

HIS MAJESTY'S GOVERNMENT OF THE KINGDOM OF TONGA



TONGA

National Infrastructure Investment Plan

2013 -2023

Public Version



PRIF
Pacific Region
Infrastructure Facility

This is a publication of His Majesty's Government of the Kingdom of Tonga.

This report was prepared by Glen D'Este, Allison Clausen, David Hamilton, Pita Moala, and Kisione Tupou as individual consultants under the guidance and support of the Government of Tonga and the Pacific Infrastructure Advisory Centre (PIAC) in Sydney, Australia.

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Abbreviations

AusAID	Australian Agency for International Development
CBD	Central Business District
CCA	Climate Change Adaptation
CEO	Chief Executive Officer
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DRM	Disaster Risk Management
DSA	Debt Sustainability Assessment
DSM	Demand-Side Management
EBIT	Earnings before Interest and Tax
EBITDA	Earnings before Interest, Tax, Depreciation and Amortisation
EIA	Environmental Impact Assessment
EU	European Union
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse gas
GIZ	Gesellschaft für International Zusammenarbeit
GoT	Government of Tonga
ICAO	International Civil Aviation Organisation
IMF	International Monetary Fund
IMO	International Maritime Organisation
IUCN	International Union for Conservation of Nature
IUDSP	Integrated Urban Development Sector Project
JICA	Japan International Cooperation Agency
JNAP	Joint National Action Plan on DRM and CCA for 2010 to 2015
M&E	Monitoring and Evaluation
MCA	Multi-Criterion Assessment
MDG	Millennium Development Goal
MLECCNR	Ministry of Lands, Environment, Climate Change & Natural Resources
MFNP	Ministry of Finance and National Planning
MLSNR	Ministry of Lands, Survey & Natural Resources
MIC	Ministry of Information and Communications
MOI	Ministry of Infrastructure
MPE	Ministry of Public Enterprises
OECD	Organisation for Economic Co-operation and Development
PE	Public Enterprises
M&E	Monitoring and Evaluation
MTBF	Medium-Term Budget Framework
MW	Mega watt
NEMO	National Emergency Management Office
NIIP	National Infrastructure Investment Plan
NIIP2010	the first NIIP covering the period from 2010/11
NIIP2013	this NIIP covering the period from 2013/14
NUDSP	Nuku'alofa Urban Development Sector Project
NZ	New Zealand
NZAID	New Zealand Agency for International Development
PAIP	Pacific Aviation Investment Program
PAT	Ports Authority of Tonga
PCRAFI	Pacific Catastrophic Risk Assessment and Financing Initiative
PE	Public Enterprise
PPCR	Pilot Program for Climate Resilience
PUMA	Planning and Urban Management Agency
QSW	Queen Salote Wharf (Nuku'alofa)
SOE	State-Owned Enterprise
SPC-SOPAC	Applied Geoscience and Technology Division of the Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Program
TA	Technical Assistance
TAL	Tonga Airports Ltd
TBC	Tonga Broadcasting Commission
TCC	Tonga Communications Corporation
TCCI	Tonga Chamber of Commerce and Industry

TCL	Tonga Cable Ltd
TFSCP	Tonga-Fiji Submarine Cable Project
TMO	Tonga Meteorological Office
TMS	Tonga Meteorological Service
TOP/T\$	Tongan pa'anga
TPL	Tonga Power Ltd
TSCP	Transport Sector Consolidation Project
TSDf	Tonga Strategic Development Framework
TWB	Tonga Water Board
UNDP	United Nations Development Program
UPMS	Urban Planning and Management System Project
USAID	United States Agency for International Development
USD	US Dollars
WAL	Waste Authority Ltd
WB	World Bank

Exchange rates

All figures quoted in the NIIP are in Tongan pa'anga (TOP). Exchange rates as at December 2012 are:

TOP 1 =	USD 0.580	NZD 0.692	RMB 3.575
	AUD 0.551	EUR 0.444	JPY 48.67

Source: *Tonga Reserve Bank Bulletin*, December 2012.

Notes

This version of Tonga's National Infrastructure Investment Plan 2013 (NIIP2013) has been prepared for public access and use. A series of annexes that accompanied this main report have not been included.

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- Ministry of Finance and National Planning
- Ministry of Infrastructure
- Ministry of Lands, Environment, Climate Change & Natural Resources
- Ministry of Public Enterprises
- Ministry of Information & Communications
- Tonga Energy Roadmap Implementation Unit
- Planning and Urban Management Authority
- National Spatial Planning Authority
- Joint National Action Plan on CCA/DRM Secretariat
- National Emergency Management Office
- Ports Authority Tonga
- Tong Broadcasting Commission
- Tonga Communications Corporation
- Tonga Cable Ltd
- Tonga Airports Ltd
- Tonga Power
- Tonga Water Board
- Waste Authority Ltd
- Civil Society
- Tonga Chamber of Commerce and Industry
- Tonga Development Bank
- Westpac Bank
- National Retirement Benefits Fund
- ADB/World Bank Focal Office Tonga
- Australian High Commission
- Embassy of the People's Republic of China
- Embassy of Japan
- JICA
- New Zealand High Commission
- CSIRO/Pacific Climate Change Science Program
- Transport Sector Consolidation Project team
- Pacific Aviation Investment Project team
- Nuku'alofa Urban Development Sector Project team
- Pilot Projects in Climate Resilience project team

Executive Summary

Background

This National Infrastructure Investment Plan (NIIP) outlines the Government of Tonga's priorities and plans for major initiatives in economic infrastructure (energy, telecommunications, water, solid waste management, and transport) over the next five to 10 years. It responds to a number of challenges facing Government:

- the need to bring together various sub-sector and agency plans into a single document;
- the need for a longer term view and sector-wide approach to infrastructure planning and management, and a systematic approach to identifying future priorities;
- Government's constrained budget position and the need to set priorities and develop sustainable mechanisms for funding infrastructure delivery and maintenance based on sound economic and financial principles;
- the need for greater attention to strategic asset management and consideration of the life cycle (especially maintenance) costs generated by new investments, including issues such as operating efficiencies and demand-side management (DSM), and the institutional and regulatory environment for infrastructure; and
- increased attention to climate change adaptation and disaster risk management aspects of infrastructure development, management and operation.

This is the second NIIP. It updates and builds on the successes of the first NIIP that was prepared in 2010. It continues the focus on responsible investment and improved asset management, and includes a stronger spotlight on climate change adaptation and disaster risk management.

The Plan is country owned and led, and was developed with the full participation of and in consultation with internal stakeholders, and private sector and community representatives. The process involved the following key steps:

1. Analysing the key drivers for investments in economic infrastructure that will improve the everyday lives of the people of Tonga and reduce the costs of doing business.
2. Assembling a comprehensive list of economic infrastructure projects in the pipeline based on information from Government, Public Enterprises, and development partners to identify those investment projects that are already underway or have committed funding.
3. Developing and applying a robust prioritisation methodology that reflects national objectives as outlined in the *Tonga Strategic Development Framework 2011-2014* (TSDF) to identify a set of infrastructure projects investments that are 'high priority' for implementation in the next five years.
4. Considering the whole-of-sector planning implications of high priority projects, and identifying linkages and complementary (non-infrastructure) measures required to obtain best long-term value from investments.
5. Assessing the financial sustainability and level of cost recovery of existing infrastructure, and the proposed investments and linkages with public sector financial management framework.
6. Assessing the current infrastructure funding position of Government and Public Enterprises, and developing a funding strategy that can form the basis for discussion between Government, national stakeholders, and development partners.

