1.93	2.30	2.30	2.30	2.30	2.30	2.30
Total	120.40	61.54	16.05	10.20	6.72	7.16	3.57	3.57	3.57	3.57	3.57	3.57
High Priority												
Capital	48.28	48.28		0.63	4.21	6.55	5.50	5.50	7.20	6.23	6.23	6.23
Maintenance	74.86	9.67				0.23	0.55	0.95	1.35	1.75	2.20	2.65
Operating	32.22	4.88				0.18	0.40	0.55	0.70	0.85	1.02	1.19
Total	155.37	62.83		0.63	4.21	6.96	6.44	6.99	9.24	8.83	9.45	10.07
TOTAL	376.38	159.71	16.05	13.03	15.01	18.20	14.09	14.64	16.89	16.48	17.10	17.72
Note * Capital includes concept planning and detailed design plus supervision and contingency escalation												

218. This schedule does not take into account possible funding from climate change funds that could be available to assist the funding of the renewable energy projects. Given the Government's priorities, and capacity and capability to manage existing and new infrastructure, it is unlikely that the target of 100% renewable energy by 2020 can be achieved without significant climate change funding.

Figure 7 : Infrastructure Schedule over 5 years (\$ million)

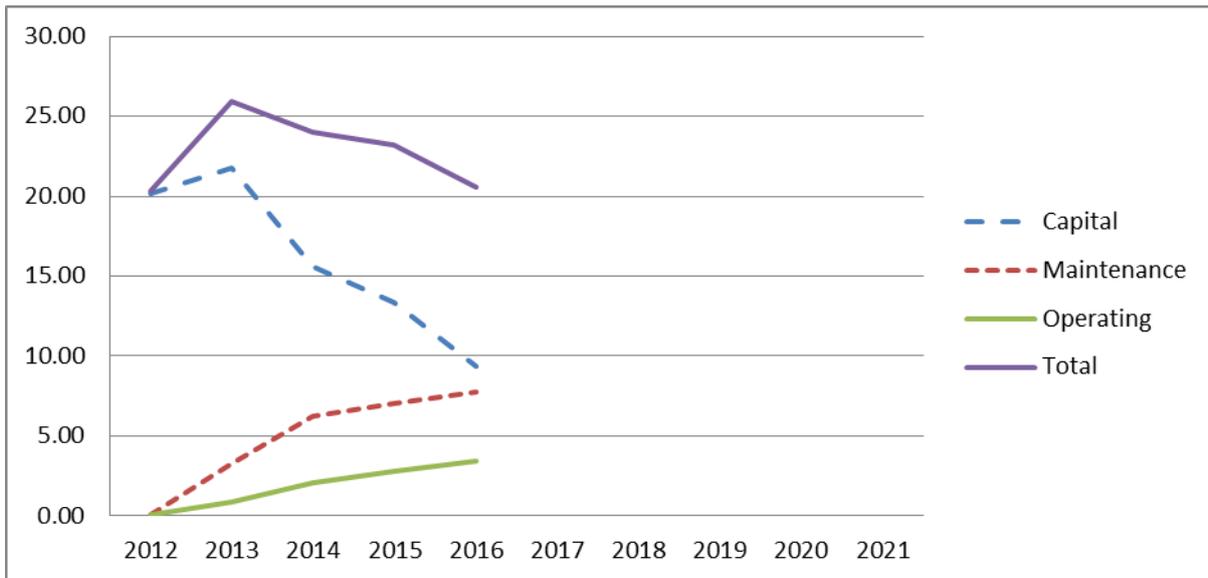
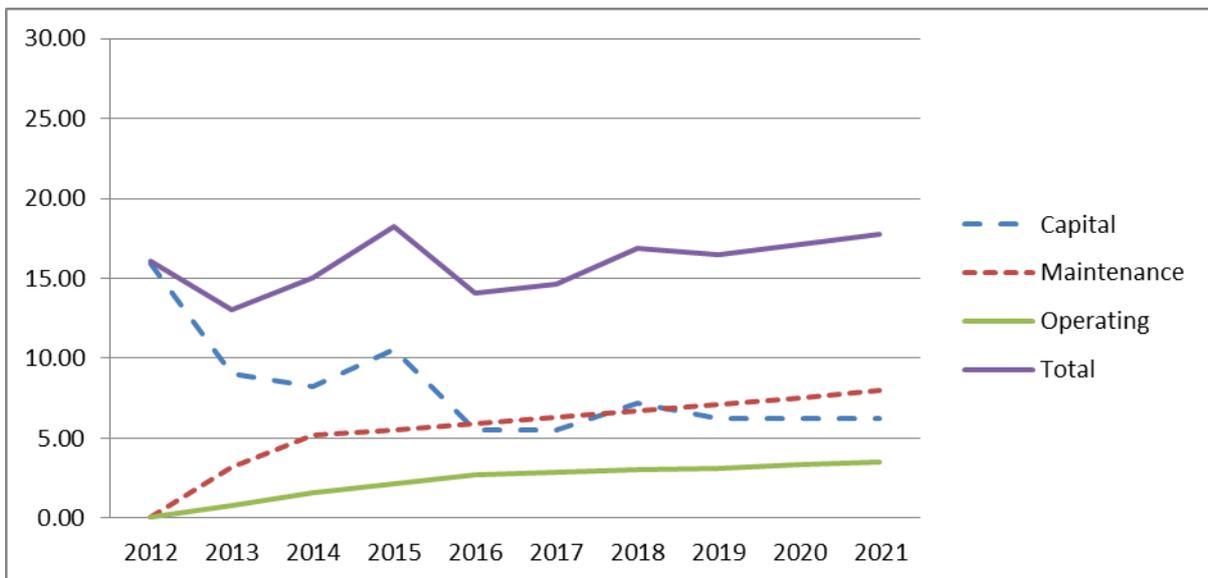


Figure 8 : Infrastructure Schedule over 10 years (\$ million)



B. Capital Expenditure

219. Tuvalu’s capital expenditure requirements are set out in Section V. This expenditure is divided between projects that are committed and funded and TISIP high priority projects. Table 19 shows the projected capital expenditure by project category for schedules over five and ten years.

Table 19 : Projected capital expenditure* by priority (\$Million)

	Total	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Five year schedule												
Committed and Funded	32.40	15.90	8.43	4.03	4.03							
High Priority	47.88	4.28	13.30	11.60	9.35	9.35						
TOTAL	80.27	20.17	21.73	15.63	13.38	9.35						
Ten year schedule												
Committed and Funded	32.40	15.90	8.43	4.03	4.03							
High Priority	48.28		0.63	4.21	6.55	5.50	5.50	7.20	6.23	6.23	6.23	
TOTAL	80.68	15.90	9.06	8.24	10.58	5.50	5.50	7.20	6.23	6.23	6.23	

Note * Capital includes concept planning and detailed design plus supervision and contingency escalation

220. Funding for the high priority projects is uncertain as they are all at the planning stage.

1. Life cycle costs

221. The capital cost of the TISIP under the five-year schedule amounts to \$71.29 million and when concept planning and detailed design plus supervision and contingency escalation are added the sum increases to \$83.27 million (as shown in Table 16). Maintenance and operating costs in the first five years are small in comparison at \$9.99 million and \$9.24 million, respectively. Adding the increase in maintenance costs for full maintenance of existing government assets including the SOEs adds a further \$14.44 million.

222. However, when maintenance and operating expenditure are taken over the full 25-year life of the projects, the total life cycle costs of the TISIP amount to \$377.87 million (including the maintenance of existing assets at \$100.12 million) with new project maintenance, \$107.54 million; and the operating costs of new projects, \$86.97 million. This highlights the hidden costs of infrastructure, which over the lifetime of the TISIP amounts to five times the initial capital cost. Details of the breakdown of these life time costs project-by-project are set out in Table 19 with a further breakdown separating out capital, maintenance and operating costs in Appendix C.

223. Just adding the dollar amounts over a 20-year period to give a total is misleading from a capital budgeting perspective, because a dollar today is worth more than a dollar in 25 years' time. This is because the dollar today can be used for consumption or investment while the dollar in the future is less certain to be available and cannot be used until a number of years have passed. The way that this time value of money is accounted for is to discount future cash flow streams. The choice of discount rate is controversial. From the perspective of an investor the appropriate rate is the expected return on investment given by the weighted average cost of capital. Typically, this would give a real discount rate of 8% or higher. Another perspective is to adopt a social time preference rate, which is usually taken to be the long term sustainable growth rate of the economy. Typically, this would give a rate of around 2-3%. Adopting a high discount rate implies a high regard for dollars in the near term while adopting a low rate implies a high regard for the longer term future.

224. In Tuvalu's present situation where capital is severely constrained and there are many competing uses for scarce capital, it may be appropriate to use a high discount rate as this puts emphasis on the near term. On the other hand, investment is also required for a long term sustainable future, implying a low discount rate. In order to highlight the real cost over the 25 year life of the TISIP, cash flows are discounted at 8% and 2%. This shows the effect of taking a short term view in contrast to a long term view. The undiscounted total cost of the TISIP over 25 years is \$351.17 million. At a discount rate of 8%, the present value (PV) is \$177.44 million. At a discount rate of 2%, the PV is \$300.83 million.

225. Spreading out the adoption schedule of new infrastructure over ten years has a small positive effect on the present values of the cashflows reducing costs somewhat. The undiscounted total cost over 25 years is \$351.48 million. At a discount rate of 8%, the PV is \$165.24 million. At a discount rate of 2%, the PV is \$297.05 million.

226. What this means for the TISIP is that a long term sustainable future requires a focus on maintaining infrastructure assets, as these are the costs that occur in the future and impose a real burden on society. The estimated maintenance costs in the TISIP are based on a planned approach. If actual maintenance is neglected, then capital costs will be higher due to the shortened life of the assets and the costs imposed on the economy of poor performance or non-performance. On the other hand, if infrastructure assets are well maintained their life is greatly extended, money that would have gone out of Tuvalu to purchase new assets stays in the local economy providing jobs and increasing economic self-reliance.

2. Medium and Long Term Priorities

227. During the prioritizing process, a number of projects were identified, but rated below the high priority projects or were considered to be long term wants rather than immediate needs. These projects are set out in Table 20. Leaving aside the Domestic Air Services and New Airport projects, which appear to be of a scale that is fully unrealistic for currently available resources including known development partner funding, the cost of these projects is \$117.4 million.

Table 20 : Medium and Long Term Priorities (\$m)

Priority	Medium		
	T3	Tuvalu Fiji Submarine Cable	33.00
	M2	Outer Island Ports Upgrade	50.00
	M3	Fisheries Harbour	2.50
	O1	Outer Island Development Project	1.00
	Sub-total		86.50
Priority	Long Term		
	P4	RE Phase 4	30.90
	A1	Domestic Air services (outer island runways etc)	TBD
	A2	New Airport	TBD
	R1	Roads Maintenance	0.00
	Sub-total		30.90

228. The next section looks at the overall capacity for funding the TISIP investments from local or other sources.

C. Current Capacity of Capital Markets

1. National Situation

229. Tuvalu is currently living beyond its means (as can be seen from Table 21). In 2010, domestic revenue was \$18.0 million while recurrent expenditure amounted to \$30.6 million, leaving a deficit of \$12.5 million. Adding grants of \$24.5 million to domestic revenue gives a total revenue of \$42.6 million. But in this election year, the Government had total expenditure of \$53.5 million [after adding Special Development Expenditure (SDE) of \$5.9 million and extra-budgetary items of \$17.1 million to recurrent expenditure] leaving a deficit of \$11.0 million prior to drawing on reserves from the Consolidated Investment Fund (CIF)¹⁸ⁱ. In 2010, the sustainable drawdown would have been \$1.9 million¹⁹. The Government drew down \$9.0 million. This was still not enough to finance the adjusted deficit so the Government borrowed the balance of \$2 million from the National Bank of Tuvalu.

230. Unfortunately, for Tuvalu, further borrowing is not available in the future as the Government has reached the extent of its borrowing limits with the bank. In addition, the Government has been drawing down more than what is sustainable from the CIF. The actual drawdowns over the last four years have averaged \$5.6 million, whereas the sustainable level has been only an average of \$2.2 million.

Table 21 : Tuvalu living beyond its means

Tuvalu Government Budget Outturn (2011 is projected)					
(A\$'000)	2008	2009	2010	2011	
Domestic Revenue	19,895	20,698	18,023	19,444	
Recurrent Expenditure	26,144	28,213	30,555	28,992	
Recurrent Deficit	-6,249	-7,515	-12,532	-9,548	
Grants	19,179	20,904	24,539	35,862	
Total Revenue	39,074	41,602	42,562	55,306	
Total Expenditure	40,997	43,491	53,527	60,235	
Deficit before CIF drawdown	-1,923	-1,889	-10,965	-4,929	
CIF actual drawdown*	7,000	2,000	9,000	4,500	
Adjusted Surplus (Deficit)	5,077	111	-1,965	-429	
Source : Ministry of Finance					
					Average
CIF balance 30 September	12,300	15,300	7,200	3,100	9,475
Actual CIF drawdown	7,000	2,000	9,000	4,500	5,625
Source TTFAC					
Note * CIF drawdown (agreed between Government and Board) when no distribution from TTF is 25% of the previous year closing balance, calculated below					
CIF agreed drawdown	2008	2009	2010	2011	Average
Opening balance		9,225	7,196	5,612	
+ Interest		369	288	224	
Closing balance	12,300	9,594	7,483	5,837	8,804
Agreed Drawdown	3,075	2,399	1,871	1,459	2,201
Interest rate	4%				

¹⁸ Distributions from the Tuvalu Trust Fund (TTF) are made to the CIF and the Government has full responsibility to use these reserves in a sustainable way.

¹⁹ The bottom part of Table 21 shows agreed approach for calculating the sustainable drawdown from the CIF when there are no distributions from the TTF. When the TTF Market Value is above the Maintained Value and there is a surplus in the CIF then the sustainable drawdown is 4% of the Maintained Value (\$119.3m at 30 September 2010).

231. The 2011 Government budget shows some restraint on recurrent expenditure, but is still expansionary overall when extra-budgetary items are included. The budget projects an increase in domestic revenue to \$19.4m (up 8%) and a decrease in recurrent expenditure to \$29.0 million (down 5%) with a recurrent deficit of \$9.5 million, down 24% on 2010. Total expenditure is up 13% to \$60.2 million.

232. To fund this, the Government is projecting an increase in grants of 47% to \$55.3 million plus a drawdown from the CIF of \$4.5 million (which is \$2.6 million more than the sustainable level). The adjusted deficit is \$0.4 million. The actual outcome will depend largely on fisheries license revenue, which is not known until December each year and can vary greatly depending on the size of the (largely weather dependent) catch.

233. Government's budget expenditure has been growing rapidly, up 50% over the last three years, funded by even greater increases in aid, up 87% over the same period and from unsustainable drawdowns from the CIF. How much more of government expenditure development partners are willing to fund is difficult to say. Development partners already fund 60% of the government's total expenditure.

234. On the basis of previous year's utilization, the CIF will be depleted before the end of 2012. There will be no distribution from the TTF for 2012 as the Maintained Value is 10% above the Market Value²⁰. Given the perilous state of the financial markets, the likelihood of the TTF delivering a distribution for 2013 is low²¹. Beyond 2013 is pure conjecture. The TTF is currently under external independent review. Next year, 2012 will be the fourth year in a row of no distribution. The Board has had advice, which if taken, would see a change to the management of the fund and the distribution policy. This would result in a more conservative annual distribution, but requires the government to give up some autonomy and the Board to dip into the capital of the Fund.

235. Given the above analysis, the government has virtually no ability to fund additional infrastructure from its own resources. It is not adequately maintaining existing infrastructure and therefore the chances of new infrastructure being adequately maintained are extremely low under current management practices. In the short term, any new infrastructure will have to be funded by development partners. In the medium term, there may be some latitude to increase borrowing to a limited extent (see next section).