The findings are brought together in this National Infrastructure Investment Plan.

Key Findings

Government recognises that while infrastructure investment projects are important, they are only part of the story. They go hand in hand with the improved management of existing and new infrastructure, and initiatives to improve the overall institutional, regulatory, and operational environment for infrastructure development. As a result, this NIIP is much more than a list of project proposals. **The NIIP is an integrated program for management of existing assets, new investments, supporting complementary measures, and linked projects.** Complementary measures include the development of sector road maps, policy changes, institutional/regulatory/financial reforms, training and capacity building, and technical assistance in support of the Government policy to capitalise on existing infrastructure and obtain best value from new investments.

Over the three years since the first NIIP was prepared in 2010, there has been a peak in infrastructure investment, with an estimated T\$300 million invested in economic infrastructure projects (note that all costs are in Tongan pa’anga, T\$). This includes around:

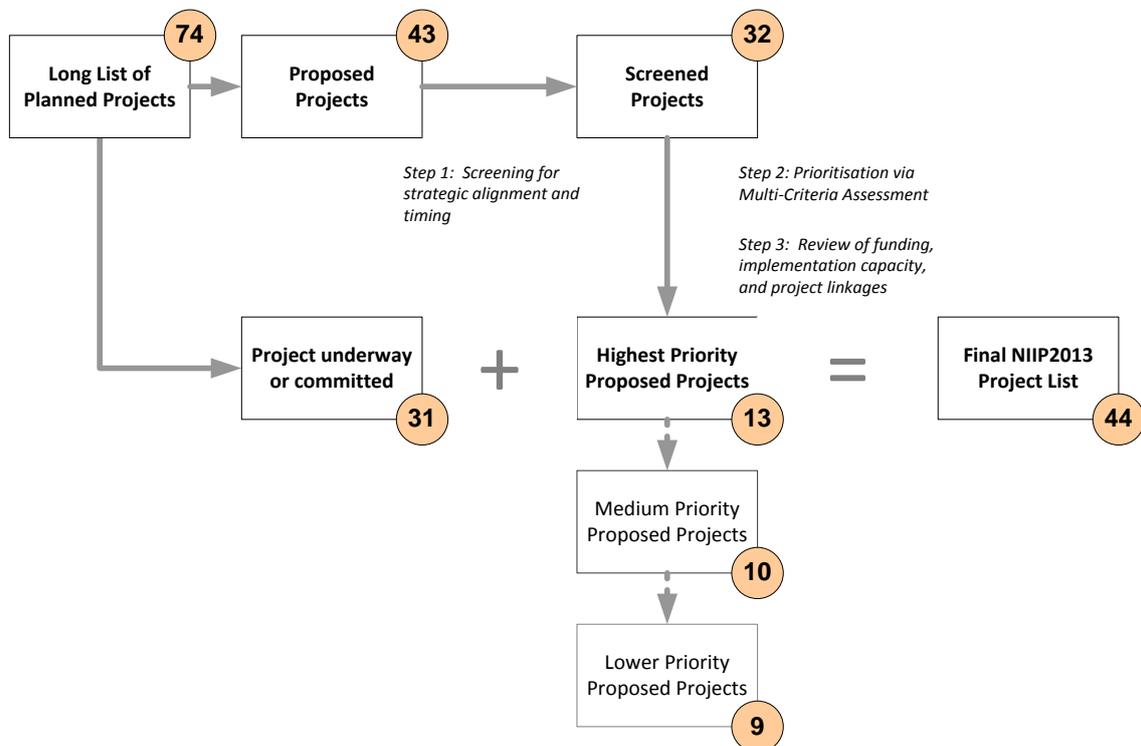
- T\$100 million in road rehabilitation and upgrade projects;
- T\$60 million in electricity generation and distribution upgrades;
- T\$30 million in telecommunications upgrades; and
- T\$50 million in the Nuku’alofa central business district infrastructure redevelopment and Vuna Wharf cruise ship terminal.

In addition, there are a range of investment projects already underway or committed. The first priority of this NIIP is to successfully complete projects that are already underway and committed, and to consolidate infrastructure that we already have through better infrastructure management, use, and maintenance. However, there are still a range of infrastructure challenges and opportunities that need to be addressed.

The complete list of future investment projects identified by this NIIP includes 74 projects spread across the economic infrastructure sectors, totalling around T\$560 million of investment over the next five years; and an additional T\$130 million in years the next five to 10 years. This includes projects that are currently underway, projects that are not underway but have committed funding, and proposed projects that currently have no confirmed funding but are proposed for possible implementation within the next five to ten years. Almost T\$180 million of investment is already underway or committed for the next 10 years. This includes more than T\$50 million of investment self-funded by Public Enterprises.

It will not be possible to fund all of the projects that have been proposed. Therefore priorities have been set. Projects that are not already underway or have committed funding were progressively screened to identify those that meet identified demands, are planned to proceed in the next five years, align well with national priorities, and deliver strong benefits to the Tongan people. A formal Multi-Criterion Assessment process was used to prioritise these projects into Highest, Medium, and Lower priority bands. The process and the number of projects at each stage of the process are shown in the following diagram (Figure A).

Figure A: Multi-Criterion Assessment process



The outcome of the prioritisation process is 13 'high priority' proposed projects for the next five years, totalling some T\$170 million. These projects have been rated as high priority because they are planned to commence within the next five years and are strongly aligned with the objectives of the TSDf; are sustainable in terms of having a foundation of adequate financial, technical, and institutional structures in place; are expected to deliver the highest levels of economic/social/environmental/resilience benefits to Tonga; and are consistent with available financial resources and implementation capacity. These 13 projects have no confirmed source of funding at this stage and represent Government's priority aspirations for additional infrastructure development over the next five years. In conjunction with ongoing and committed projects, they form the basis for development strategies for each of the infrastructure sectors over the next five to ten years.

The 13 high priority projects are listed in the table below. If the highest priority projects are all implemented, together with ongoing and already committed projects, the total investment in economic infrastructure over the next five years would be some T\$350 million. About 50 per cent of this investment is in projects already underway (T\$100 million), or already committed (T\$70 million).

Table A: Summary of highest priority proposed projects

Sector	Ref	Project	Estimated Cost (T\$m)	FY2014-18					
Energy	E11	Additional 1-2MW of Solar PV on Tongatapu	24						
	E16	Outer Islands On-Grid Renewable Energy	9						
Telecoms	T9	Fibre-Optic Cable to Ha'apai and Vava'u ¹	30						
	T10	Communications for Early Warning and Disaster Recovery	6						
Water	W3	Outer Islands water supply improvements	15						
	W4	Expand Nuku'alofa system to growth areas	11						
Solid Waste	S6	New Landfill or Transfer Station on Ha'apai	4						
Roads	R10	Outer Islands Roads Upgrading Program	10						
Sector	Ref	Project	Estimated Cost (T\$m)	FY2014-18					
Ports	P9	Maritime Sector Safety and Resilience	20						
Airports	A11	Resurfacing Ha'apai Airport runway, apron, taxiway	9						
	A12	New Control Tower at Fua'amotu International Airport	7						
Multi-sector	M2	Coastal Protection - Eastern Tongatapu	15						
	M4	Disaster Response & Evacuation Infrastructure	12						
Sub-total – High Priority proposed projects			172						
+ Projects Underway and Committed			173						
TOTAL			T\$345						

To obtain full value from any new capital investments, the investment must be supported with initiatives to improve the management of existing and new infrastructure, and measures to improve the overall institutional and regulatory environment. This integrated framework of priority investments and complementary measures is the essence of the NIIP. The framework is summarised in Table B, structured in terms of Government's four priority themes for the development of economic infrastructure over the next five years: *Connecting Tonga*, *Infrastructure for Communities*, *Reliable and Affordable Energy*, and *Sustainability, Safety and Resilience*.

¹ This project is linked to a proposed extension of the Fibre-Optic cable from Tonga to Samoa.

Table B: Summary of priority projects and complementary initiatives by theme

Theme	Sector	Priority Investment Projects	Complementary Initiatives
Connecting Tonga	Telecoms	<ul style="list-style-type: none"> T9: Undersea fibre-optic cable linking Ha'apai and Vava'u with international networks (T\$30m)² T 10: Communications for Early Warning and Disaster Recovery (T10 T\$6.0m) 	<ul style="list-style-type: none"> Update the access/regulatory regime for telecoms sector Private sector and Government initiatives (e-Government) that take advantage of opportunities emerging from improved internet access
	Roads	<ul style="list-style-type: none"> R10 : Outer Islands Roads Upgrading Program (T\$10m) 	<ul style="list-style-type: none"> Develop private sector capacity for road maintenance (TSCP)
	Ports	<ul style="list-style-type: none"> See <i>Sustainability, Safety and Resilience</i> theme. 	<ul style="list-style-type: none"> Post-harvest facilities for fishing and agricultural produce (handling, storage, processing) (initial support provided EU and Australian Aid)
	Airports	<ul style="list-style-type: none"> A11: Resurface the runway at Salote Pilolevu airport (Ha'apai) (T\$9m) A12: New Control Tower for Fua'amotu Airport (T\$7m) 	<ul style="list-style-type: none"> Update the policy environment for domestic aviation Post-harvest facilities (initial support under EU program)
Infrastructure for Communities	Water	<ul style="list-style-type: none"> W3: Outer islands water supply system improvements (Vava'u, Ha'apai, 'Eua) (T\$15.0m) W4: Expand Nuku'alofa system to new growth areas (T\$11.4m) 	<ul style="list-style-type: none"> Prepare a roadmap for the Water Sector that examines the full water cycle, including sanitation and drainage. The roadmap should <ul style="list-style-type: none"> - clarify and simplify institutional responsibilities for water and sanitation - prepare a situation report for the Sanitation sector, that identifies issues, problems and responses - prepare a drainage plan for Nuku'alofa - prepare an investment plan for the next 10 years - explore demand-side management (DSM) and other non-infrastructure options for making better use of existing and planned infrastructure
	Solid Waste	<ul style="list-style-type: none"> S6: Improved Solid Waste disposal arrangements for Ha'apai (T\$4m) 	<ul style="list-style-type: none"> Prepare a sector roadmap that addresses the institutional, financial and operational model for the sector and provides a five to 10 year investment plan.
Reliable and Affordable Energy	Energy	<ul style="list-style-type: none"> Additional on-grid solar electricity generation <ul style="list-style-type: none"> - E11: 1-2 MW on Tongatapu (T\$24m) - E16: Outer islands (Vava'u Ha'apai, 'Eua) (T\$9m) 	<ul style="list-style-type: none"> Non-Infrastructure aspects of the Energy Roadmap <ul style="list-style-type: none"> - Policy, legal, regulatory reform supporting the Energy Roadmap - Research and feasibility studies of alternative energy sources (wind, wave, coconut oil, etc) - Improved fuel supply chain logistics - Other non-infrastructure aspects of the Energy Roadmap (DSM, etc)
Sustainability, Safety, Resilience	Sustainability		<ul style="list-style-type: none"> Institutional reform to clarify/simplify responsibilities across all sectors Develop and implement a national policy and strategy for strategic asset management Implement new arrangements for sustainable road maintenance funding and delivery (TSCP)
	Safety	<ul style="list-style-type: none"> Maritime Sector Safety and Resilience project (preliminary estimate of T\$20 million but specific investments can be split out) 	<ul style="list-style-type: none"> Update arrangements for managing and maintaining ports for inter-island shipping Strengthen EIA system and capacity, and environmental monitoring Upgrading and capacity development in maritime safety and pollution response Update/upgrade maritime safety and pollution facilities; hydrographical charts, etc Upgrading and capacity development in aviation safety
	Resilience	<ul style="list-style-type: none"> M2: Coastal Protection – Eastern Tongatapu (T\$3.0m) M4: Disaster Response and Evacuation Infrastructure (T\$12.0m) 	<ul style="list-style-type: none"> Mainstream CCA/DRM into infrastructure planning, design, standards and management Upgrade Meteorological services and capability Improved arrangements for coordination of major projects with multi-sector implications

² Linked to the proposed extension of the international fibre-optic cable between Tonga and Samoa.

Capacity to financially sustain existing and new infrastructure

As discussed above, there has been a peak in infrastructure investment over the last three to five years, and investment is expected to continue under this NIIP. This creates a major challenge for Tonga to fund and sustainably maintain existing infrastructure and high priority new investments. Under current arrangements, responsibility for economic infrastructure operation and maintenance is split between Public Enterprises and Ministries, with all economic infrastructure except roads and outer islands ports currently under the management of Public Enterprises.

The financial performance of Public Enterprises has improved since the NIIP of 2010, but in terms of capacity for infrastructure financing, the picture is mixed. Table C summarises the results of an analysis of the capacity of Public Enterprises to self-fund infrastructure maintenance and renewal.

Table C: Analysis of capacity for self-funding infrastructure costs

Sector	Agency	Operations	Maintenance	Small CAPEX	Medium CAPEX	Large CAPEX
Energy	Tonga Power	High	High	High	High	Medium
		High	High	High	High	Medium
Telecoms	Tonga Communications Corp. (TCC)	High	High	High	High	Medium
	Tonga Broadcasting Commission (TBC)	High	Medium	Medium	Low	Low
Water	Tonga Water Board (TWB)	High	High	Medium	Low	Low
Waste	Waste Authority Ltd	Medium	Low	Low	Low	Low
Transport	Tonga Airports Ltd (TAL)	High	High	High	High	Low
	Ports Authority Tonga (PAT)	High	High	High	High	Low

Several Public Enterprises (Tonga Power Ltd (TPL), Tonga Communications Corporation (TCC), Ports Authority of Tonga (PAT), and Tonga Airports Ltd (TAL)) have effective maintenance and investment programs in place, and can fully fund routine maintenance and small-medium asset renewal from their own resources. However, these Public Enterprises would struggle to self-fund investments to replace or rehabilitate the largest item of infrastructure that the Public Enterprise owns (such as the airport runway) or is required in order to transform the sector (such as an undersea fibre-optic cable).