2. Debt Management

236. Tuvalu's outstanding debt at year ending 2009 was \$18.1 million, of which, \$14.0 million was external. By the end of 2010, total debt was \$14.7 million, of which, \$10.6 million was external. Projected debt at the end of 2011 is expected to be \$11.9 million, of which, \$9.4 million is external (see Table 22).

Year ending December	2009	2010	2011
External Debt	14.0	10.6	9.4
Total Debt	18.1	14.7	11.9

237. Tuvalu's major creditors are ADB at 58.5% of 2010 total debt (see Table 23), FTF \$4.0 million and TMTI \$4.6 million, and the National Bank of Tuvalu (NBT) 23.1% (of which

²⁰ Under the current distribution formula the Market Value of the TTF must exceed the Maintained Value before there can be a distribution.

²¹ Assuming 3% inflation and a real return of 4% the Market Value of the fund would have to grow by 18.6%.

Government Outer Island Suspense Accounts was 14.3% and NAFICOT was 8.8%). Outstanding borrowing by the Development Bank of Tuvalu (DBT) at the end of 2010 amounted to \$1.9 million or 12.9% of total debt.

Source	Percentage of Total Debt
ADB	58.8
NBT	23.1
DBT	12.9

238. To put these debt levels into context, external debt as a percentage of GDP was 33.2%, at the end of 2010 and is projected to be 28.8% by the end of 2011 (see Table 24). External debt servicing as a percentage of exports of goods and services was 27.5% in 2010 and is projected to be 25.5% by the end of 2011. Government debt as a percentage of GDP was 38.6% at the end of 2010, is projected to be down to 29.5% by the end of 2011, and fall to 12.9% by the end of 2016. By international standards, these levels appear low, but Tuvalu's dependence on aid and limited ability to increase domestic revenue must be taken into account when considering raising debt levels.

	2010 Actual	2011 Projected	2016 Estimated
Government Debt as % GDP	38.6	29.5	12.9
External Debt as % of GDP	33.2	28.8	14.9
External Debt Servicing as % of Exports	27.5	25.5	18.7

239. Assuming no further borrowing by the end of 2016, external debt as a percentage of GDP is expected to fall to 14.9% and debt servicing of external debt as a percentage of exports of goods and services is expected to be down to 18.7%. This situation is creditable, manageable and well within the performance criteria set in TKII, which stated that external debt should not exceed 60% of GDP. In retrospect, this benchmark appears on the high side and IMF in their recent country review recommended that debt should be kept below 30% of GDP. Even with this latest advice, there appears to be some headroom for further borrowing as existing debt declines over the next few years. By 2016, there would be latitude to borrow a further \$4 million and stay within the 30% of the IMF-recommended GDP benchmark.

3. State Owned Enterprises

240. SOEs in Tuvalu have been subject to considerable scrutiny and support over the last years to improve governance, functionality and service performance. Significant developments have been improvements to financial reporting and the recent production of audited accounts for 2010 is a major milestone. The two key infrastructure SOEs, TEC and TTC, both have their problems and from a corporate perspective, are insolvent and dependent on the support of government to continue operating. At the time this report was being written, the Government had begun a process to de-corporatise TEC, a move that has major implications for future infrastructure development. The situation for each of these SOEs is outlined below.

241. TEC has exclusive rights to the generation and supply of electricity to Funafuti customers and also supplies electricity to the outer islands. It was corporatised in 1991 and made its first small operating profit of \$25,638 in 2010. But TEC suffers from a deficiency of working capital and shareholders' equity, which casts doubt over the corporation's ability to continue as a going concern. On the plus side, TEC has a plan to increase tariffs and was in

the process of implementing it prior to the latest government moves. This plan would have started the process of addressing the equity issue.

242. TEC's financial situation is summarised in Table 25. Total income in 2010 amounted to \$6.2 million, of which, \$2.7 million came from electricity sales and \$3.4 million from grants. This compares with sales of \$2.2 million and grants of \$1.9 million in 2009. The cost of supplying electricity is very high. Based on the information in the audited accounts for full cost recovery (including a capital charge), the cost of supplying electricity is estimated to be 133 cents per unit (kWh), of which consumers pay only 25%. Even so, doubtful debts have doubled in the last year to reach \$0.7 million. Repairs and maintenance costs have risen by 70% in the last year to \$134,000, but still only amount to 2.2% of total expenses. TEC is not financially viable under the present tariff structure even with the current high level of development partner support and recent strengthening of management systems.

Table 25 : SOE Financial statistics (\$ millions)		
Year ending December 2010	TEC	TTC
Total income	6.237	1.612
Revenue from services	2.734	1.029
Grants	3.424	0.264
Expenses	6.177	1.632
R&M	0.134	0.043
Net Profit (Loss)	0.026	(0.151)
Depreciated value of assets	6.504	13.515
Net Working capital (negative)	(1.990)	(2.430)
Shareholders' funds (negative)	(1.038)	(0.695)
Source: Government audited accounts		

243. TEC's situation is not financially sustainable and to continue operating, it requires the good will of the government and support of development partners. Tariffs fall well short of covering operating costs let alone full cost recovery. Non-payment for service is an escalating issue with the government itself not keeping up with payments. When the government approved policy of cutting power to non-paying customers was activated against the government itself, the response was to proceed with nationalization legislation.

244. This is a major U-turn in Government policy. De-corporatising TEC will do nothing to confront the issues that prevent moves to a more sustainable level of operation; unfortunately, it is likely to result in a less viable situation. On the cost side, maintenance is low by international standards. While the power house and generators appear to be well maintained (as they are relatively new), the distribution system is deteriorating rapidly with no apparent work done since the last refurbishment programme undertaken less than four years ago. Already junction boxes are showing serious corrosion and nothing appears to be done about it.

245. Despite TEC's obvious problems, it is expected to have a major part to play in the government's strategic objective to derive all of the nation's power needs from renewable energy by 2020. To develop an implementation plan for this goal, the government has set up the Renewable Energy and Energy Efficiency Unit (REEEU). The Unit will require considerable support from development partners to ensure there is a rational plan with achievable goals that integrates renewable energy into the overall power system. Maintenance issues will not go away with the proposed move to renewable energy, on the contrary regular preventative maintenance of solar systems is crucial to long term

operational efficiency. In addition, the current diesel based generation systems will need to be maintained and kept operational as a backup.

246. TTC's financial position is also summarised in Table 25. Like TEC, TTC is in the position of having a deficit in working capital and shareholders' funds. For the year ending December 2010, net working capital was negative \$2.4 million and shareholders' fund was negative \$0.7 million. Telephone revenue in 2010 amounted to \$1.0 million, while other operating income, including a government grant of \$264,384, amounted to \$0.6 million. TTC made an operating loss of \$20,534 and a total loss of \$150,616. Doubtful debts amounted to \$56,033 while \$1.2 million was written-off trade debtors. Repairs and maintenance amounted to \$43,408 in 2010 up from \$12,010 the previous year. Even at 2010 levels, maintenance is still only 2.6% of total expenditure, which is well below what is required for a sustainable service. TTC is not financially viable under the present structure. The audited accounts show strong doubts over the corporation's ability to continue as a going concern. TTC requires the good will of the government and support of creditors to continue operating.

247. TTC will struggle to manage the installation and operation of new telecommunications systems based on renewable energy with its current level of resourcing. It is not viable using conventional systems and coping with further installations on outer islands will add to the burden.

248. In summary, the power and telecommunications SOEs are struggling to cover operating costs from revenue generation let alone be sustainable on a full cost recovery basis. Ensuring the current systems are properly maintained must be the first priority of management. Any new infrastructure investment needs to be undertaken with a whole systems approach which recognizes the short comings of the existing systems, and the environmental, physical, capacity and capability constraints that exist in Tuvalu.

D. Overall Funding Strategy

249. It is clear that Tuvalu does not have the capacity and capability to fund and manage existing infrastructure let alone new investments. TISIP therefore recommends to place an emphasis on programs to boost the maintenance of existing infrastructure as a first priority. The concept of the *Fakafoou* Program outlined in Section VIII-C on maintenance is seen as the way to cure the Pacific disease (lack of maintenance and in particular lack of preventative maintenance). This will require development partner funding and systems to monitor and evaluate performance. Development partners are already moving to direct budgetary support and setting aside a proportion of this for the *Fakafoou* Program would provide major economic, social and environmental benefits. The estimated cost per annum of the gap between existing and full maintenance is \$4.08 million. Project management including monitoring and evaluation costs would need to be added to this annual figure.

250. Turning now to new infrastructure, the priority setting process resulted in a five year development schedule, which has an average annual funding requirement of \$23 million. This is considered ambitious and beyond the indicative development partner funding envelope of about \$15 million per annum. In addition, it has not been vetted to determine whether there is the capacity and capability to implement it effectively. An alternative schedule that spreads the implementation of new infrastructure to stay within the currently identified funding envelope doubles the length of implementation to ten years. While the capital requirement averages only \$7.3 million per annum, when operating and maintenance (O&M) costs are included, the average is \$15.1 million. This highlights the importance of budgeting for whole of life costs. Funding projects on the basis of capital costs only would result in less than half the total costs of such projects being met. While the expectation is often that projects will be able to cover their own O&M costs, the reality is that this is seldom the case, particularly in Tuvalu.

251. Over a 25-year period, the Present Value (PV) of total costs is \$163 million when using a discount rate of 8%. Of these, capital costs make up \$60 million, maintenance costs \$74 million, and operating costs \$29 million. The additional maintenance costs to provide for full maintenance of existing assets amounts to \$42 million alone. This takes into account the assumption made that in TEC and TTC, renewable energy projects largely replace fossil fuel technology over time. The total PV of committed and funded projects amount to \$63 million and high priority projects, \$60 million.

252. It is possible that new funds will become available from climate change programs. Tuvalu needs to capture all that it can from such programs. Should the amount of funding from this source be beyond current capacity and capability, then a safe repository is needed to bank the funds until such time as they can be efficiently and effectively deployed. In this respect, Tuvalu is better placed than most other PICs as it has the TTF that can be used for this purpose. The TTF is seen as a model of good governance and investment management in the Pacific. It has just been through an independent review²² which concluded that the governance structure of the fund is sound and that the fund has achieved its overall objective of providing Tuvalu with financial reserves and support for the recurrent budget.

²² Tuvalu Trust Fund – Investment Review, A report submitted to NZ MFAT and the TTF, Vinstar, 30 November 2011.

VII. SECTOR PRIORITY PROGRAMS

253. This section combines the prioritization, timing and investment analysis, and outlines the key program requirements and necessary supporting activities for each sector over the coming 5-10 years.

A. Water & Sanitation

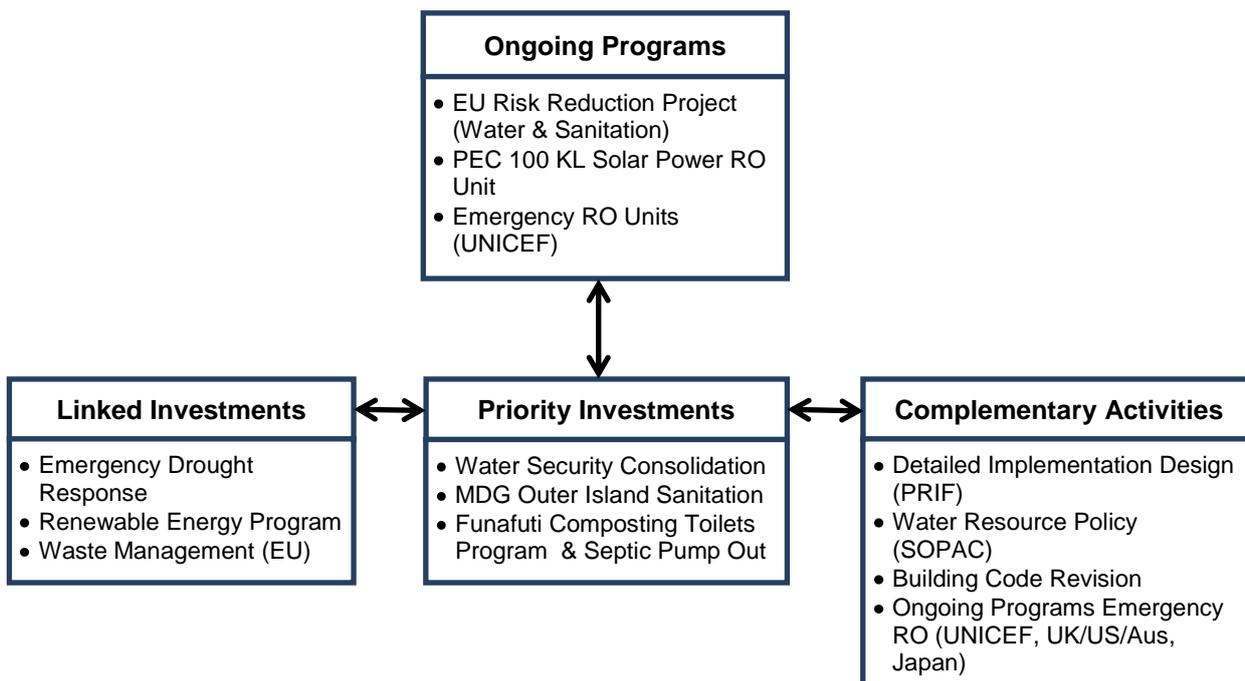
254. Figure 9 outlines the proposed water and sanitation investment program. The key activity for the water sector is the provision of a water consolidation program. This would expand on the AusAID and EU programs and consolidate lessons learned from the recent drought to move towards a more sustainable water resource use. The program will be designed by a water and sanitation engineer in the early part of 2012 under PRIF funding. It is likely to include the provision of additional community water tanks on Funafuti; the rehabilitation and/or provision of guttering and pipes for all roofs; introduction of revised building codes, commercial maintenance programs, incentives and disincentives; revised bulk water-delivery pricing; and memoranda of understanding between households and Government for ongoing maintenance and provision of basic water needs. It will link closely with the Water Resources Policy that is being completed by SOPAC in early 2012.

255. As part of the water sector program, composting toilets are proving successful as a water saving device in addition to a sustainable sanitation alternative. The provision of demand-driven composting toilet program on Funafuti and a pilot demonstration project on the outer islands will complement the water sector program. A key issue for the demand-driven program will be to price the units at a level that is affordable yet reflects its true savings. This will need to be closely linked to the proposed household water Memorandum of Understanding (MOU), whereby Government and individual households negotiate a supply and maintenance agreement for water provision/collection, revised water pricing and building codes.

256. The EU (EDF-10) is also assisting in the up-scaling of IWRM eco-toilets to households in Funafuti. However, this is still being designed and seeking clarity on household contributions to cost of units as well as reduction in overall unit cost. They are also supporting community mobilisation in conjunction with TANGO to define key messages on maintenance of water tanks and eco-toilets as well as waste management practices and water conservation.

257. Given the enhanced RO water production capability on Funafuti (and the outer islands) following the recent drought, a management plan will be required to ensure that RO-produced water is priced adequately so that repairs and maintenance can occur. Spare parts and technical capability will be required for each of the different units so that they can be utilised immediately, rather than waiting for an expensive development partner response. This will ensure that the units are available during periods of low rainfall; and will ensure that there are more incentives for people to maintain their own rainwater harvesting infrastructure. These RO units will mostly be solar powered and that technology will need to be incorporated into the current TEC REEEU project to ensure maintenance and operations are at an adequate standard.