The financial position of the Tonga Water Board (TWB) is improving, with strong growth in revenues and an improved capacity to meet operating and maintenance costs and small capital expenditures. The Tonga Broadcasting Commission (TBC) can fund operations, but is struggling to keep pace with maintenance requirements, resulting in a gradually deteriorating infrastructure condition. The Waste Authority cannot fully fund the cost of operations and maintenance from its own resources and requires a Government subsidy to remain financially viable. Public Enterprises (with the possible exception of TPL, the TCC, and PAT) have a limited capacity for additional borrowings based on an analysis of their debt carrying capacity.

The Government has a very limited capacity to finance economic infrastructure activities either from its Budget or through borrowing:

- The economy is improving but Budget conditions are expected to remain tight. The economy is growing slowly (0.8 per cent in real terms in 2011/12) and after several years of deficits, Government has budgeted for a small surplus in 2012/13, and surpluses of the order of one per cent of Gross Domestic Product (GDP) are projected in the next three financial years.
- The level of existing Government debt and impending principal and interest repayments also pose significant challenges. The country's present value of debt to GDP and present value of debt to exports are expected to exceed their debt sustainability thresholds of 100 per cent and 30 per cent until at least 2018. In response to this challenge, Government has adopted an interim 'no new loans' policy.
- Dividends from Public Enterprises are not a significant revenue source, nor are they likely to be so in the medium term.

These conditions severely limit the capacity of Government to self-fund infrastructure initiatives.

Funding strategy

The table below combines the requirements for capital expenditure on infrastructure over the period 2013/14 to 2017/18 with estimated expenditures on complementary initiatives and the costs of maintenance of infrastructure (including pre-existing assets). It also provides a summary of the total demand for infrastructure finance over this period.

Table D: Total demand for infrastructure finance (T\$ million)

	2013/14	2014/15	2015/16	2016/17	2017/18	Total
<i>Capital Investment</i>						
NIIP2010 underway and committed	104	49	7	8	5	173
NIIP2013 high priority	16	62	60	24	10	172
Other smaller items of capital expenditure	8	8	8	8	8	40
<i>Complementary initiatives</i>						
NIIP2013	3	3	3	3	3	15
<i>Maintenance</i>						
Pre-existing assets ¹	10.5	10.5	10.5	10.5	10.5	52.5
NIIP2010 underway and committed	0.5	2.5	2.5	2.5	2.5	10.4
NIIP2013 high priority	0.3	0.8	1.5	2.0	2.1	6.7
Total	142	136	92	58	41	470

Notes: ¹ Including NIIP2010 assets operational in 2011/12

Based on the analysis of financial capacity of the Government, Public Enterprises, and past and planned external assistance programs, the Government plans to fund the above program as follows:

- **Public Enterprises** are expected to lift spending on infrastructure through revenues from user fees, contribute approximately T\$35 million to maintenance, and some T\$80 million to financing capital expenditure in infrastructure over the five year period. This includes contributions to NIIP2013 high priority projects and to major investment projects already underway or committed, and to planned smaller investments that are part of the Public Enterprises' own investment program. In particular, the proposed new control tower at Fua'amotu and the expansion of the Nuku'alofa water system are two NIIP priority projects that could involve partial self-financing by the TAL and TWB respectively.
- **Government** is planning to contribute roughly T\$5 million to infrastructure investment and T\$35 million to maintenance, consisting of increased spending on maintenance for outer islands ports and the establishment of a 'Road Fund' that will be phased in over several years and when fully operational will provide more than T\$6 million each year for routine and periodic maintenance.
- **Development Partners** are expected to continue providing support for economic infrastructure and associated technical assistance and capacity building with an amount of approximately T\$300 million. During past years, major development partners have committed some T\$380 million in assistance for ongoing and planned infrastructure projects. With the Government's 'no new loans' policy in place, it is expected that grant finance will increase to make up for lower concessional loan finance. A greater contribution is also expected from regional and global funds for Climate Change Adaptation (CCA)/Disaster Risk Management (DRM) activities. Government will take a lead role in facilitating CCA/DRM investments, a key emerging priority in the NIIP process.
- The **private sector** is not expected to contribute significantly to capital investment in infrastructure in the short-medium term, but will play a critical and increasing role as a service provider in terms of design, construction, operations, and specialist technical services in the maintenance and construction of infrastructure. In the event that the extension of the undersea cable from Tonga to Samoa materialises, it is expected that part of the costs of linking up Ha'apai and Vava'u (project T9) will be covered from revenues from the use of that cable.

The funding strategy as explained above is summarised in the table below.

Table E: Indicative infrastructure budget for 2013/14 - 2017/18 (T\$ million)

	Demand for Funding	Funding Source		
		Government	Public Enterprises	Development Partners
Capital Investment	\$385	\$5	\$80	\$300
Complementary Activities	\$15	-	-	\$15
Maintenance	\$70	\$35	\$35	-
Total	\$470	\$40	\$115	\$315

In the short-medium term, making better use of existing infrastructure is also critical. Government considers that despite current financial constraints, substantial progress can be made towards optimising the use of existing and new infrastructure assets through improved asset management and operating efficiencies. In particular, advancements can be made with relatively modest budgets and development partner support for complementary initiatives (mostly technical assistance) aimed at building the foundation of sustainability, safety, and resilience that underpins the NIIP. This will include:

- working with Ministries and Public Enterprises to strengthen their capacity in planning, financial evaluation, business case development, implementation, and management of proposed infrastructure investments. All proposed investments should be supported by life-cycle costing and an asset management plan;
- retaining the clear commercial focus of Public Enterprises and accelerating progress on improving their financial performance as a way of strengthening capacity to meet maintenance and investment needs;
- promoting the principles of strategic asset management as a framework for improved infrastructure management and facilitating a ‘maintenance culture’ at the Board and Chief Executive Officer (CEO) level;
- placing a greater emphasis on making better use of existing infrastructure through measures such as demand-side management (DSM), improved efficiency of service delivery, and alternative service delivery options;
- ensuring that environmental impact assessments (EIA) and environmental management planning is undertaken for major infrastructure projects, and strengthening and harmonising environmental monitoring and enforcement of legislative requirements;
- strengthening the capability of the MOI for oversight of safety standards, especially in the maritime and aviation sectors. Safety, especially in the transport sector, is one of Government’s highest priorities; and
- mainstreaming climate change adaptation and disaster risk management into all aspects of infrastructure planning, management and operation, especially through the JNAP process (*Joint National Action Plan on DRM and CCA*), and *Strategic Program for Climate Resilience for the Kingdom Of Tonga*.

In addition to specific complementary initiatives, Government intends to strengthen the policy and operational environment for funding and managing infrastructure by:

- using the NIIP process to provide clear direction about Government’s infrastructure development priorities, and making sure that the NIIP is widely available within Government and to the broader community;
- continuing initiatives under the Government Structural Reform process to clarify and simplify institutional responsibilities and streamline Government procedures in the infrastructure sector;
- strengthening the role of the Ministry of Infrastructure (MOI) in creating an improved environment for infrastructure development, financing, and delivery, because infrastructure relies on having effective public policies, institutions and legislation;
- strengthening forward planning requirements by requiring that all economic infrastructure sectors have a 10-year infrastructure strategy and a three-year investment plan; and
- engaging further with the private sector, and continuing the reform and private sector development initiatives already launched by Government.

Updating the NIIP

The NIIP is an integral part of the Government’s national planning and budgeting process. With many infrastructure projects and reforms already underway and more in the NIIP priority pipeline, it is important to keep the NIIP updated to ensure it remains relevant to emerging challenges and opportunities. The update cycle will align with the Medium-

Term Budget Framework (MTBF) process that is being introduced by the Government from 2013 and with updates to the TSDF.

Every four to five years, a full update of the NIIP will be prepared. A partial update will be released after two to three years with developments regarding the list of high priority projects and complementary initiatives; highlights of emerging challenges; and notes of any major changes to overall Government policies and priorities for the infrastructure sector.

The Ministry of Finance and National Planning (MFNP) in collaboration with the MOI will monitor progress on implementation of the NIIP and prepare brief annual progress reports. The Government intends to make these annual progress reports available to national stakeholders and development partners, and aims to present them at annual infrastructure coordination meetings.

1 Context

1.1 About the National Infrastructure Investment Plan (NIIP)

The National Infrastructure Investment Plan (NIIP) outlines the Government of Tonga's priorities and plans for major infrastructure initiatives over the next five to 10 years. This is the second NIIP (NIIP2). It updates and builds on the successes of the first NIIP that was prepared in 2010 (referred to as NIIP 2010, or NIIP1). Of the 12 priority investment projects proposed in the first NIIP, most are now underway and many of the supporting reforms and capacity building initiatives are also moving forward. The success of NIIP1 in terms of formal adoption by Government; facilitating dialog with Development Partners; and facilitating funding for priority projects and initiatives suggests that NIIP1 got it about right in terms of capturing the prevailing key themes and priorities for the infrastructure sector. But NIIP 2010 has been less successful in terms of achieving broad and lasting awareness and impact at a working-level in the Government of Tonga (GoT) and the broader community.

This Plan covers major infrastructure initiatives with national, regional, or local significance. It looks at the next five years to 2018 in detail and the five years from 2018 to 2023 in terms of broad directions for infrastructure development. It is the result of extensive consultation with infrastructure managers, users, and funding partners.

This Plan focuses on economic infrastructure facilities that support everyday life and business activity, such as energy supply systems, telecommunications, water and waste management, and transportation. In particular, the NIIP includes priorities and plans for major initiatives in the following sectors:

- Energy (electricity, fuel)
- Telecommunications (telephone, internet, broadcasting)
- Water and waste related services (water supply, waste water, drainage, solid waste)
- Transport (airports, roads, sea ports)

Other categories of built infrastructure supporting social services and governance, such as education, healthcare, and correctional services, are not included in this Plan and generally have their own sector plans. Government is considering extending the scope of the NIIP to provide broader coverage of social and administrative infrastructure as a second stage of the NIIP process.

1.2 Why is the plan needed

Infrastructure service delivery in Tonga is quite mature in terms of the availability and capacity of basic services. Tonga also has some of the best human development outcomes in the region in terms of the Millennium Development Goals (MDGs). But in other areas of infrastructure asset management, such as the cost, quality, and sustainability of infrastructure and services, Tonga is not keeping pace with needs and community expectations.

This Plan is a step towards a more systematic approach to infrastructure planning, coordination, and asset management. It is needed for a number of reasons:

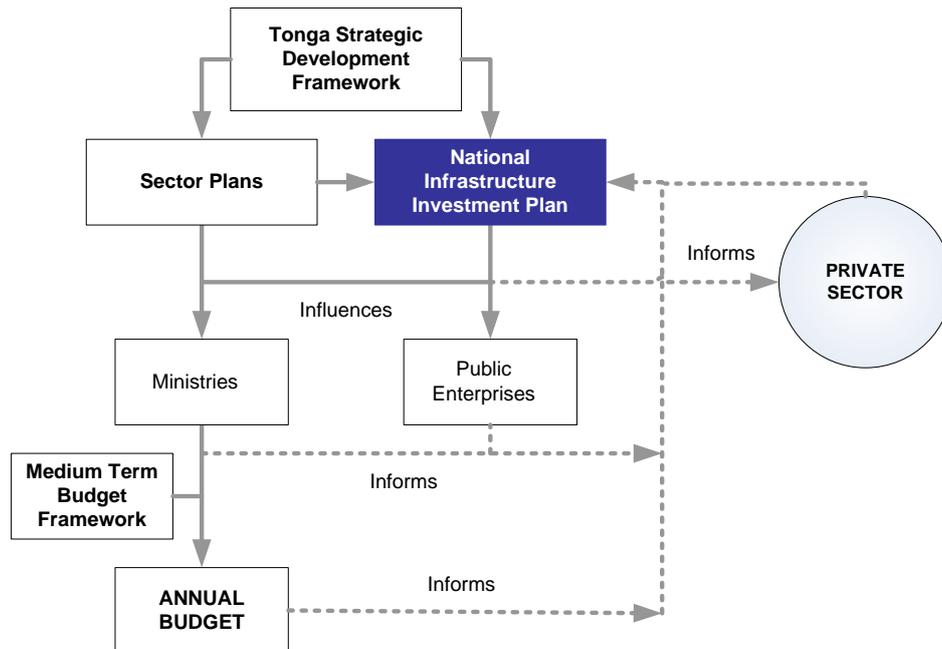
- Planning tends to be undertaken separately in each sub-sector, often on a project basis. The NIIP takes a sector-wide approach that brings together the various sub-sector and agency plans into a single resource about infrastructure priorities and plans. This provides a catalyst for a more coordinated and integrated approach to infrastructure planning, development, and service delivery by Government agencies, Public Enterprises, and the private sector.
- The NIIP is an important step towards establishing asset management as a core function of Government and infrastructure managers; instilling a greater emphasis on maintenance; and incorporating a life-cycle approach to infrastructure management.
- The NIIP is also a catalyst for a greater emphasis on Climate Change Adaptation (CCA) and Disaster Risk Management (DRM) in infrastructure planning, implementation, and operation. The aim is to ensure that all infrastructure is more resilient to the potential impacts of climate change and natural disasters.
- In addition, the NIIP is a key input to medium and longer term budget planning. It provides a picture of the scale and sequencing of future investment and financing needs, and ongoing maintenance requirements.

- Finally, by providing greater certainty about the nature and timing of infrastructure projects, the NIIP improves the investment environment for the private sector. It also provides development partners with clear information about Government priorities and plans for infrastructure development, and the areas where assistance is most needed.

1.3 How does NIIP relate to other plans

The NIIP is an important part of the national planning and budgeting process. This process and the role of the NIIP in the overall infrastructure planning process is summarised in Figure 1.1.