Figure 9 : Water and Sanitation Investment Program

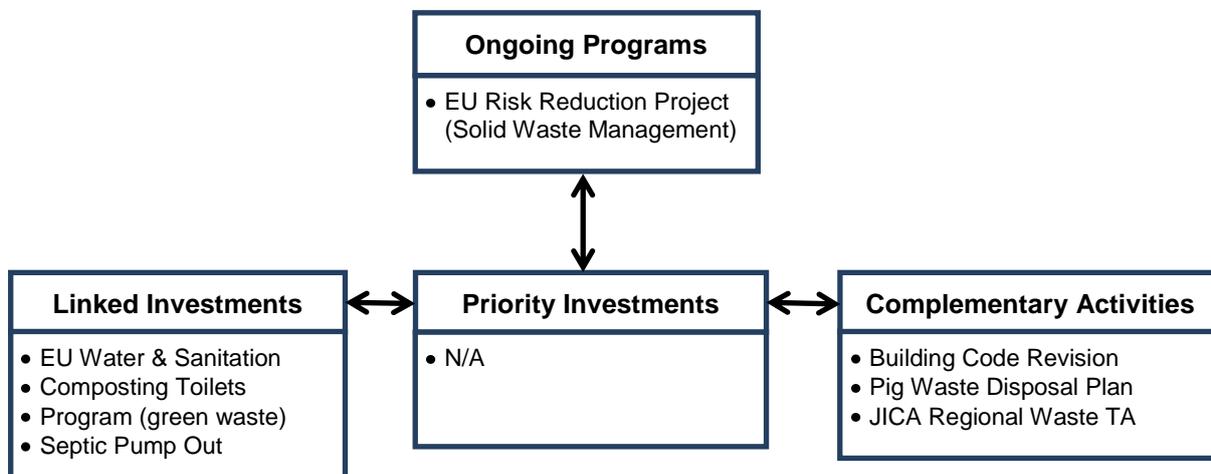


B. Waste Management

258. Figure 10 outlines the proposed sanitation and waste management investment program. The program is currently under design by the EU Risk Reduction Project and SWAT. It includes the consolidation of Funafuti and outer island landfills; the collection of an import tariff to fund SWM activities; and facilitation of private sector recycling, composting and re-use activities.

259. During project implementation, consideration should also be given to the collection and treatment of pig waste (50% of all liquid waste on Funafuti) and the development of alternative solutions for sludge disposal. This has environmental, health and business benefits and will be used by SWAT to develop longer term solutions for sanitation in Tuvalu.

Figure 10 : Waste Management Investment Program



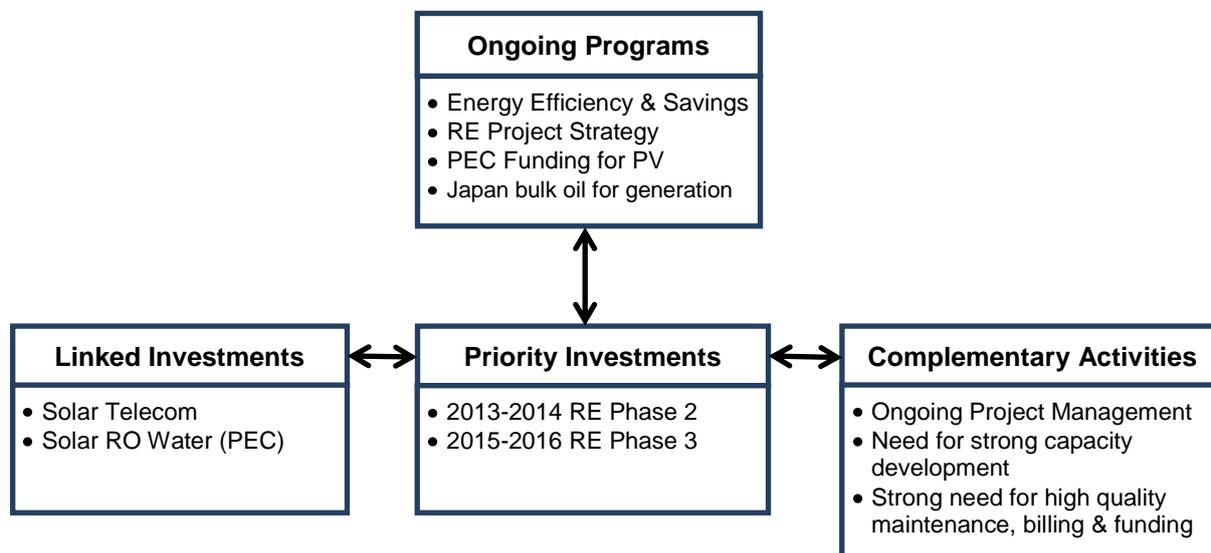
C. Power

260. Figure 11 outlines the proposed power investment program. It is still under development by the consultant to TEC. It consists of a phased approach to the provision of renewable energy (through solar, wind, energy efficiency and bio-fuels) throughout Tuvalu.

261. While initially focusing on improving energy efficiency, the investments will reduce the reliance of Tuvalu on imported bulk fuel. It will still require the improved maintenance of transmission and distribution lines, switching and transformer equipment, particularly on Funafuti. There is an urgent need to ensure capacity throughout the islands to undertake this, in addition to ensuring that the highly technical generation systems are operated within their specifications. This capacity could be sourced initially through a Pacific-region TA, funded by development partners.

262. Given the situation in Tuvalu where the Government is seeking to dismantle TEC and re-nationalise assets and operations, this program may be at risk.

Figure 11 : Power Sector Investment Program



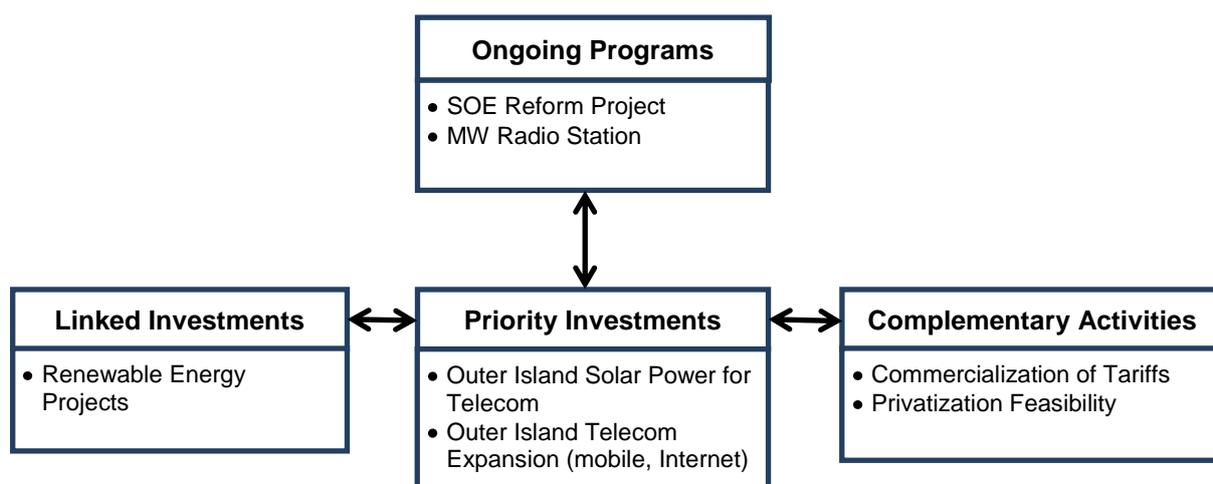
D. Telecom

263. Tuvalu has a telecom system that, for a small island country, is relatively extensive but expensive. Given the remoteness and small population base, it is unlikely that telecom charges can be reduced, particular given that TTC is not yet running profitably, despite the ongoing SOE reform program.²³

264. The priority investments in the sector are shown in Figure 12. They involve expanding, ensuring reliability and improving efficiency of services in the outer islands. The solar power telecom project, although ranked separately, will be an integrated component of the REEEU project. The telecom services expansion project will enable education, health and governance programs to be expanded through the provision of mobile and internet capability.

²³ This may also be at risk given recent developments in the power sector to de-corporatise TEC.

Figure 12 : Telecom Investment Program



265. These programs will be reliant on TTC maintaining its commercial focus, charging commercially viable tariffs and ensuring technical capacity and capability (funds and resources) for operations and maintenance. Given the experience of other countries in the region, technical capacity could be easily sourced from regional professionals through TA, or potentially through the contracting out of critical maintenance programs.

E. Roads

266. Figure 13 outlines a modest road investment program for Funafuti. There are only a small number of surfaced roadways on Funafuti that in the absence of ongoing maintenance, require rehabilitation. Government has indicated that it intends to invest in this rehabilitation, utilising the equipment that will be on island during the proposed airport runway resurfacing.

267. Government should use that opportunity to also assess the potential for private sector involvement in maintaining the road infrastructure through outsourcing. This will require specialised equipment and materials to do properly, but community initiatives to extend the width of the road using concrete in places show that it can be done.

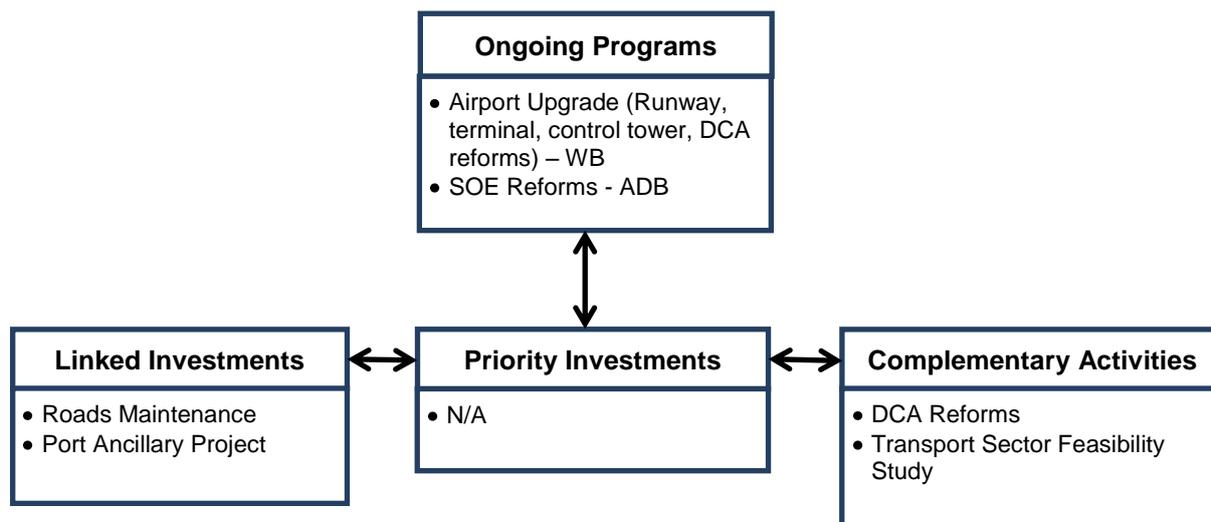
Figure 13 : Road Investment Program



F. Air

268. Figure 14 outlines the proposed air transport investment program. The key for DCA is to maintain airport infrastructure to standards that will allow current air operations to be maintained and expanded (frequency of aircraft movements) as required.

Figure 14 : Air Transport Investment Program



269. The World Bank has recently approved an aviation investment project for Tuvalu which will enable it to meet minimum ICAO safety and security standards, while preserving and extending the service life of existing airport assets. The activities include: the rehabilitation of airport pavement; a new terminal building and control tower; air traffic control, communication, fire safety, security and weather station equipment; and airfield maintenance equipment. The project will also commit funds towards sector reforms, training and capacity building.

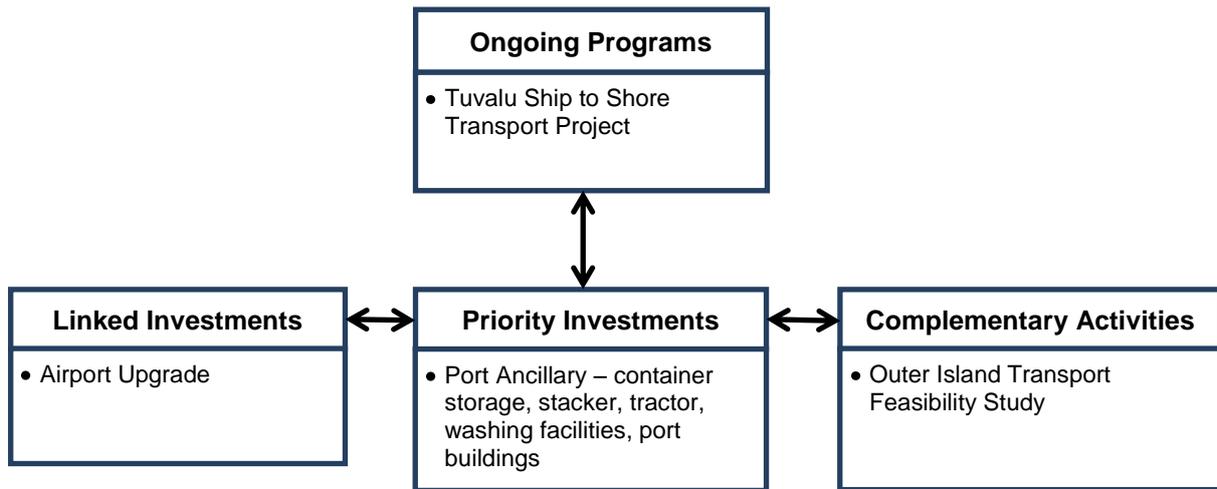
270. In the longer term, DCA needs to be able to sustain its investments – nav aids, airport buildings and runway. It cannot let these items depreciate without having appropriate funding available for their eventual replacement. Consideration needs to be given to increasing fees and charges for aircraft movements, and placing these funds into a long term maintenance fund. The corporatisation of DCA could be considered as a means to achieve these outcomes, and could draw upon the experience by many other airports in the Pacific. It could also utilise the experience gained in the current SOE reviews by ADB.

271. While not an urgent investment priority, Government is keen to address the perceived air transport needs of the outer islands and international tourists. While anecdotal evidence of current tourist numbers; ability and willingness of customers to pay; and local capacity and capability to maintain air transport infrastructure and aircraft would appear to be very low, Government is keen to see these issues considered in a transparent manner. It is proposed that an inter-sectoral transport strategy be commissioned to examine the demand, feasibility and options for both marine and air transport between the islands and regionally. This would provide the basis for ongoing investment in the medium to long term, particularly with regard to outer islands ports and airports, air services, and shipping.

G. Maritime

272. Figure 15 outlines the proposed maritime transport investment program. The critical program for this sector is the provision of supplemental infrastructure for the recently developed port. This would include the provision of paved container movement and storage areas, a container stacker/and crane; container washing facilities; port buildings; and sector reforms (including improved maintenance capacity and corporatisation). It is expected that the investment, particularly the construction efforts, could be coordinated with the proposed air transport infrastructure project to take advantage of equipment that will be on-island.

Figure 15 : Maritime Transport Investment Program



273. Prior to additional investment in the sector, it is proposed that an inter-sectoral transport strategy be commissioned to examine the demand, feasibility and options for both marine and air transport between the islands and regionally. This would provide the basis for ongoing investment in the medium to long term, particularly with regard to outer islands ports and airports, air services, and shipping.

VIII. THE WAY FORWARD

274. Apart from integrated planning and cross sectoral investments, the overall infrastructure sector requires additional development. This section outlines the key supporting activities that Tuvalu needs to undertake to plan, manage and deliver the infrastructure over the short- to medium-term.

A. Improved Coordination

275. Heads of government departments formed the PRIF Taskforce to guide the development of the TISIP. This group is a technical advisory committee chaired by the Minister of Public Utilities, Communication and Transport, and in his absence, the Secretary for Finance. Thus, it has multi-ministerial and political/technical dimensions. The value this group has provided in advising the coordinated technical development of the TISIP was immense; and indicates the need for it to be sustained as an Infrastructure Advisory and Coordination Panel (IACP) as implementation commences. It could be an adjunct to the official National Infrastructure Coordinating Committee which comprises Ministers and their advisors; and could provide secretariat services, as well as be a point of contact to implementation consultants and development partners.