Figure 1.1: Relationship between NIIP and the planning process



The overall direction and priorities of national infrastructure planning and the NIIP are shaped by the *Tonga Strategic Development Framework 2011-2014 (TSDF)*. The TSDF is the Kingdom's principal document for setting economic and social development objectives. It sets the following development vision for the Kingdom:

“To develop and promote a just, equitable and progressive society in which the people of Tonga enjoy good health, peace, harmony and prosperity, in meeting their aspirations in life”.

More specifically, the TSDF highlights “dynamic public and private sector partnership as the engine of growth” (TSDF Outcome Objective 2), and Government’s emphasis on strong inclusive communities, equitable development, and its belief that “all parts of the country should enjoy similar economic and social opportunities, enabling the outer islands and rural development programmes to contribute to national prosperity” (TSDF Objective 1).

Infrastructure and the NIIP play a major part in meeting these TSDF goals. In particular, TSDF Outcome Objective 3 specifies the need for:

“Appropriate, well planned and maintained infrastructure that improves the everyday lives of the people and lowers the cost of business, by the adequate funding and implementation of the National Infrastructure Investment Plan (NIIP)”.

This objective, and in particular the TSDF emphasis on quality of life; inclusive development; access to infrastructure services; affordability, safety and reliability; private sector development; maintenance and asset management; environmental sustainability; and resilience to climate change and natural disasters, provide an integrating framework for the NIIP and identifying infrastructure priorities.

As well as being influenced by the TSDF, the NIIP is also shaped by sector development strategies/plans, including the *Joint National Action Plan on Disaster Risk Management and Climate Change Adaptation (JNAP)*. Together, the TSDF,

NIIP, and sector plans then influence Ministries and Public Enterprises in their corporate and investment planning. The Corporate Plans and the Annual Management Plans of Ministries set out a three-year strategic plan for the Ministry and a one-year management plan for allocation of resources. This aligns closely with the annual budgeting process of Government, and the Medium-Term Budget Framework (MTBF) which incorporates forward projections of aggregate expenditure and revenue. Full implementation of the MTBF is expected for the 2013/14 Budget. A similar process occurs in Public Enterprises where Statements of Corporate Intent play an equivalent role in forward planning and budgeting. The NIIP also provides important information on planned future investments that can be used by the private sector in its planning and decision-making.

Finally, each update of the NIIP is informed by national and corporate investment plans and budgets plus the priorities of the private sector. At this stage the planning loop is completed.

1.4 How to read the plan

The NIIP outlines Government priorities and plans for economic infrastructure for the next five to 10 years and lists priority initiatives planned for this period. The Plan is organised as follows:

- Chapter 2 commences with an analysis of the current situation, economic and social factors that drive the need for infrastructure, the specific challenges for Tonga, and the way that the Government of Tonga intends to respond to these challenges.
- Chapter 3 looks at each infrastructure sub-sector (energy, telecommunications, water, solid waste management, transport) in more detail. It provides an overview of the key developments, challenges, and demand drivers in each sub-sector, and then outlines a set of initiatives (investments, supporting measures) that Government sees as priority areas for the sub-sector. This section also briefly describes the process that was used to determine these priorities.
- Chapter 4 examines broader issues of sustainability (financial, operational, environmental, institutional), safety, and resilience (climate change, natural disasters) that underpin infrastructure development.
- Chapter 5 follows with a discussion of how the infrastructure will be delivered, including demand for infrastructure finance, funding strategy, and partnership arrangements.
- Finally, Chapter 6 of the Plan concludes with a brief description of how it will be monitored and updated. The Government intends that the plan will be regularly updated to reflect progress on implementation of the Plan's milestones and changing needs.

2 The infrastructure challenge

Infrastructure investment responds to the needs and the challenges facing Tonga, and to national social and economic development goals as expressed in the TSDF. The starting point for this NIIP is an understanding of the link between infrastructure and economic and social development; the factors that are driving the need for infrastructure investment in Tonga; and the strategic framework that guides the Government in formulating its response to these challenges. Key demographic and economic indicators are provided in Table 2.1 below.

Table 2.1: Key demographic, economic and sector indicators

Indicator		
<i>Demographic</i>		
Population (2011)	103,040 persons	
- Tongatapu	75,160 persons	
- Outer Islands	27,880 persons	
Average growth rate (5 years to 2011)	0.2%	
- Tongatapu	0.8%	
- Outer Islands	-1.4%	
No. of Households (2011)	18,160	
Average Household Size	5.7 persons	
<i>Economic</i>		
GDP (2010-11)	T\$782 million (USD 453 million)	
GDP per capita (2010-11)	T\$7,600 (USD 4,400)	
Growth in GDP (real terms)	0.8% (2011/12r); 2.9% (10/11r); 3.3% (09/10); 3.2% (08/09)	
Government Budget Surplus/Deficit (%GDP)	0.1% (2012/13e); -3.0% (11/12e); -7.3% (10/11p); -5.3% (09/10)	
Growth in Consumer Prices	6.1% (2010/11); 1.7% (2009/10); 5.5% (2008/09)	
Exchange Rate:	0.545 (USD/T\$: 2010/11 average)	
<i>Sector Contributions</i>		
Key Components of GDP 2010-11	Agriculture, forests and fisheries -	17%
	Commerce, restaurants and hotels -	13%
	Government services -	12%
	Construction -	11%
Key Components of Exports 2010-11	Live animals, animal products -	50%
	Vegetable products -	41%

Sources: Tonga Census 2011; Tonga National Accounts Statistics (Tonga Statistics Department, June 2012 and February 2013); Government of Tonga Budget Statement for year ending 30th June 2013

2.1 The link between infrastructure and development

Infrastructure plays a critical role in achieving the goals of the TSDF because there is a clear and positive linkage between infrastructure, social development, and economic growth. International research provides evidence of this strong, positive association. There is still much to be debated about the size of infrastructure impacts on economic output; short-term versus long-term benefits; which infrastructure categories give the best results; and the influence of certain policies and practices. However, there is consensus that:

- There is a positive correlation between infrastructure and economic outcomes. Investment in core economic infrastructure (such as electricity, telecoms, transport, sewerage, and water systems) produces the largest gains in productivity. Investments in roads and telecommunications typically deliver the greatest social returns.
- Maintenance is less 'visible' but is likely to have a greater positive influence on economic output than new projects.
- When access to core infrastructure has been addressed, the best economic results come from improving efficiency and then from reducing service prices.

This means that well-targeted investment in infrastructure can have significant benefits for economic growth and quality of life. But the reverse is also true. Inadequate infrastructure is a bottleneck to economic activity and also reduces the day-to-day wellbeing of people; their quality of life; and the ability to withstand and respond to disasters. Sustainability is also compromised because resources are used wastefully.

It is also important to assess whether or not existing infrastructure is being used and managed efficiently. When it is not, service coverage, pricing, and quality are all compromised, and the benefits of appropriate infrastructure are not realised. As a result, this NIIP focuses not just on physical infrastructure but also on the way it is used and managed.