276. The IACP would be responsible for monitoring progress of the TISIP, ensuring that it is regularly reviewed, and guide its integration with national planning and the annual budget process. Specialist sub-sector groups of the IACP would be tasked with developing sector master plans, overseeing complex infrastructure planning and development processes, and ensuring that sector baseline information and performance targets are collected and reviewed. The IACP and its relevant sector group, would become the first contact for infrastructure matters by any development partner, consultants or researchers when they arrive in Tuvalu, thereby ensuring continuity and cooperation within the sectors.

277. The secretariat to the PRIF taskforce has been the Department of Planning and Budget (DPB). It is expected this would continue, particularly as it directly links with the planning, budgeting and aid management functions of that division. DPB would have to ensure that coordination at the sector and sub-sector level is maintained post-TISIP development. This would entail Government requiring **all** agencies to coordinate any development partner contact through DFED; and specifying that Foreign Affairs ensures **all infrastructure development partner and research missions** are first coordinated and managed by DPB prior to their entry into the country.

B. Improved Sector Planning

278. Tuvalu has little comprehensive sector planning, apart from the well-supported energy sector. While an Integrated Water Resources Management policy and strategy are being developed, and other outdated sector plans are to be updated (such as SWM), other key sector plans have also been identified that are necessary and complementary to proposed investments. The key plan for medium- to long-term investment requirements is the Outer Island Transport Strategy that would examine the feasibility for marine and air transport options.

279. At a minimum, the proposed plans and revisions should include:

- Detailed asset register and management plans
- Key baseline and performance data
- 10-year infrastructure strategy that addresses and is linked to the TKII and its successor

- 3-year rolling investment plan that outlines capital, operational and R&M costs, versus incomes, tariffs and subsidies.

280. Better planning will ensure that project investment is more rational and supported by a sound business case. The development of this TISIP and a standardized National Project Profile (see Appendix C) is a first step. Government will require that all projects submitted for its funding or support are presented in the new format with full and adequate explanations for each section. The project briefs provide information that supports the ability for the IACP and NICC to undertake future project ranking processes and re-define sector priorities. This is expected to produce a more systematic approach to project preparation and allow better comparisons to be made between proposed projects.

C. Maintenance

281. Maintenance and the broader issues of asset management and sustainability are critically important issues for the Government and are a key focus of the TISIP. There is a history of under-performance in this area (shared with other Pacific Island Countries) which in Tuvalu's case appears to arise for the following reasons:

- Intergenerational cultural factors that stem from the natural basis of island infrastructure (e.g. houses built of local materials had a finite life unless destroyed by extreme weather events and when that point came a new house was built).
- Experience that if a development partner-provided asset became unusable, eventually the development partner would replace it.
- Budget policies that do not allow for all operating and maintenance expenses from revenues based on fully costed tariffs.
- Insufficient cash in the budget after salaries and other fixed costs (in the short term) are met and often leaving urgent preventative maintenance delayed for another day or year or decade.
- A culture of "fix it when it is broken" rather than applying preventative maintenance practices.
- Budgets that do not allow for fully-funded maintenance from revenues.
- Service prices that do not adequately provide for maintenance.
- Investment decisions being made on the basis of the supply price only and not whole of life costs, leading to the purchase of cheaper, poor quality assets with a shorter economic life.

282. In order to have an efficient and effective infrastructure program, changes are needed in a way that addresses the above factors. Ideally, this means that at least the full cost of operating and maintaining economic infrastructure (i.e. excluding a capital charge) should be funded from operating revenues and recovered through user charges. This will involve strengthening the financial performance of SOEs and Ministries. It could also involve setting aside money in a reserve account for known periodic major maintenance events.

283. In the short term, the priority is to cover routine operating and maintenance costs. Currently, a significant proportion of these costs are covered by development partners, e.g. 50% of power costs. This focus should be followed by the replacement of smaller capital items. In the medium- to long-term, the willingness of development partners to continue funding major capital items will determine the extent to which new infrastructure is provided. Unless new sources of sustainable revenue are identified, the Government will be unable to take increasing responsibility for infrastructure.

284. As part of this process of taking increased responsibility for existing infrastructure, the following five point plan is proposed as a possible basis to start improved maintenance performance and be adopted by all those in control of economic assets in Tuvalu:

1. Each asset owner should conduct (with expert assistance if necessary) a review of their operations, investment plans and tariffs to ensure that adequate service prices are planned;
2. Establishment of a maintenance reserve account (with appropriate controls on how the money can be used) for periodic major maintenance;
3. Provision of advice on planning and implementing improvements in operational and maintenance efficiency including application of whole of life investment planning principles;
4. Development of asset management plans that provide for preventative maintenance, including training; and
5. Implementation of these plans using regional supervisors (experienced tradespeople) on period contracts, funded to cover spare parts, materials and labour (sourced from the private sector).

285. Implementation of these measures is expected to be funded from the recurrent budget and SOE budgets with specific support from development partners. Successful implementation will require leadership from both the Government and development partners and technical assistance grants from development partners, at least in the short- to medium-term. The adoption of a south/south approach specifically aimed at improving operational and maintenance efficiencies will have major spin-off benefits to the economy. Instead of money coming into the country and straight out again paying for infrastructure that is replaced well short of economic life, this money will be used to extend the life of assets, creating jobs in the private sector and circulating increased levels of money through the local economy. Using experienced plumbers, builders and electricians from PICs will be cost effective and help break the cultural barriers that often compromise good intent. Supervisors who are constrained in their own country by cultural obligations do not have these same restrictions when working in other countries. Building up a pool of such people in the region will benefit all participating countries through south/south exchanges.

286. Lack of maintenance is known as the Pacific disease with maintenance not appearing in the local language. But Tuvalu has a word "*Fakafoou*" which means to make new. It is to do with repairing, as well as refurbishing or even to build a new structure altogether. This word could be used to highlight (brand) a new program of using south/south exchanges of maintenance supervisors. These supervisors would be responsible for maintenance for specific assets, such as Funafuti's power network. They would work under period contracts of say 12 months and be responsible for specific outcomes. If they do not perform the contract would not be renewed. Development partners are showing increasing interest in direct budgetary assistance. The program could be funded from this source. The program will improve transparency, accountability and efficiency. It will create jobs in the private sector, boost the local economy and increase regional labour mobility.

D. Streamline Processes

287. The Government is committed to ensuring that the TISIP priority program is delivered as quickly and effectively as possible. With current administrative blockages and poor inter- and intra-sector cooperation, this will prove to be a challenge. The re-establishment of planning and coordinating mechanisms as outlined above will go some way to addressing this problem.

288. However, the capacity and capability in Government and the systems that are currently in place are not adequate. Procedures need to be reviewed, clarified and simplified, without foregoing relevance and completeness. Although MFED is the central agency for managing proposals for funding support and dialogue with development partners about support for economic infrastructure projects, it isn't proactively managing this function. It is an area that should attract additional support. Consideration of planning capacity building, procurement process support and strategic re-structure of aid management processes should be undertaken. It would link closely with the formation of the NICC, IACP and improved coordination processes outlined earlier.

289. The TISIP (and its regular review) is also a means for Government to streamline the development of economic infrastructure by providing clear direction and information about its infrastructure development priorities to its own department, the private sector and development partner community. It provides a starting point for dialogue with development partners, who have their own development agenda, and provides strength for productive discourse and negotiation. The involvement by sector of decision makers and planners in the TISIP development process has already ensured that sub-sector planning is broader and more encompassing of cooperative initiatives. The TISIP itself will provide further clarity to sector decision makers, and provide a defined means for incorporating new projects within a rational and balanced investment process.

E. TISIP Review

290. As part of the ongoing Government commitment to improving infrastructure development, it will be important to update this TISIP on a regular basis to align with the revised planning and budget priorities, and reflect implementation progress. It is proposed that the TISIP be updated every two years.

291. The TISIP 2011 has highlighted the development of a few sector master plans, particularly in the water and sanitation sectors. With their completion expected in early 2013, it would provide an ideal opportunity for Government and MFED (DPB) to undertake a revision and re-ranking of projects based on any newly identified and prioritized sector investments prior to the end of the TKII period (2015). This would provide information regarding the appropriate timing and interval for a more detailed "hard" TISIP review and revision as part of the TKII preparation.

292. In any case, Government agencies and Public Enterprises are required to annually report project implementation progress and changes in sector performance as part of the annual budget process. This information, together with consultations with community representatives, the private sector, and development partners, will help to shape future updates of the TISIP and allow MFED to monitor progress and performance. It is expected that this will be facilitated and coordinated by the NICC with the assistance of the IACP.

293. The proposed annual review would include alignment of the TISIP with the planning and budgeting process; review implementation progress; incorporate results of any sector development plans; and incorporate and rank newly identified projects.

APPENDICES

APPENDIX A LIST OF PERSONS MET

Government Department and Agencies

Hon.Kausea.Natano	Minister for Public Utilities & Communications & Transport & also Chair of PRIF Task Force
Mr. Minute A Taupo	Permanent Secretary for Finance and Economic Development & deputy Chair PRIF Task Force
Mr. Lutelu Faavae	Permanent Secretary for Communications and Transport
Mrs.Olioliga.Iosua	Permanent Secretary for Public Utilities
Mr. Pusineli Laafai	Permanent Secretary for Home Affairs
Mrs.Misalaima.Nelesone	Permanent Secretary for Personnel and Training
Mr. Tepau.Sotaga	Assistant Secretary for Communications and Transport
Mr. Taasi.Pitoi	Director for Marine
Mr. Letasi.lulai	Director for Planning and Budget
Mr. Molipi Tausi	Energy Planner
Mr. Vitoli Iosefa	Director of Civil Aviation
Mrs. Susan Tupulaga	Head of the SWAT Agency of Government
Mr. Temate Melitiana	Senior Assistant Secretary, Office of the Prime Minister
Mr. Iete Avantele	Assistant Secretary for Natural Resources
Mr. Tematiu Vave	Local Government Officer
Mrs. Paufi Afelee	Assistant Tourism Officer
Mr. Mataio Tekinene	Environment Department Director
Mr. Charles Leepo	Draughtsman, Public Works Department
Mr. Uatea Salesa	Deputy Director of Works
Mr. Nielu Meisake	Assistant Energy Planner, Public Utilities Ministry
Mr. Nobuaki Matsui	Development Adviser JICA, Office of the Prime Minister
Mr.Stephen.Boland	Budget Management Specialist
Mr.Amosa.Taui	Senior Budget Adviser
Mrs.Simalua.Enele	Acting Senior Economic Adviser
Mrs.Tavau.Falani	Budget Adviser
Mrs.Lita.Molu	Project Officer
Mr.Ampelosa.Tehulu	Director for Public Works Department
Mrs.Taloline.Afega	Support Staff for Planning and Budget
Mrs.Moeo.Ron	Fisheries Representative
Mr.Sumeo.Silu	Disaster Coordinator
Mr. Lopati Samasoni	Director of Rural Development, Home Affairs Ministry

Public Corporations

Mr. Simeiti.Lopati	General Manager, Tuvalu Telecommunications Corporation
Mr. Anisi Penitusi	Manager Technical Department, Tuvalu Telecom Corporations
Mr. Mafalu Lotolua	General Manager, Tuvalu Electricity Corporation

Mr. Taeka. Satupa Ag. GM in the absence of the substantive GM of Tuvalu Electricity Corporation
Mr. Paul Levi Ag. Manager Technical Dep't, Tuvalu Telecom Corporations

Non Government Organisations

Mrs.Pasemeta.Talape NZAID and EU Liaison Officer
Mr.Niuatui.Niuatui MDG Project Officer
Mr.Saufatu.Sopoaga President, TNPSO
Mr.Elisala.Pita CEO, TNPSO
Mr.Lono.Leneuoti TUFHA Representative
Mr. Puafitu Faalo President, TANGO
Mr. Pisi Seleganiu IWRM Coordinator

Private Individual

Mr. Iefata Paeniu Retired Maritime Officer

Appendix B HIGH PRIORITY PROJECT INFORMATION SHEETS

PROJECT DESCRIPTION

W1	Water Security Consolidation (Funafuti)	
Sector:	Water and Sanitation	
Responsible Agency:	Public Works Department, MPU&T	
Background/ Rationale:	<ul style="list-style-type: none"> • Households in Funafuti and outer islands have been provided with storage tanks for water security by AusAID & EU since 2007. Community tanks have been provided. • There is significant lack of guttered roofing, maintained gutters and clean or connected tanks to ensure optimal rainwater harvesting • Numerous estimates indicate that for the majority of conditions (including drought) most households could be fully self-sufficient with rainwater, without the need for RO water • RO water is sold at less than 20% cost 	
Objectives	<ul style="list-style-type: none"> • To introduce measures to ensure optimum rainwater harvesting; increase community water tank storage; reduce reliance on RO water; and promote climate adaptation and preventative maintenance. • To avoid reliance on development partners during periods of drought. 	
Scope of Works	<ul style="list-style-type: none"> • 8 community water cisterns on Funafuti • Guttering and repairs to all buildings; training of plumbers • Introduction of measures to promote (rewards & fines) water collection and storage • TA to revise building code & enforcement/incentives; RO water pricing; meteorological information; water conservation measures 	
Features	<ul style="list-style-type: none"> • Promoting 100% self-sufficiency on rainwater except in extreme drought • Reducing reliance on costly RO water • Facilitating a move towards preventative maintenance (piloting innovative measures) 	
Social Benefits:	Short Term:	
	<ul style="list-style-type: none"> • Resilience in periods of reduced rainfall • Adequate supply of water. • Money saved on purchased water 	
Economic Benefits:	Long Term:	
	<ul style="list-style-type: none"> • Opportunity cost of development partner money being used elsewhere • More regard for self-sufficiency and preventative maintenance 	
Environmental benefits:	Short Term:	
	<ul style="list-style-type: none"> • Less fuel used • Water collected rather than runoff to lagoon / eroding roads 	
Alignment with National Corporate Objectives:	Long Term	
	<ul style="list-style-type: none"> • Lower or eliminate subsidies • Provide additional infrastructure only when economically viable 	
	Short Term	
Cross Sector	<ul style="list-style-type: none"> • Expand collection and storage of water for housing, business and other structures (especially on Funafuti (TKII)) • Promote water conservation through education and awareness programs 	
	<ul style="list-style-type: none"> • Sanitation initiatives such as composting latrines will further reduce water usage. 	

Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input checked="" type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: None			
Land Requirement:	N/A – Land will be freed up from RO unit usage			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
	\$		\$3,000,000	\$	\$	\$
User Charges?	<input type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No	Water fund used for incentives, funded by fines				
Implementation Timing:	<input checked="" type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed by Government by <input type="checkbox"/> Funded by Development partner					
Financing Source	Capital: O&M:					

PROJECT DESCRIPTION

W2	Outer Island sanitation (Composting Toilet Program) MDG			
Sector:	Sanitation			
Responsible Agency:	Ministry of Home Affairs			
Background/ Rationale:	<ul style="list-style-type: none"> • Pilot program with 2 compost toilets (SOPAC) has been successful (each unit \$5000) • Previous efforts unsuccessful due to location, type, cultural. • New style can be cheaper, technologically simple and reduce water usage by 30% 			
Objectives	<ul style="list-style-type: none"> • Provide a series of composting toilet units; • Community education for water saving awareness • Implement sustainable sanitation systems that are simple and cost effective 			
Scope of Works	<ul style="list-style-type: none"> • Composting toilet units (110) • Materials for various housing styles (in-house, separate unit, basic etc) 			
Features	<ul style="list-style-type: none"> • Community education to raise water conservation awareness • 100% plumbing support as part of project 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Reduced water use and costs 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> • Improved sanitation practices 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • Lower water charges • Less need for septic maintenance 			
Alignment with National / Corporate Objectives:	Long Term			
	<ul style="list-style-type: none"> • Lower or eliminate subsidies • Provide additional infrastructure only when economically viable 			
Project Type:	Short Term			
	<ul style="list-style-type: none"> • Expanded collection and storage of water for housing, business and other structures (especially on Funafuti (TKII)) • Promote water conservation through education and awareness programs 			
Project Stage:	Cross Sector			
	<ul style="list-style-type: none"> • Sanitation initiatives such as composting latrines will further reduce water usage. 			
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Positive impact.			
Land Requirement:	On household land; or replace existing			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 60,000	\$600,000	\$	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes	0% of Full Cost Recovery		% of O&M		
	<input checked="" type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input type="checkbox"/> None <input checked="" type="checkbox"/> Commit ed Gove nment by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: EDF 10?? Concept note stage O&M					

PROJECT DESCRIPTION

W3	Composting Toilet Program			
Sector:	Sanitation			
Responsible Agency:	Public Works Department			
Background/ Rationale:	<ul style="list-style-type: none"> • Pilot program with 2 compost toilets (SOPAC) has been successful (each unit \$5000) • Previous efforts unsuccessful due to location, type, cultural. • New style can be cheaper, technologically simple and reduce water usage by 30% 			
Objectives	<ul style="list-style-type: none"> • Provide a series of composting toilet units; with various housing designs • Community education for water saving awareness • Implement sustainable sanitation systems that are simple and cost effective 			
Scope of Works	<ul style="list-style-type: none"> • Composting toilet units (400) • Materials for various housing styles (in-house, separate unit, basic etc) 			
Features	<ul style="list-style-type: none"> • Subsidised, user pays • Variable styles to meet budgets • Community education to raise water conservation awareness • 100% plumbing support as part of project 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Reduced water use and costs 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> • Improved sanitation practices 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • Lower water charges • Less need for septic maintenance 			
Alignment with National Corporate Objectives:	Long Term:			
	<ul style="list-style-type: none"> • Less water usage (up to 30%) • Minimise seepage to groundwater 			
Project Type:	Short Term:			
	<ul style="list-style-type: none"> • Improved Water security • Reduced environmental degradation • Improve public health and community well-being, and reduce the spread of enteric diseases 			
	Cross Sector			
Project Stage:	<ul style="list-style-type: none"> • Lower or eliminate subsidies • Provide additional infrastructure only when economically viable 			
	<ul style="list-style-type: none"> • Expand collection and storage of water for housing, business and other structures (especially on Funafuti (TKII)) • Promote water conservation through education and awareness programs 			
	<ul style="list-style-type: none"> • Sanitation initiatives such as composting latrines will further reduce water usage. 			
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start

Environmental Category:	<p> <input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Positive impact. </p>
Land Requirement:	On household land; or replace existing

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 100,000	\$1,000,000	\$	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	% of Full Cost Recovery			% of O&M	
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: O&M					

PROJECT DESCRIPTION

P2	Renewable Energy Phase 2 (2013-2014)
Sector:	Energy
Responsible Agency:	Tuvalu Electricity Corporation (TEC) /Energy Department
Background/ Rationale:-	<ul style="list-style-type: none"> • In 2002 over 90% of all households in Tuvalu had access to mains electricity. • Importing fossil fuel to meet the electricity production demand is a major drain on the country's income. • Outer islands operation is for 18hours per day and at times it operates only for 2-4hrs per day from lack of diesel fuel supply. • The government of Tuvalu committed itself in 2008 to convert the national diesel power generation to 100% renewable energy by 2020. • 4.3 MWp (2010)
Scope of Works	<ul style="list-style-type: none"> • Provide grid-connected renewable energy systems to all populated islands of Tuvalu with backup batteries at house level • Primarily via PV solar arrays and a few wind turbines • Batteries (\$15 million) to be replaced every 10 years
Features	<ul style="list-style-type: none"> • In order to meet the 100% renewable energy target, all systems will require batteries for the supply of power at times without sunlight or wind. • The existing diesel generators will be retained to serve as a backup for PV solar and will be operated with imported biodiesel • Energy efficiency campaigns and demand management will accompany the renewable energy development and contribute to minimizing the required system capacity and costs.
Social Benefits:	Short Term: <ul style="list-style-type: none"> • Increased availability of electric power, particularly to the rural population of the outer islands, for improved productivity and living conditions. • Minimising the laborious task and the risk of someone getting hurt from unloading of diesel drums from workboats onto the reef. • Improved essential services from more secure power supply, such as lighting, food refrigeration and telecommunication.
	Long Term: <ul style="list-style-type: none"> • Improved security of power supply. • Improved quality of life and health from safe food storage, clinic vaccines etc. • Improved educational system for more of educational equipment's like computers, internet, etc available at each Primary School. • Increased productivity in the household, particularly for women's manufacturing of local handcrafts, and the productive use of the cooler night time hours in general. • Prolong the service life of household electrical appliances, educational and office electrical equipment's from a more reliable and quality power supply.
Economic Benefits:	Short Term: <ul style="list-style-type: none"> • Savings of diesel imports • Reduced vulnerability to the ever increasing rise of fuel prices • Employment opportunities for the installation of the equipment.
	Long Term: <ul style="list-style-type: none"> • Decreased cost of electricity; reduced Government subsidies to TEC for fuel; improved cash flow for other essential expenditure by the community. • Improved health, education and overall wellbeing and productivity. • Improved environment and attraction of eco-tourism. • Opening up of opportunities for the communities to develop small cottage industries like fish shops, refrigerated goods etc..
Environmental benefits:	Short Term: <ul style="list-style-type: none"> • The same as long-term benefits at a rate determined by available funding.
	Long Term: <ul style="list-style-type: none"> • Reduced greenhouse gas emissions. • Preventing the risk of damaging the life of marine species living in the vicinity of the reef channel from oil spills from fuel drums. • Minimising the risk of damaging a) the soil and underground water reservoirs from waste oil and diesel leaks and b) nearby trees from engines exhaust.

	<ul style="list-style-type: none"> Preventing the risk of a major catastrophe like fires from large amount of diesel fuel stored on each island. 	
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> The project is aligned with the Tuvalu National Energy Policy Tuvalu shall attain a prosperous living standard that is fostered through an energy policy that promotes the provision of socially, financially, economically, technically, politically and environmentally sustainable energy Promote & implement the use of appropriate, proven, affordable & cost effective renewable energy technologies both for urban and rural applications. TNEP The government of Tuvalu has committed itself in 2008 to convert the national diesel power generation to 100% renewable energy by 2020.
	Short Term	<ul style="list-style-type: none"> Improving the power supply to other essential services such as telecommunications, water supply, health and education, particularly on the outer islands.
	Cross Sector	<ul style="list-style-type: none"> The project will benefit all residential, commercial and government customers on each island from having a more reliable and secured power supply. Examples are: new desalination plants being supplied together with PV systems to be independent from diesel fuel (Japan funded), telecommunication system and other essential services getting battery banks and priority in the use of power in cases of grid failures or catastrophes.
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existin <input type="checkbox"/> Refurbish Existing	
Project Stage:	<input checked="" type="checkbox"/> Concept <input checked="" type="checkbox"/> Planning <input type="checkbox"/> Design <input type="checkbox"/> Ready to Start	
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: The environmental impact envisaged in the project is the disposal of batteries, solar panels and electronic controls after their service life.	
Land Requirement:	Spare land areas and building roof tops will be required in all islands for the installation of solar PV systems.	

PROJECT FINANCING

Capital Cost estimate:	Pre-Construction	Construction	R&M	Operating	Whole of Life
	\$1 million	\$ 15 million	(every 10 years) \$4 mil	Per year \$0.1million	25 years \$115 million
User Charges?	<input checked="" type="checkbox"/> Yes 30% of Capital Cost Recovery		<input type="checkbox"/> No 100 % of O&M		
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+				
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by				
Financing Source	Capital: Donation O&M: User Charges				

PROJECT DESCRIPTION

P3	Renewable Energy Phase 3 (2015-2016)
Sector:	Energy
Responsible Agency:	Tuvalu Electricity Corporation (TEC) / Energy Department
Background/ Rationale:-	<ul style="list-style-type: none"> • In 2002 over 90% of all households in Tuvalu had access to mains electricity. • Importing fossil fuel to meet the electricity production demand is a major drain on the country's income. • Outer islands operation is for 18hours per day and at times it operates only for 2-4hrs per day from lack of diesel fuel supply. • The government of Tuvalu committed itself in 2008 to convert the national diesel power generation to 100% renewable energy by 2020. • 4.3 MWp (2010)
Scope of Works	<ul style="list-style-type: none"> • Provide grid-connected renewable energy systems to all populated islands of Tuvalu with backup batteries at house level • Primarily via PV solar arrays and a few wind turbines • Batteries (\$15 million) to be replaced every 10 years
Features	<ul style="list-style-type: none"> • In order to meet the 100% renewable energy target, all systems will require batteries for the supply of power at times without sunlight or wind. • The existing diesel generators will be retained to serve as a backup for PV solar and will be operated with imported biodiesel • Energy efficiency campaigns and demand management will accompany the renewable energy development and contribute to minimizing the required system capacity and costs.
Social Benefits:	Short Term: <ul style="list-style-type: none"> • Increased availability of electric power, particularly to the rural population of the outer islands, for improved productivity and living conditions. • Minimising the laborious task and the risk of someone getting hurt from unloading of diesel drums from workboats onto the reef. • Improved essential services from more secure power supply, such as lighting, food refrigeration and telecommunication.
	Long Term: <ul style="list-style-type: none"> • Improved security of power supply. • Improved quality of life and health from safe food storage, clinic vaccines etc. • Improved educational system for more of educational equipment's like computers, internet, etc available at each Primary School. • Increased productivity in the household, particularly for women's manufacturing of local handcrafts, and the productive use of the cooler night time hours in general. • Prolong the service life of household electrical appliances, educational and office electrical equipment's from a more reliable and quality power supply.
Economic Benefits:	Short Term: <ul style="list-style-type: none"> • Savings of diesel imports • Reduced vulnerability to the ever increasing rise of fuel prices • Employment opportunities for the installation the equipment.
	Long Term: <ul style="list-style-type: none"> • Decreased cost of electricity; reduced Government subsidies to TEC for fuel; improved cash flow for other essential expenditure by the community. • Improved health, education and overall wellbeing and productivity. • Improved environment and attraction of eco-tourism. • Opening up of opportunities for the communities to develop small cottage industries like fish shops, refrigerated goods etc..
Environmental benefits:	Short Term: <ul style="list-style-type: none"> • The same as long-term benefits at a rate determined by available funding.
	Long Term: <ul style="list-style-type: none"> • Reduced greenhouse gas emissions. • Preventing the risk of damaging the life of marine species living in the vicinity of the reef channel from oil spills from fuel drums. • Minimising the risk of damaging a) the soil and underground water reservoirs from waste oil and diesel leaks and b) nearby trees from engines exhaust.

	<ul style="list-style-type: none"> Preventing the risk of a major catastrophe like fires from large amount of diesel fuel stored on each island. 		
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> The project is aligned with the Tuvalu National Energy Policy Tuvalu shall attain a prosperous living standard that is fostered through an energy policy that promotes the provision of socially, financially, economically, technically, politically and environmentally sustainable energy Promote & implement the use of appropriate, proven, affordable & cost effective renewable energy technologies both for urban and rural applications. TNEP The government of Tuvalu has committed itself in 2008 to convert the national diesel power generation to 100% renewable energy by 2020. 	
	Short Term	<ul style="list-style-type: none"> Improving the power supply to other essential services such as telecommunications, water supply, health and education, particularly on the outer islands. 	
	Cross Sector	<ul style="list-style-type: none"> The project will benefit all residential, commercial and government customers on each island from having a more reliable and secured power supply. Examples are: new desalination plants being supplied together with PV systems to be independent from diesel fuel (Japan funded), telecommunication system and other essential services getting battery banks and priority in the use of power in cases of grid failures or catastrophes. 	
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Project Stage:	<input checked="" type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design <input type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: The environmental impact envisaged in the project is the disposal of batteries, solar panels and electronic controls after their service life.		
Land Requirement:	Spare land areas and building roof tops will be required in all islands for the installation of solar PV systems.		

PROJECT FINANCING

Capital Cost estimate:	Pre-Construction	Construction	R&M	Operating	Whole of Life
	\$3 million	\$ 17 million	(every 10 years) \$4 mil	Per year \$0.1million	25 years \$115 million
User Charges?	<input checked="" type="checkbox"/> Yes	30% of Capital Cost Recovery		100 % of O&M	
	<input type="checkbox"/> No				
Implementation Timing:	<input type="checkbox"/> Immediate	<input type="checkbox"/> 2012-2014	<input checked="" type="checkbox"/> 2014+		
Financing Stage	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Committed Government	by	<input type="checkbox"/> Funded Development partner	by
Financing Source	Capital: Donation O&M: User Charges				

PROJECT DESCRIPTION

T1	Renewable Energy for Telecommunication Network	
Sector:	ICT	
Responsible Agency:	Tuvalu Telecom Corporation (TTC) (State Owned Enterprise)	
Background/ Rationale:	<ul style="list-style-type: none"> • Late 2007-2009 – TTC and the Government co-funded the upgrading of TTC network infrastructure for telephone, internet and FM radio services on the Outer Islands, and Funafuti. • Currently, all the outer islands and Funafuti is fully dependent on commercial power to power the equipment. Commercial power only runs 14-18hrs daily on the other seven islands with the exception of Niulakita which is completely run on batteries during daytime. • Backup power supply system was not included on each Outer Islands due to costs related reasons. 	
Objectives	<ul style="list-style-type: none"> • The main aim of this project proposal is to provide a fully redundant hybrid solar power systems for all of the outer islands telecommunication networks and the main hub on Funafuti, in order to be operational at all times. • The new power supply systems will be stable and adequate to meet future requirements, particularly in relation to the expansion of new services (internet services as well as the rollout of mobile service on outer islands). • All outer islands to have their telephone, fax, internet and future services to run or available at all times. 	
Scope of Works	<ul style="list-style-type: none"> • Outer Islands: Includes the procurement and installation of a solar power system on all the eight outer islands. The system will include solar panels, batteries, regulators, inverters and other accessories, which will run TTC Communication networks on a 24 hours basis. • Funafuti - Main Hub. Includes procurement and installation of solar panels, regulators and other accessories for the main hub on Funafuti. This will allow the hub to have a hybrid power system that runs on both solar power and A.C. 	
Features	<ul style="list-style-type: none"> • 24 hour service • Less power consumption / costs • Existing tariffs able to enhance operational return of TTC 	
Social Benefits:	Short Term:	
	<ul style="list-style-type: none"> • Telephone, Internet and FM Radio services will be available 24hrs to the Outer Island communities. • Improve quality of life and complements the operation of social services (education & health) on the outer islands.. • Better access of communications to the public communities, Government agencies, private business and local producer on the outer islands. • Emergency and Disaster alert warnings such as tsunami will get immediately to local communities, when disbursed. 	
Economic Benefits:	Long Term:	
	<ul style="list-style-type: none"> • Encourage new business entrepreneur to invest on the Outer islands. • Benefits overseas Tuvaluan (students, seafarers, those who have migrated and etc...) can communicate with their love ones anytime they wish. 	
Environmental benefits:	Short Term:	
	<ul style="list-style-type: none"> • Reducing in energy usage from commercial power, so less carbon emission 	
Alignment with National / Corporate	Long Term:	
	<ul style="list-style-type: none"> • Aligned with Tuvalu Government's strong political commitments to International agreements on climate change. • Improve ICT and extend nationwide 	

Objectives:	Short Term	<ul style="list-style-type: none"> • Provide economic infrastructure where economically viable • Eliminate subsidies to public utilities • Improve customer satisfaction and services delivery to the public as aligned with the objectives in the TTC Corporate Plan 2011 		
	Cross Sector	<ul style="list-style-type: none"> • Links with 100% renewable target for Energy sector • Part of Energy sector plan 		
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input type="checkbox"/> Design	<input checked="" type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: The typical risk associated with Solar Power system is always associated with the usage of acid and lead batteries, but this issue is well mitigated in future plans of the Government Waste department on e-waste recycling.			
Land Requirement:	Land is already available.			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		US\$33,600	AU\$389,906	AU\$100,000(10yrs)		
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No	High potential				
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: ? O&M: Tuvalu					

PROJECT DESCRIPTION

T2	Expansion of Internet and Mobile services on the Outer Islands			
Sector:	ICT			
Responsible Agency:	Tuvalu Telecom Corporation (TTC) (State Owned Enterprise)			
Background/ Rationale:	<ul style="list-style-type: none"> Late 2007-2009 – TTC and the Government co-funded the upgrading of TTC network infrastructure for fixed telephone, internet and FM radio services on the Outer Islands, and Funafuti. A mobile service to the outer islands was not included in this upgrading. Internet services on the outer islands is only limited to TTC cafe and nearby vicinity, <i>Falekaupule</i> and the National Bank of Tuvalu branches office, access to the community residence is not possible due to technical limitation of the network equipments on the outer islands. In late 2009, TTC & PACTEL installed a mobile network on Funafuti on a sharing agreement of 60% TTC and 40% PACTEL. In October 2010, Vaitupu was the first outer islands to install its mobile network, follow by Nukulaelae on June 2011. Coverage of the mobile was only limited close to the proximity of the tower due to height of the tower (18meters) on both islands. 			
Objectives	<ul style="list-style-type: none"> The main aim of this project proposal is to expand the coverage of Internet and mobile services on each outer island to enable better coverage of the main residential areas. 			
Scope of Works	<ul style="list-style-type: none"> Includes the procurement and installation of the tower and internet access equipment's on each island. 			
Features	<ul style="list-style-type: none"> The highest benefits will be the people residing on the outer islands including students, parents, seaman husbands, visitors to the islands. Expanded fee revenue for TTC. 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> Complements the operation of social services (education & health) on the outer islands. Better access of communications to the public communities, Government agencies, private business and local producer on the outer islands. Emergency and Disaster alert warnings such as tsunami will get immediately to local communities, when disbursed. 			
Economic Benefits:	Short Term:			
	<ul style="list-style-type: none"> More cost competitive TEC due to additional revenue 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> Assist with disaster relief and environmental management 			
Alignment with National Corporate Objectives:	Long Term			
	Short Term			
	Cross Sector			
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input type="checkbox"/> Design	<input checked="" type="checkbox"/> Ready to Start

Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: The only impact is the e-waste , and this will be covered under the Waste Management department plan on recycling.
Land Requirement:	Land already available

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
	\$		\$840,000	\$ 10,000 / yr	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: (US\$510k) ; Tuvalu (\$330k) O&M: 100,000 over 10 years (Tuvalu)??					

PROJECT DESCRIPTION

T3	Connecting to the World – Tuvalu to Fiji Submarine Cable			
Sector:	ICT			
Responsible Agency:	Tuvalu Telecom Corporation (TTC) (State Owned Enterprise)			
Background/ Rationale:	<ul style="list-style-type: none"> Most employees are employed by Government and Public sector and about 15% of the male population is employed as seaman on foreign merchant ship. Remittance from their wages is around (US\$4million-2006 economic estimates). Major Tuvalu export are its educated and technical people – seafarers, international organisations Allow high speed connection (internet, voice) with rest of world for communication and education 			
Objectives	<ul style="list-style-type: none"> Connect Tuvalu with an undersea telecom cable to access high speed data and voice Replace reliance on satellite. 			
Scope of Works	<ul style="list-style-type: none"> Optical submarine project. 			
Features	<ul style="list-style-type: none"> High speed data access 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> People of Tuvalu will have access to better telecommunications and content services at an affordable price. Higher penetration of internet services to the communities 			
	Long Term:			
	<ul style="list-style-type: none"> Improvement in quality of life due to improvement in delivery of e-health and e-education High speed internet access at affordable prices, better communication access with Tuvaluan residing overseas (Seaman, students and those who already migrated) Improvement in emergency and disaster management. 			
Economic Benefits:	Short Term:			
	<ul style="list-style-type: none"> Lower costs of bandwidth can enable TTC to stop running at a loss. 			
	Long Term:			
	<ul style="list-style-type: none"> Improve telecommunications services at affordable prices Offer better economic opportunities to international markets as well as domestic opportunities for local markets. New avenue for new services and encourage foreign investor to invest in Tuvalu. Paved a way for Tuvalu to be able to locally host its CCTLD (.tv) and able to monitor in real-time .tv registry and its country code (688) usage. 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> N/A 			
	Long Term:			
	<ul style="list-style-type: none"> N/A 			
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> Improve ICT and extend nationwide 		
	Short Term	<ul style="list-style-type: none"> Provide economic infrastructure where economically viable Eliminate subsidies to public utilities 		
	Cross Sector	<ul style="list-style-type: none"> 		
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input checked="" type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impac <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Sea bed disturbance and entry/exit points on land in Fiji and Tuvalu			
Land	minimal			

Requirement:	
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PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$1 million	\$33 million	\$500,000/annum	\$1 mil / annum	\$0.00
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No	Potential				
Implementation Timing:	<input type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input checked="" type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: ? O&M: ?					

PROJECT DESCRIPTION

M1	Funafuti Ports Ancillary			
Sector:	Maritime			
Responsible Agency:	Maritime, MPU&T			
Background/ Rationale:	<ul style="list-style-type: none"> • The new Funafuti port was constructed by JICA, consisting of 2 finger wharves. • The project did not include enough container handling or stevedoring facilities • During wet weather, the unpaved container yards become sodden, placing larger O&M costs on limited equipment 			
Objectives	<ul style="list-style-type: none"> • To bring the port up to a high standard to handle shipping and containers over the long term. 			
Scope of Works	<ul style="list-style-type: none"> • Paving of container area for forklift and container handling equipment • Provision of additional container handling equipment, (option: container stacker) • Additional stevedoring sheds and port operations office. • Container washing facility (recyclable water) 			
Features	<ul style="list-style-type: none"> • More efficient port operations • Expanded fee revenue for Ports. 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Reduced stevedoring costs due to efficiencies • Savings on dirty container fee. 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> • Security of port handling 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • Container washing (using recyclable water) • Less dirt run off to lagoon 			
Alignment with National / Corporate Objectives:	Long Term			
	<ul style="list-style-type: none"> • Improve effectiveness of transport services to the outer islands • Improve management, O&M of infrastructure and support services 			
	Short Term			
Project Type:	Cross Sector			
	<ul style="list-style-type: none"> • Reduced costs in all sectors for equipment 			
Project Stage:	<input type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input checked="" type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Changed run-off to lagoon			
Land Requirement:	Land already available			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 120,000	\$1,000,000	\$ 50,000 / yr	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No	50%				
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: O&M: Tuvalu					

PROJECT DESCRIPTION

M2	Outer Island Ports Upgrade		
Sector:	Maritime		
Responsible Agency:	Maritime, MPU&T & Home Affairs		
Background/ Rationale:	<ul style="list-style-type: none"> • Current ship to shore project funded by NZ and Australia improving access through lagoons • JICA funded wharf on Vaitupu • Study to include wharves, jetties and handling equipment showed low cost:benefit ratio (was dropped) • Other OI's still want jetty or wharves to ensure supplies can be landed in all weather and improve passenger transfers 		
Objectives	<ul style="list-style-type: none"> • To design and build wharves and/or jetties and cargo handling equipment on each of the outer islands 		
Scope of Works	<ul style="list-style-type: none"> • Wharves and jetties • Handling equipment 		
Features	<ul style="list-style-type: none"> • More efficient port operations • Expanded fee revenue for Ports. 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> • Use during emergencies to easily land supplies • Savings on damaged cargo • Ease of passenger dis/embarkation 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> • Security of port handling 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • Negative impact on lagoons and reefs 		
Alignment with National Corporate Objectives:	Long Term		
	<ul style="list-style-type: none"> • Improve effectiveness of transport services to the outer islands • Improve management, O&M of infrastructure and support services 		
	Short Term		
Project Type:	<ul style="list-style-type: none"> • Minimise subsidies 		
	Cross Sector		
Project Stage:	<ul style="list-style-type: none"> • Reduced costs in all sectors for equipment 		
	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Environmental Category:	<input checked="" type="checkbox"/> Concept <input type="checkbox"/> Planning <input type="checkbox"/> Design <input checked="" type="checkbox"/> Ready to Start		
	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Construction on reefs; change in surface flows; runoff to lagoons		
Land Requirement:	Land not yet available (or identified)		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 120,000	\$1,000,000	\$ 50,000 / yr	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No	50%				
Implementation Timing:	<input type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input checked="" type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: O&M: Tuvalu					

PROJECT DESCRIPTION

M3	Fishing and Yacht Marina		
Sector:	Maritime		
Responsible Agency:	Dept Fisheries & Maritime, MPU&T		
Background/ Rationale:	<ul style="list-style-type: none"> The new Funafuti port was constructed by JICA, consisting of 2 finger wharves. Commercial fishing boats and yachts are unable to use the port Mooring along the reef impacts the environment and also is unsafe in poor weather. 		
Objectives	<ul style="list-style-type: none"> Provide a safe haven for commercial and cruising boats during poor weather 		
Scope of Works	<ul style="list-style-type: none"> Fisheries harbour and pier to accommodate 60 fishing vessels, commercial/visiting yachts 		
Features	<ul style="list-style-type: none"> More efficient port operations Expanded fee revenue for Ports. 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> Reduced damage to vessels in bad weather Reduced risk of theft 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> Tourism through improved cruising yacht traffic 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> Reef impact 		
Alignment with National Corporate Objectives:	Long Term		
	<ul style="list-style-type: none"> National Fisheries Master Plan Improve management, O&M of infrastructure and support services 		
	Short Term		
Project Type:	Cross Sector		
	<ul style="list-style-type: none"> Fishing, tourism 		
Project Stage:	<input checked="" type="checkbox"/> New Infrastructure	<input type="checkbox"/> Upgrade/Replace Existing	<input type="checkbox"/> Refurbish Existing
Environmental Category:	<input checked="" type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input type="checkbox"/> Design
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Reef dredging		
Land Requirement:	Land already available		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 120,000	\$2,500,000	\$ 100,000 / yr	\$100,000	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No	50%				
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input checked="" type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: O&M: Tuvalu					

PROJECT DESCRIPTION

O1	Integrated Outer Island Infrastructure Project		
Sector:	Multiple Sector		
Responsible Agency:	Home Affairs (Rural Development		
Background/ Rationale:	<ul style="list-style-type: none"> • The Outer Islands will be receiving project benefits in water, sanitation, solid waste power, maritime and telecom. • The Government has an emphasis on promoting outer island growth and living standards to reduce pressure on Funafuti and balance growth • Outer Islands have access to trust funds and Government expenditure for maintenance and operations 		
Objectives	<ul style="list-style-type: none"> • To provide small scale infrastructure improvements to outer island communities 		
Scope of Works	<ul style="list-style-type: none"> • To be determined but could include limited infrastructure preventative maintenance (workshop and education/materials); road improvement/repair; extension of utility programs (internet cafes); community water and power facilities; sea walls and planning. 		
Features	<ul style="list-style-type: none"> • Balance investments on Funafuti • Extend benefits from current and planned infrastructure improvements in other sectors 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> • Improved use of infrastructure • Ability to maintain and extend service life of investments • Less reliance on Funafuti 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> • Livelihood security, particularly in times of emergency / or transport disruption 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • Unknown, minimal 		
Alignment with National Corporate Objectives:	Long Term		
	<ul style="list-style-type: none"> • Provide better infrastructure to outer islands 		
	Short Term		
Project Type:	<ul style="list-style-type: none"> • Increase contracting out of Government services 		
	Cross Sector		
Project Stage:	<ul style="list-style-type: none"> • Preventative maintenance in all sectors • Extension of benefits from other sector projects 		
	<input type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input checked="" type="checkbox"/> Refurbish Existing		
Environmental Category:	<input checked="" type="checkbox"/> Concept <input type="checkbox"/> Planning <input type="checkbox"/> Design <input type="checkbox"/> Ready to Start		
	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain:		
Land Requirement:	Land already available		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	R&M	Operating	Whole of Life
		\$ 150,000	\$1,000,000	\$ 50,000 / yr	\$	\$
User Charges?	<input type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input checked="" type="checkbox"/> 2015+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded Development partner by					
Financing Source	Capital: O&M: FaleKaupule / Trust funds					

Appendix C.3. Capital Cost cashflows of the TISIP

Tuvalu Infrastructure Priority Scheduling																											
Capital																											
Ref	Project	Estimated Capital Cost (\$m)	Estimated Operating Cost (\$m)	Status	Funding Source	2011 - 2045																					
						11	12	13	14	15	16	17	18	19	20	21	22	36	37	38	39	40	41	42	43	44	45
Committed and Funded																											
	EU Envelope B - Risk Reduction Project (water, sanit)	2.20	2.42	F	EU	1.21	1.21																				
	Solar Power RO Units & Solar Energy	4.00	4.80	F	Japan / PAC	0.40	4.40																				
	Energy Efficiency measures	0.50	0.60	F	EU	0.05	0.55																				
	RE 2012	4.45	5.34	P/F	various	0.45	4.90																				
	EU Envelope B - Risk Reduction Project (waste)	0.40	0.44	P/F	EU		0.44																				
	Airport Upgrade (runway, control tower, terminal)	11.00	12.10	P/F	WB			4.03	4.03	4.03																	
	Navalds refurbishment	0.40	0.46	P/F	GoT	0.46																					
	Tuvalu Ship to Shore Project	8.00	8.80	F	NZ		4.40	4.40																			
	Sub-total	30.95	34.96			2.57	15.90	8.43	4.03	4.03	0.00																
	PV			30.68																							
Priority																											
	High																										
P2	RE Phase 2	15.00	18.00	P	U					1.50	5.50	5.50	5.50														
P3	RE Phase 3	17.00	20.40	P	U								1.7	6.23	6.23	6.23											
T1	Solar Power ICT (Outer Islands and Funafuti)	0.90	1.04	P	U			0.05	0.50	0.50																	
M1	Funafuti Port Amenities	2.00	2.32	P	U			0.12	1.10	1.10																	
W1	Water Security Consolidation	3.00	3.60	P	U			0.30	1.65	1.65																	
W2	MDG Outer Island Sanitation	0.60	0.72	P	U			0.06	0.33	0.33																	
W3	Composting Toilets program & Septic Pump Out	1.00	1.20	P	U			0.10	0.55	0.55																	
T2	Expansion ICT to Outer Islands	0.84	1.01	P	U				0.08	0.92																	
	Sub-total	40.34	48.28	0.00	0.00	0.00	0.00	0.63	4.21	6.55	5.50	5.50	7.20	6.23	6.23	6.23	0.00										
	PV			48.28																							
	TOTAL	71.29	83.25			2.57	15.90	9.06	8.24	10.58	5.50	5.50	7.20	6.23	6.23	6.23	0.00										
	TOTAL PV			78.97				7.33	(Average over 10 years)																		

Appendix C.4. Total Cost cashflows of the TISIP

Tuvalu Infrastructure Priority Scheduling																											
Ref	Project	Estimated Capital Cost (\$m)	Estimated life cycle costs (\$m)	Status	Funding Source	2011 - 2045																					
TOTAL COST						11	12	13	14	15	16	17	18	19	20	21	22	36	37	38	39	40	41	42	43	44	45
National Recurrent Budget - projected marginal increase to "Full" maintenance			70.50				0.00	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00										
PV					41.82																						
Committed and Funded																											
	EU Envelope B - Risk Reduction Project (water, sanit)	2.20	6.69			1.21	1.30	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.13									
	Solar Power RO Units & Solar Energy	4.00	15.76			0.40	4.40	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.40								
	Energy Efficiency measures	0.50	1.97			0.05	0.55	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05								
	RE 2012	4.45	17.53			0.45	4.90	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.45									
	EU Envelope B - Risk Reduction Project (waste)	0.40	2.02				0.44	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.04									
	Airport Upgrade (runway, control tower, terminal)	11.00	42.79					4.03	4.47	4.91	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	0.33								
	Navaidis refurbishment	0.40	2.04			0.46	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.04									
	Tuvalu Ship to Shore Project	8.00	31.60				4.40	4.88	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.24									
	Sub-total	30.95	120.40			2.57	16.05	10.20	6.72	7.16	3.57	3.57	3.57	3.57	3.57	3.57	3.50	2.50	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PV				63.42		5.92 (Average over 10 years)																				
Priority	High																										
	P2	RE Phase 2	15.00	57.45			0.00	0.00	0.00	0.00	1.50	5.50	6.05	6.60	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.50				
	P3	RE Phase 3	17.00	70.61			0.00	0.00	0.00	0.00	0.00	0.00	1.70	6.23	6.86	6.86	7.48	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	0.34
	T1	Solar Power ICT (Outer Islands and Funafuti)	0.90	3.21			0.00	0.00	0.05	0.50	0.54	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.07	0.07							
	M1	Funafuti Port Amenities	2.00	10.04			0.00	0.00	0.12	1.10	1.26	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.20								
	W1	Water Security Consolidation	3.00	9.24			0.00	0.00	0.30	1.65	1.77	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.15	0.15							
	W2	MDG Outer Island Sanitation	0.60	2.11			0.00	0.00	0.06	0.33	0.36	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.03	0.03							
	W3	Composting Toilets program & Septic Pump Out	1.00	3.61			0.00	0.00	0.10	0.55	0.60	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.06	0.06							
	T2	Expansion ICT to Outer Islands	0.84	4.33			0.00	0.00	0.00	0.08	0.92	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.09								
	Sub-total	40.34	160.59			0.00	0.00	0.63	4.21	6.96	6.44	6.99	9.24	8.83	9.45	9.45	10.07	4.46	4.38	4.33	4.17	3.61	3.37	1.87	1.87	1.87	0.34
	PV				60.00		2.57	16.05	12.33	13.93	17.12	13.01	13.56	15.81	15.40	16.02	16.02	16.64	10.96	6.88	4.66	4.17	3.61	3.37	1.87	1.87	1.87
	TOTAL	71.29	351.48				15.08 (Average over 10 years)																				
	TOTAL PV				165.24																						
	Discount rate		8.0%																								

APPENDIX D SUMMARY OF THE 2011 TK II REVIEW

Summit Discussion notes

Set out below are the views relayed to Brian Bell by Solofa on the points made by Discussants and from the floor of the gathering²⁴.

Good Governance

- Query as to whether Island Leaders were included in the Leadership Code and confirmed by the SecGov that this is so
- Confirmed that TK II is owned by the nation and not just the government so it up to the people to ensure that the achievements and deficiencies are correctly recorded in the stocktake and that new ideas are incorporated to move forward
- If the Review is done well it will make obtaining assistance from the development partner community more rewarding
- TK II must be sold to the development partners so that it is the basis of dialogue so that Tuvalu dictates development
- Times are challenging for TMTI with marketing low and opportunities scarce
- TK II supports the Constitution and Island Leaders have an expectation that implementation will be achieved as envisaged
- Island Leaders noted the conflict senior civil servants and politicians have when their partners are in business, but did not have a solution
- Concern over the low level of the CIF and also the low level of awareness of what the actual level is
- The mood of the meeting was that the government and civil servants needed to aspire to greater achievement as pointed out in the evaluation report
- At times there are conflicts between the Constitution and tradition which Island Leaders are trying to retain

Economic growth and stability

- The Global Financial Crisis (GFC) has major implications for Tuvalu with reduced overseas income
- Fishing Licence income is critical and Tuvalu needs to do more to maximise revenue from this source and take more control over its natural resources
- Both Tuvalu and Tonga receive special assistance from the EU, but Tonga receives more than five times the assistance. Tuvalu needs to identify areas where the EU can assist to maximise potential EU support
- The TTF is facing hard times with no returns until the market value exceeds the maintained value again
- The GFC is forcing the government to look critically at the social side of the Budget and the high levels of expenditure including the maintenance of ships to deliver on the obligation to supply goods and services to Outer islands (OIs)
- Fiscal discipline is needed to manage the Budget, minimise external debt and not to rely on borrowing it cannot afford
- Use of the AUD means Tuvalu gets the flow on effects of Australia's economic performance relative to the rest of the world. As most of the revenues Tuvalu receives are denominated in USD and because the AUD is more expensive, Tuvalu

²⁴ All discussion was in Tuvaluan.

is losing out if converted to AUD. Included are Fishing Licenses, dot tv revenues and ship registry income.

- Leaders are urged to restrain expenditure during the hard times that are being felt
- If the government keeps spending it will not be able to assist the OIs and will lose out
- The private sector has not received even partial assistance from the government, which has not honoured commitments
- External sources of revenue to the government are volatile and more effort needs to go into broadening the revenue base
- There is an apparent conflict in that TKII states the need for a balanced budget at one point (Box 6.1, point 2) and then stating the deficit should not be greater than 3% at another point (Box 6.2, point 1), furthermore IMF is quoted as saying the deficit should not be greater than 11% (Evaluation Report, p24).
- A point raised about private sector investment was deferred to later in the programme.

Social Development

- There are encouraging developments
- The up-scaling of sports and youth is going well, but not yet to international standard (i.e. no medals yet at international games)
- Need to consider lowering the retirement age to 50 to open up positions for young people

Health

- Routine issues such as staff shortage ongoing
- Up-skilling is ongoing
- Scheduling of clinics to the remainder of the islands under the Japanese project
- More visits are required particularly on dentistry because an island has raised concerns that an increase in dental inspection is needed to avoid further incidence of the ailment

Housing

- Needs for better coordination of the housing pool on Vaitupu
- The building code is still under consultation at national and departmental levels

Gender

- Concerns over domestic violence, declining but still an issue
- Paternal leave is in the Act but neither employers or employees push for it
- On OIs very strict rationing of diesel for power generation means there is no power for emergencies outside normal hours of operation

Decentralisation

- Housing space on Funafuti an issue so move of functions to Vaitupu and Nukufetau needed
- A National Housing Authority independent of government is needed to allocate and maintain houses

Utilities

- New reservoirs and need on each island
- Unused government leased land should be given back to *Kaupule* to build houses – more so on Funafuti where the demand for houses is great.

Faleaupule and Outer Islands

- General Administrative Orders (GAOs) should be extended to *Kaupule* officers or perhaps the *Kaupule* Guidelines should be reviewed to adopt GAOs.
- Review of FTF distribution formula called for by Nukulaelae

Culture and tradition

- There is a need to review the *Falekaupule* Act in relation to the Constitution as culture is not included (what to do and what not to do)
- Culture evolves and it can't be legislated for
- On-going clash of tradition and western thinking
- The Ministry is urged to delegate their role on culture, perhaps by including traditional values into the school curriculum
- A project on recording traditions (in writing and video) was started in 2009. as part of the formulation of the 'National Policy on Culture', Which is now in draft form. The Secretariat of the Pacific Community assisted Tuvalu prepare the policy. Former politician B. Paeniu was recruited to do the study.

Rural Development

- OIs are urged to develop so that young people have a reason to stay
- Stronger leadership is required to reduce urbanization through business development, mini loans e.g. for fish markets²⁵

Infrastructure on OIs

- Development projects recently funded by government under Special Development Expenditure²⁶
 - Naumea access roads to pulaka pits
 - Nuitao causeway Nanumaga housebuilt for pastor, kitchens
 - Nui kitchen project
 - Vaitupu tennis courts, milk fish ponds
 - Nukufetau jetty and workshop.
 - Funafuti milk fish pond trial and housing project (around 40 houses were called for and about 10 have been or are about to be completed)
 - Nukulaelae multipurpose youth centre
 - *Above subject to checking*

Island Development Plans

- Plans completed for Nukufetau (Tuvaluan only), Funafuti and Nanumaga
- These documents should link directly into the TKII

Solid Waste

- Recycling proposed under Green Waste Tuvalu (GWT), metal and plastics, needs government to government support particularly on hazardous waste

²⁵Brian Bell and Gerdalska went around the OIs in the 1990s promoting the NZ Small Business Development Scheme, which had this objective. After an initial flurry it died away.

²⁶ This resulted in a budget blow out in the election year. All of these projects should have been funded under the FTF, except building of pastor's houses which is not permitted under FTF. Instead OIs hoard FTF money and keep going back to the government and development partners to fund development projects.

- Green Growth – based on recycling. Government may initiate? Korea could provide assistance on liquid hazardous waste, Japan on up-skilling and maintenance of machinery
- *Solofa has to go back to the SWAT and ascertain what is the true position with regard to the foregoing.*

Poverty

- Nothing new came out of the discussion or comments from the floor

FaleKaupule and Outer islands

OIs Development & Governance, culture and tradition

- A Cultural National Policy has been researched and documented but not yet adopted by government

Private Sector Investment

- Most of the PICTA and PACER requirements have been met, government is now in position to look at reducing tariffs and gap in the gaps of loss of revenue. Government is exploring ways in which it can recoup lost revenue from reducing of tariffs
- Government says that opportunities exist for TNPSO to further expand but has done very little to improve the environment for this to happen
- FDI Act in place, but not being complied with, the board is doing little to encourage
- Price Control Board – more needs to be done to make the Board effective, consumers need additional protection from being exploited for the protection of consumers
- Tax reform – still on-going including capacity building
- Infrastructure to cater for tourists needs to be explored – small is beautiful, but that is not enough to attract tourists
- ICT is being explored to market tourism with Tuvalu as a destination
- Publishing of government accounts needs to be done on a more timely basis and be audited

Trade, Labor and Employment Opportunities

- Injection of funds by government is minimal or non-existing
- Activities suitable for private sector should get government out to downsize civil service and increase opportunities for private sector growth
- Gradually phase out fishing licenses and fish by Tuvaluans including a fish canning factory for export
- DBT needs to provide a fairer distribution of loan funds to potential entrepreneurs
- Expand training not only for local market but also the region and rest of the world so Tuvaluans are more marketable
- Lack of a private sector development plan limits effectiveness of TNPSO
- Disagree with the government's policies to reduce subsidies to NGOs
- The general population's skills have risen but not employment opportunities
- DBT lacks capital to expand its lending
- Credit culture is alive in Tuvalu with high failure rates on loans
- Support the development of the private sector to create jobs for those who cannot get into government jobs and thus create further jobs
- Not only have to make profit but also look after their employees with proper contracts
- Foreign investors are not attracted to conditions in Tuvalu, the reverse is true apart from a few Chinese who out compete (kill) locals in retail. Chinese are now dominating the retail sector

- Land is really scarce on Funafuti, what can government do to allow local businesses to expand – foreigners have got land but not locals – nepotism was apparent when a foreigner was allocated a piece of leased land whereas local business men were denied to sub lease.
- Restrictions too rigid meeting bureaucratic requirement for business start ups
- Commission charged by DBT is too heavy
- Need to reduce fares for the regional employment scheme
- Chinese business people take money out of the country
- TMTI employment opportunities, white list must be retained and also maintain ILO standards at the same time
- TMTI should come under Labour rather than Education – for employment opportunities
- Need to fast track the Diagnostic trade integrated study (DTIS) to receive funding from Tier 1
- Look at a national lottery for Tuvalu
- DBT of business centre have a place for new business ideas to be debated
- If land is resold there should be encouragement to build higher to make more efficient use of scarce land
- Don't agree with composting toilets as it needs of leaves of plants – need a sewerage system and perhaps turn it as a commercial entity to create more businesses.
- Snack industry based on taro or tapioca
- Informal employment: 1-2 day job should be encouraged
- DBT allow similar options that ADB does with grace periods and low interest
- Limited contacts with business contacts in Europe, CDE office in Suva should be utilized – CDE or Centre for Development of Enterprises has established an office in Suva Fiji and businesses either individually but more so as a group through the TNPSO can start linking up with that office and seek whether they can access funding assistance from the European Investment Bank which the EU had deposited billion euros.
- Price control policy should be more effective
- Access to credit, form filling too big an obstacle for people – need to be clearer, simpler
- Upgrade TMTI to include deck officers and others in training
- Government look to explore opportunities with other shipping lines for seafarers e.g. Swires

Education

- Up-skilling of teachers being achieved and on going
- Class rooms all except Nanumea and Nukufetau, Funanfutri partially received duplex class rooms, but more needed
- Quality of primary school education much higher in Funafuti than on OIs
- Motufoua upgrading on going, Japanese government has agreed to fund phase 2 from January v2012,v by 2013 upgrading will be complete
- Curriculum being implemented on outer islands and on going
- Upgrading maths, english, science and culture all being achieved
- Disabled people needs being achieved
- Regular reviews are being undertaken
- Tuvalu Education Strategic Plan achieved
- Non-achieved: recruiting student councilor and creation of a junior secondary school
- Support for the notion of including culture in the curriculum
- PIFS and SPC are supportive of education
- Use ICT to deliver to OIs primary schools included

- Dangers and risks of HIV AIDS need to be taught in schools
- Encourage the development of the youth national plan
- Pre-school get minimal assistance from government – government should fund by Education Department
- Lack of pre-school impacts on performance later
- Shifting of form 7 from Funafuti to Mufoua is encouraged to take place
- Currently government and USP caters for form 7 that is the Augmented Foundation separate from the Form 7 the Ministry of Education established in the beginning of this year – it should be absorbed into the schools
- Form 3 and 4 be delivered in primary school

Natural Resources

- Lands, fisheries, environment and tourism
 - Extension services in agriculture be revived for food security
 - More effort be put into training of technical skills
 - Due to GFC prices are rising and will rise further making production of local food an even greater imperative
 - Revisit the idea of providing basic tools for gardening so families can produce their own food
 - Staff need to be boosted to enable sectoral planning in agriculture
 - Lack of skills to understand the EEZ limits with Kiribati, France and Fijian on gong problem to resolve disputed boundaries
 - Discourage agreements with distant water fishing nations and focus of the regional agreements
 - Government needs to work with land owners to resolve the issue of setting lease conditions including prices
 - Biodiversity and biosecurity – encourage integrated farming methods
 - Urged addition capital be injected into the fish markets
 - More coordinated management of solid waste disposal especially on Funafuti
 - Management of algae growing as a result of increased nutrients flowing into the lagoon
 - Island Councils raised routine issues such as the fish market on Funafuti as an outlet for OI product

Infrastructure and Support Services

- Policy of 100% renewable energy by 2020 is being delayed through lack of staff to implement it
- Separating the administration of marine and ports will increase revenue. This should go as far as corporatization
- Stevedoring should be carried out by the Kaupule on each island using ex seafarers. This will save on crew on the interisland vessels and produce revenue and jobs of the outer islands. It should follow international standards of best practice but on a smaller scale
- The target of 100% renewable will be much higher than currently estimated from \$40 million to \$60 million
- Tuvalu's power costs are much higher than Fiji and PNG
- The construction of the government building and the new media department with small rooms and little ventilation means that there will be high levels of air conditioning needed for people to work in these buildings than necessary with better design
- Suppliers of energy products should be commercial with competition and not a government department
- The reef channel at Nukulaelae needs to be resisted as it is spoiling adjacent land

- Privatise the two ships
- Increased security at the cargo shed is needed as there is an increase in pilfering between Nukulaelae and Funafuti – this was raised by the Nukulaelae delegation however pilfering is much greater when ships arrive from the central and the northern islands. So it is urged that something is done to eliminate such incidences.
- Internet needs to be better quality and unit cost reduced for OIs
- Overseas contractors need to use more local labour
- Gravel and sand needs to be sourced from elsewhere outside the country to preserve the atolls
- Use the larger buildings to fix solar panels rather than individual houses
- More money is needed to maintain primary schools. Kaupule owns the property and they must maintain them
- Reduce the use of land lines and increase the use of the internet
- Decentralization would increase the demand for internet
- Review the freight tariff of the two ships to increase usage
- Ship scheduling needs to improve as reliability will improve revenue
- Tuvalu hook up to the marine cables – beside Funafuti (Cable and Wireless) and also between Nui and Niutau (Telstra) – for much better broadband
- Officials are not carrying out their assigned tasks and more discipline is needed for those who do not perform
- Worthless putting up infrastructure that is no maintained
- Need a national infrastructure plan
- Need to review departments regularly for performance i.e. annually , five years is worthless
- Too much Regional Seasonal Employment Scheme money is being spent in Fiji (\$1000 each) while people wait for the ship to take them home
- A competitor is needed to lower the price of telecom services
- To increase tourism there need to be much bigger planes coming to Tuvalu
- Noted that the TISIP is linked to TKII and meets the earlier criticism that there is no infrastructure plan
- The monopolistic provisions of TTC should be relaxed so the service is cheaper to the consumer
- Support for the TISIP
- Ship to shore is too long in coming since 2002 and only started a month ago
- Boat harbors are safer than just reef widening and needed at Niutau and Nanumaga for inclusion in the TISIP
- Attitude of people, when anything goes wrong the finger is always pointed a the government, but the reality is that it is the officials who are managing and running the two ships if and when they are at fault. SOE managers receive perks that put their packages much higher than officials, but they are not performing to the level inferred by their package
- Ship delays are due to inefficiencies of officials
- Decision to distribute water tanks to the 3 northern islands is because they are usually much drier than the southern island
- Urge the connectivity to OIs be improved as a high priority for use by schools, quality is really down and this affects the quality of education

Appendix E TISIP RANKING RESULTS

TISIP Initial Project Ranking Report 28 October 2011

A. Results

1. Twelve projects were ranked at the workshop on Monday 24th October 2011. The scoring for each of the 20 questions listed under the seven criteria were averaged across each of the taskforce respondents to give an average score for each question under each project. This attempted to show a group response.

2. Because many of the resultant scores showed clustering, the scores were normalized into bands – high, medium and low – between the highest and lowest scores for each question across all projects. This further eliminated bias due to accumulation of small marginal differences. Question responses located in the top third of results received a “3”, middle third a “2”, and lower third a “1”.

3. The resultant scores for each question under each of the seven criteria were then averaged for each project. This eliminated the “weighting” effect of criteria that had more or less questions. The result was a list of 7 “scores” for each criteria under each project.

4. The resultant scores for each of the seven criteria were then summed under each project to provide a total average score. The results are shown below:

Project	Score	Rank	Cost (mil)	Sub Total
P3 – Energy Sector 2015-16	18.8	1	16.8	
P2 - Energy Sector 2015-16	17.3	2	15.0	
T2 – Outer Island Telecom	17.3	2	0.5	
W1 – Water Consolidation	16.8	4	3.0	
M1 – Port Amenities	16.8	4	1.0	36.3
W2 – Outer Island Compost Toilets	16.3	6	0.7	
W3 – Funafuti Compost Toilets	16.2	7	1.0	
T1 – Outer Islands Solar Telecom	14.5	8	0.9	2.6
T3 – Submarine Cable	13.5	9	33.0	
O1 – Integrated Outer Island	13.5	9	1.0	
M2 – OI Ports Upgrade	12.3	11	50.0	
M3 – Fisheries Marina	9.1	12	2.5	86.5
				125.4

B. Issues

5. There were a number of issues and discrepancies noted in the scoring and ranking process that affected the result.

6. **Sector Bias** – There was a significant correlation between respondents in certain sectors, particular power and telecom, to score questions for their own projects *significantly* higher than others. This was discovered by examining the standard deviation between sub and total scores, with some ranking “their” projects more than 2 standard deviations above

the next ranked in other sectors. It was noted that generally, respondents who represented multiple sectors, or were from outside a sectoral department (such as planning) had less bias.

7. **Inconsistent scoring** – For projects such as P2 and P3 – which were virtually identical apart from timing, it was unusual that the latter project (slated for 2015-16) would be ranked any differently, let alone above, the former (slated for 2013-2014). On examination, this was due to about 3 or 4 individuals who scored different results for the data under the same criteria. This could be due to rushing, poor understanding of the project itself, or simple human error.

8. **Different scoring** – apart from the discrepancies noted above, there was general agreement between scorers on most responses. This was noted by looking at the standard deviation across all responses, and noting where it was highest.

9. The two power projects had the largest difference of opinions, followed closely by the M1- Port Augmentation project. The difference of opinion would also support the bias noted in paragraph 6.

10. The main *questions* that generated differences of opinions across all projects were: “contribution to exports – foreign exchange”, “no environmental impacts”, “no land or social issues”, and “id of a development partner”. The inconsistent results on these questions are most likely due to the way the question was phrased.

C. Moving Forward

11. There are a number of ways to move forward:

- **Group Re-ranking** - Undertake a group re-ranking of all of the 13 projects, or a subset of the projects that consistently came in the top 8 and subjecting them to further refinement. The group agreeing on the response to each question.
- **Consensus building** – using the initial ranking as a starting point; keeping in mind the biases that occurred; and taking account of real timing and phasing of projects (such as T2 and T1 need to be combined; P2 2 years prior to P3 etc) undertake a purposive ranking. This should be done as a group looking at the projects as a whole.
- **Elongated timing** – as a complement to *consensus building*, an initial phasing/timing could be undertaken. The top 8 projects comprise almost \$39 million. There is an expectation that these can be implemented over a 4-5 year period at \$8m per annum. A good way to force decision making is to “pretend” that the annual budget is only say \$5m per year – and *force* the scheduling, timing and phasing of the top 8 projects over 8 years instead. Of course the actual timing will be different, depending on development partners and Government – but the exercise forces participants to weigh up criteria across projects.

12. It is understood that the PRIF taskforce is expecting to build consensus during a meeting on the 31st October and provide a list of prioritized projects. It is important that the participants:

- review the project sheets to gain a clear understanding of the rationale and impacts for each project;
- that they openly discuss issues across the 7 criteria and any others that they feel are necessary – noting any additional criteria
- recording the reasons why projects are re-ranked so that they can be included in the inclusion in the final rationale justifying the plan framework.

TISIP TASKFORCE MEETING

Minutes of TISIP Taskforce Meeting No. 7/11
 Cabinet Room
 Wednesday 2nd November, 2011 at 10am

Present:

Honorable Minister for Public Utilities & Communications Transport (Chairman)	-	Hon.Kausea.Natano
Secretary for Finance & Economic Development	-	Minute.Taupo
Secretary for Public Utilities	-	Olioliga. Iosua
Secretary for Home Affairs & Rural Development	-	Pusineli.Laafai
Assistant Secretary Communication & Transport	-	Tepau.Sotaga
Director for Planning & Budget	-	Letasi.lulai
Director for PWD	-	Ampelosa.Tehulu
Director for Civil Aviation	-	Vitoli.Iosefa
Director for Marine	-	Taasi.Pitoti
Manager TTC	-	Simeti. Lopati
Ag.Manager for TEC	-	Taeka. Satupa
Local TISIP Consultant	-	Solofa.Uota
Ag.Economic Adviser (Secretariat for Taskforce)	-	Puara.Tanei
Policy Advisor to the Office of Prime Minister (observer)	-	Nobuaki. Matsui

1.0 OPENING REMARKS

The chairman, Hon. Minister for Public Utilities & Communications Transport (MPUCT) in his opening remarks welcomed the members of the TISIP Taskforce to the meeting and thanked them for availing themselves.

2.0 MATTERS ARISING FROM THE MINUTES

The Chair opened up the floor for members to comment on the “TISIP Initial Project Ranking Project Report” that was prepared by Mr.Andrew.McIntyre and the need for the task force to re-rank and prioritize the project profiles.

The TISIP Task force discussed the following and agreed on re-ranking the project sheets by building consensus and taking into account the way forward as proposed in the “TISIP Initial Ranking Report written by Andrew.McIntyre.” Listed below is the prioritized list of project profiles along with its reasons:

(1) P2: Energy Sector 2013 to 2014

It was agreed that P2 be ranked as a top priority amongst the project listed as the project itself is of great importance to Tuvalu in achieving its long term goals of renewable energy by 2020. With its current Master Plan in place the project would benefit dramatically by enabling the energy sector in achieving both its short and long goals and benefits. As P2 is the first phase of P3 the Task force agreed that P2 should initially be ranked before P3 as its implementing time frame is also before P3’s timeframe.

The project is also essential to those living in the Outer Islands. Ninety per cent of Tuvalu’s population uses electricity, importing fossil fuel to meet the electricity production demand is a major drain on the country’s income. Outer Island operations were up to 18 hours per day

and at times it operated only from 2 to 4 hours per day due to the lack of supply in diesel fuel. The project is said to have short and long term benefits on the Social, Environmental and Economical areas which could be extracted from the project profile sheets that was prepared by Mr. McIntyre. The project also is in line with the National Sustainable Development Strategy Plan or “Te Kakeega II.”

(2) P3: Energy Sector 2015 to 2016

P3 was ranked second in the prioritized list as it is back to back with the P2 project. Again, it is logical that this project is ranked second to P2 as it is similar to that of P2 but differs in its implementing stages or timeframes. The benefits and other criteria are similar to that of the P2 project.

(3) T1: Outer Islands Solar Telecom

T1 was agreed as the third ranked project within the prioritized list and was switched with T2’s ranking as per the “TISIP Initial Project Ranking Report.” The project is said to be of more priority than that of T2 and would also be in line with the plans of the renewable energy as in P2 and P3. The need to have the upgrading of the TTC network infrastructure for telephone, internet and FM radio services on the Outer Islands and Funafuti is essential as the Outer Islands and Funafuti are fully dependent on commercial power. Commercial power only runs for 14-18 hours daily on the other seven islands with the exception of Niulakita which completely runs on batteries during daytimes. Backup power supply systems’ were not included on each Outer Islands due to costs related reasons.

The objective of the project is to provide fully redundant hybrid solar power systems for all of the Outer Islands Telecommunications networks and the main hub on Funafuti, is intended to be operational at all times. The Project is beneficial in all aspects such as, Socially, Environmentally and Economically. Additionally, it is in line with the National Sustainable Development Strategy Plan.

(4) M1: Port Amenities

M1 was ranked as fourth in the prioritized list and was switched with W1 (Water Consolidation) as in the TISIP ranking report. The project is necessary to improve the port amenities and to pave the pathways at the porting area to allow forklifts to transport cargoes and containers from the ship to the warehouse. It is also important that one of the objectives of this project would enable Tuvalu to meet up with the World Standards of Port Amenities. By improving the port amenities, it will lessen the turn-around time for ships and so will reduce freight or wharf-charges.

The project is essential in reducing cargoes from falling off the forklifts due to poor pavements which has been a current issue and is also evident within the porting area. It is also important that the implementation of this project would enable containers to be properly stored in proper storage rooms or warehouses rather than being left idle alongside the main road which may result in a lot of unforeseen accidents that may be disastrous to drivers of motorcycles and vehicles. Another importance of this project was to allow cargo ships to sail during evenings as the current trend of shipping schedules only allows for cargo ships to sail during day times which has resulted from the poor facilities and conditions at the main port. The project would also assist consumers in paying lower freight rates. Since M1 has the same scoring as W1. The TISIP Task force agreed that M1 would be ranked as a priority over W1.

(5) W1:Water Consolidation

The TISIP Task force agreed to switch M1 and W1 and that W1 was to be ranked as fifth place within the prioritized profile list. The project had the same scoring (refer to TISIP Initial Project Report prepared by Andrew McIntyre) of 16.8 as that of M1. The Taskforce agreed that M1 had more priority over W1 since M1 was viewed as a current problem that needed to be attended to immediately. W1 project consisted of repairs and maintenance to guttering to all buildings to assist households during periods of drought. Though the project is essential it is viewed as that of a lesser priority to M1.

(6) W2: Outer Island Compost Toilets

The Task force did not make alterations to the ranking of both the W2 and W3 as in the Initial Ranking Report and agreed on having both projects ranked at its current level. Hence, W2 is still ranked as sixth on the prioritized list of projects. The project is aimed at providing a series of composting toilet units to those living in the Outer Islands. Tuvalu is currently taking on the lead role in introducing this project within the Pacific as Tuvalu is known to implement this project within the Pacific. The Task force agreed on having the W2 ranked as in the Initial Ranking Report and that there were no alterations made to the rankings.

(7) W3: Funafuti Compost Toilets

As mentioned above, the W3 project remained as the seventh ranked project within the prioritized list. The reasons were also similar to that of W2 except that this project would benefit residents on Funafuti. Therefore, W2 was agreed as a priority over W3.

(8) T2: Outer Island Telecom

This project was ranked as eighth on the prioritized list and was switched with T1 as per the Initial Ranking Report. T2 was agreed by the Task force to be ranked and switched with project T1. Also note that T1's timeframe initially comes before T2's timeframe. The new power supply systems (from T1 project) will be stable and adequate to meet future requirements, particularly relating to the expansion of new services (internet services as well as the rollout of mobile service on Outer Islands which is exactly what T2 project is about).

(9) A2: International Air Port & Services

The Task force agreed that the inclusion of A2 project into the prioritized list was essential since it was not stated in the Initial Ranking Report due to its costing and deferred timeframe. However, the Task force agreed that the project is essential to Tuvalu especially, in increasing tourism, meeting passengers' demands, flow of government or private corporations businesses, punctuality of students to schools and accessibility to medical assistances in the capital for medical referrals. The project itself has short and long –term benefits within the Social, Economic and Environmental areas. It is also a priority that is in line with the National Sustainable Development Strategy Plan or "Te Kakeega II." In view of this the Task force strongly agreed that A2 should be included in the prioritized list of projects for TISIP.

The 9 projects were re-ranked by the TISIP Task force, the remaining 4 (T3, O1, M2 & M3) were agreed to remain the same as per the Rankings within the Initial Ranking Report. The major issue brought up by the TISIP Task force was that the A1 Project Profile (Domestic Air Services) was totally missed out during the Initial Ranking that took place on October 24th, 2011). This had resulted from an error in coding and was not distributed to members. A1 and A2 projects were not presented to members at the 24th October Workshop. Hence, the TISIP

Task force agreed that both A1 and A2 were essential projects that needed to be included under the Prioritized List of Project Profiles for TISIP despite its costing and deferred timeframes so that the Final TISIP would reflect and be aligned with the priorities stated under Tuvalu's National Sustainable Development Strategic Plan.

The Chair had then requested the Secretariat to confirm with Mr. McIntyre on the A1's project sheet.

The following is the current prioritized list as of Wednesday November 2nd, 2011 with exception to changes to include A1 into this list.

- (1) P2: Energy Sector 2013-2014
- (2) P3: Energy Sector 2015-2016
- (3) T1: Outer Islands Solar Telecom
- (4) M1: Port Amenities
- (5) W1: Water Consolidation
- (6) W2: Outer Island Compost Toilets
- (7) W3: Funafuti Compost Toilets
- (8) T2: Outer Island Telecom
- (9) A2: International Air Port & Services
- (10) T3: Submarine Cable
- (11) O1: Integrated Outer Island
- (12) M2: Outer Island Ports Upgrade
- (13) M3: Fisheries Marina

3.0 CLOSING REMARKS

The Chairman in his closing remarks thanked the TISIP taskforce members for their attendance and especially for their contribution to the issues that were raised.