2.2 What drives the need for infrastructure investment?

Tonga is generally well-placed in terms of access to basic infrastructure, associated services, and the coverage and capacity of those services. Overall, basic services and service coverage are good, with full national coverage of basic telecommunications and improving; a high level of access to reticulated power and water, and off-grid arrangements in place elsewhere; one of the highest levels of road density in the region; and a strategically located network of ports and airports throughout the country (see Chapter 3 for more details). However, many challenges still remain.

The main priority for the development of Tonga's infrastructure sector is to use infrastructure as a catalyst for improved macroeconomic, social, and environmental outcomes in line with key TSDF objectives, while at the same time, continuing to improve basic services. In other words, to use infrastructure to improve quality of life, underpin economic development, and meet changing needs. This determines the main drivers for continued infrastructure investment and improved infrastructure management in Tonga as presented in the NIIP 2013 – 2023:

- Improved operation and maintenance of current infrastructure to provide basic infrastructure that is appropriate, well planned, and maintained. As well as ensuring access to basic services, there are growing community expectations regarding improving the quality, safety, and reliability of the services provided.
- Improved infrastructure and services in the outer islands to achieve national goals of inclusive growth by developing the country as a whole, in line with TSDF Outcome Objective 1. The small population, multi-island geography, remoteness from markets, and small market size of Tonga creates special challenges for the development and operation of infrastructure in support of these goals,³ and adds significantly to the cost and difficulty of supplying economic infrastructure services throughout the country.
- Leveraging infrastructure as a catalyst and enabling factor for economic growth. In particular, lowering the cost of doing business and creating the enabling environment for the private sector to increase the output of the productive sectors, especially tourism, agriculture, forestry, and fisheries (TSDF Outcome Object 2 and Government Budget Strategy). Tourism, agriculture, forestry, and fisheries activity currently comprises around 30 per cent of GDP and 90 per cent of exports. These sectors rely on access to quality basic services (power, telecommunications, water, waste management, roads) and have a high level of reliance on international/domestic aviation and maritime links. In doing so, the infrastructure sector also creates employment and direct opportunities for private sector participation in construction, maintenance, and management. Government expects the private sector to take an increasing role in the infrastructure sector as part of its economic growth strategy.
- Population trends, especially drift to urban areas and the opportunities arising from new technology (such as online services), are changing the nature and pattern of demand for infrastructure services. The total population of Tonga is around 103,000 and is growing slowly (average of 0.2 per cent per year over the last five years), but the pattern is not uniform. There is a strong trend of urban drift, with the population of Nuku'alofa (especially in urban fringe areas) growing much more quickly than the national average (up to an average 2.5 per cent growth per year in some areas). Around 75 per cent of the national population is now concentrated in Tongatapu. This creates pressure on urban services on Tongatapu and inter-island connectivity.
- Improving the resilience of infrastructure to the impacts of climate change and natural disasters to protect the community and provide a safeguard so that infrastructure services are still available when they are needed most. Tonga averages T\$30 million per year in losses from cyclones and earthquakes and has a 50 per cent chance of experiencing a loss exceeding T\$300 million in the next 50 years.⁴ According to the best available scientific advice, Tonga's climate is changing and infrastructure will need to increasingly cope with more powerful cyclones, more very hot days, and increased rainfall intensity.
- Ensuring that Tonga maintains its compliance with international safety and security regulations in the international aviation and maritime sectors, so that connectivity to international and national markets is not

³ For a general overview of the challenges facing Tonga and other Pacific nations, see Asian Development Bank, *Swimming Against the Tide* (2004).

⁴ From the Pacific Catastrophic Risk Assessment and Financing Initiative (2011).

constrained such as to become a brake on economic development and an impediment to social connectivity. This is particularly critical to development of export-based industries.

These key drivers of demand for infrastructure development and their relative significance for each of the infrastructure sub-sectors are discussed in more detail in Chapter 3.

There is also a wider issue that remains one of Tonga's greatest infrastructure challenges. The role of government in relation to the infrastructure sector is changing. Government has largely moved away from taking responsibility for infrastructure investment and service delivery, to being a facilitator of infrastructure service outcomes. Under current arrangements, all economic infrastructure except roads and outer islands ports, are now under the management and operation of Public Enterprises. This change is consistent with international good practice, but it requires a continuing focus by Government on the policy, legislation, institutional, and regulatory environment that underpins the infrastructure management system. As a result, this Plan takes an integrated approach that considers the need for investment in infrastructure and also the need for continual improvement in infrastructure management and the infrastructure policy environment.

2.3 Strategic framework for infrastructure development

This NIIP represents the Government's recognition of the importance of infrastructure as a catalyst for economic and social development; and a response to the pressures to respond to changing patterns of demand, and continue to improve the quality, sustainability, resilience, and safety of infrastructure in Tonga. The situation is complex, but to guide Government's response to the challenge of infrastructure development and maintain focus on the key issues and objectives, it is important to have a clear vision for developing infrastructure to best benefit Tonga. The TSDF Outcome Objective for the infrastructure sector (Objective 3) provides a starting point:

"Appropriate, well planned, and maintained infrastructure that improves the everyday lives of the people and lowers the cost of business..."

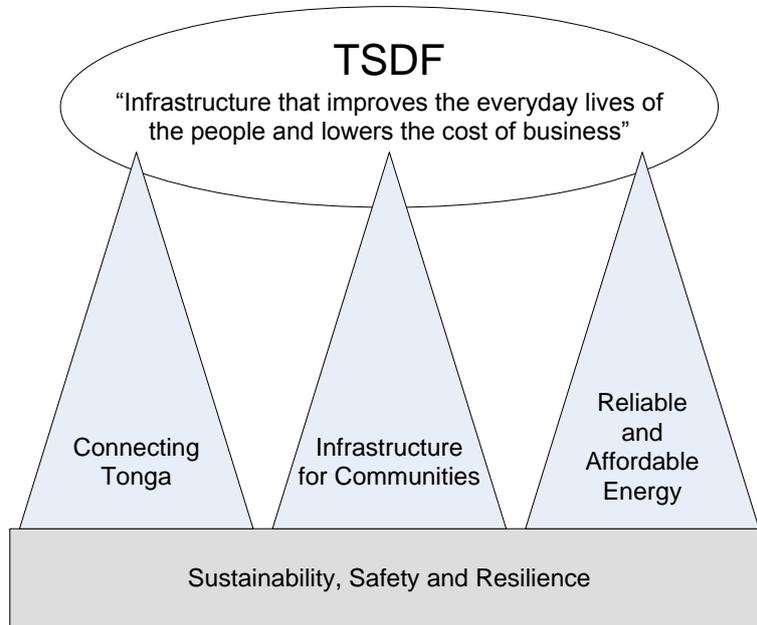
As noted above, this means leveraging infrastructure as a catalyst and enabling factor for economic growth and inclusive development. However, it is important for the NIIP to provide more specific guidance about the reasons for investing in infrastructure and the objectives that Government seeks to achieve. Government's strategic framework for the infrastructure sector can be distilled into three core themes and one enabling theme:

- **Connecting Tonga** – this theme is about connecting people and business to each other within Tonga and internationally through transport and communications links. This connectivity is vital for bringing people, activities, and economic development together, especially in terms of access to international markets and ensuring that all parts of the country share similar economic and social opportunities.
- **Infrastructure for Communities** – this theme is about developing the basic utilities and associated infrastructure services that support vibrant communities and economic development, including electricity, water, sanitation, solid waste management, and drainage. Inadequate basic utilities can be a bottleneck to economic growth, and also reduce the day-to-day well-being of people and their quality of life.
- **Reliable and Affordable Energy** – as well as basic access to electricity, energy supplies need to be reliable and affordable. This theme is about transforming the Tonga energy sector to make it more sustainable in terms of affordability; greater use of renewable energy sources; and reduced reliance on imported fuels. In the longer term, this will also underpin sustainable economic growth.
- **Sustainability, Safety and Resilience** – these qualities are not optional extras, but are an essential part of any infrastructure development. Sustainability, safety, and resilience to climate change and natural disasters provide the foundation that underpins all infrastructure in Tonga. In this context, sustainability means that the infrastructure is affordable on a full life-cycle cost basis (financial sustainability); that the infrastructure assets are properly maintained and managed (operational sustainability); that impacts on the local and global environment are minimised and preferably reduced (environmental sustainability); and that adequate institutional frameworks and capabilities are in place to support the development (institutional sustainability).

These themes and their relationship to each other and the TSDF are shown in the following diagram (Figure 2.1). As mentioned above, the importance of these themes and the overall strategic framework is that they provide a

touchstone for maintaining a clear focus on the rationale and objectives for infrastructure development in Tonga. In a nutshell, **the reason for investing in developing the infrastructure sector is to connect people and business to social and economic opportunities; to provide the basic infrastructure services that support vibrant communities and the economy; and to provide access to reliable and affordable energy, in a way that is sustainable, safe and resilient.**

Figure 2.1: Relationship between themes



3 Priorities for infrastructure development

There is already a substantial amount of infrastructure investment underway, committed or proposed.⁵ At the same time, there are also a range of infrastructure challenges and opportunities that need to be addressed. This part of the NIIP outlines Government's priorities for investment in the infrastructure sector over the next five to 10 years. It provides an overview of the current investment program for economic infrastructure and a summary of priorities for new initiatives for each sector. To provide a more complete picture of investment plans for each sector, it includes Government and Public Enterprise projects.

3.1 How the priorities have been determined

The first priority is to successfully complete projects that are already underway and committed, and to consolidate the infrastructure that we already have through better infrastructure management, use, and maintenance. Government is increasingly adopting a sector-wide approach to planning and improving infrastructure performance, and has several major medium/long-term infrastructure programs that are underway or in preparation (Table 3.1). These programs include:

- Tonga Energy Roadmap (TERM) implementation, which is a diverse and multi-year program aimed at improving quality access to modern energy services; increasing use of alternative (especially renewable) energy sources; reducing vulnerability to external price shocks; and implementing related institutional and regulatory reforms and DSM initiatives (support from multiple development partners).
- Tonga-Fiji Submarine Cable Project (TFSCP), which will develop a communications cable linking Tonga with existing international networks at Fiji, and provide technical assistance and capacity strengthening to improve the regulatory framework (supported by the Asian Development Bank (ADB), Australian Government, World Bank (WB)).
- Nuku'alofa Urban Development Sector Project (NUDSP), which is implementing high priority investments in urban infrastructure, especially in the water and solid waste sector; and strengthening the policy, planning, and management environment for delivery of urban services, including asset management (supported by ADB and Australian Government).
- Integrated Urban Development Sector Program (IUDSP), which is improving urban infrastructure in Nuku'alofa through high priority road and drainage projects (supported by the ADB).
- Transport Sector Consolidation Project (TSCP), which is supporting development of the transport sector through a program of investment in airports, roads, and ports; technical assistance; and capacity building (supported by the WB and Australian Government).
- Pacific Aviation Investment Program (PAIP), which aims to improve operational safety and oversight in the international air transport sector through investment (including resurfacing of Fua'amotu and Vava'u airport runways) and capacity building (supported by the WB).

In addition, there are a large number of smaller economic infrastructure projects already underway or committed.

⁵ In this Plan, a project is defined as *committed* if funding has already been identified and confirmed for the investment and there is a high probability that it will proceed, and *proposed* if it is proposed for future implementation but funding has not been confirmed and timing is less certain. Planned investments include all those project that are underway, committed or proposed.

Table 3.1: Major projects already underway or in preparation in each sector

Project	FY14	FY15	FY16	FY17	FY18	after FY18
Energy (TERM Implementation)	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Communications (TFSCP)	■ ■	□ □	□ □	□ □		
Water (NUDSP)	■ ■	■ ■	■ ■	■ ■		
Solid Waste (NUDSP)	■ ■	■ ■	■ ■	■ ■		
Roads (TSCP, IUDSP)	■ ■	□ □	□ □			
Airports (TSCP, PAIP)	■ ■	■ ■	■ ■	■ ■		
Maritime (TSCP)	■ ■	□ □	□ □	□ □	□ □	

■ ■ Underway
 □ □ Follow-up project under preparation or discussion

These ongoing projects provide a foundation for improving economic infrastructure over the next five to 10 years, but will not address all of the current and emerging challenges. Therefore, additional investment and related initiatives will be required where it is needed, is affordable, and will deliver benefits to the economy and community.

Priorities for additional projects over the next five to ten years were identified through a process of consultation and analysis. The first step was to carry out an analysis of the current status of infrastructure and services, and assess demand for new infrastructure. The second step involved consultation with infrastructure managers (Ministries, Public Enterprises) and users (community and private sector) to identify a long list of proposals for infrastructure projects and related initiatives that address current deficiencies and emerging infrastructure needs. These project ideas were then refined in discussions with infrastructure managers to ensure that the project objectives, concept, and likely costs were clearly identified. This process generated more than 40 proposals for new major projects that would improve the national infrastructure system at a total cost estimated to be around T\$500 million.

However, with available financial resources and implementation capacity it will not be possible to deliver all of these projects over the next five years. Therefore decisions needed to be made about investment priorities. The long list of proposed projects was progressively screened to identify projects that are strongly aligned with national goals; planned to proceed in the next five years; and which deliver strongest benefits to the Tongan people. The first test checked whether each project concept is aligned with TSDF goals and MDGs; and is consistent with the relevant sector and corporate plan. Projects that demonstrated a high level of strategic alignment were retained and moved forward to the next stage in the screening process. The next step was to set aside all projects that are not planned to commence in the next five years. The timing of projects beyond five years is less certain and in most cases, these longer-term proposals are still in the development phase.

The remaining proposed projects were then assessed using a formal multi-criterion assessment (MCA) methodology which ranked the projects according to their performance against criteria linked to key TSDF outcome objectives.⁶ The criteria included economic (access to markets; effect on the cost/quality/capacity of infrastructure services); social (access to social opportunities and interaction; effect on service coverage/ quality/reliability/safety); environmental (effect on soil/water/air/ecosystems); climate change and disaster management factors (climate change adaptation/mitigation, CCA/DRM resilience); and sustainability (financial, technical, institutional). The starting point for the selection and weighting of criteria for the multi-criteria assessment was a review of the criteria and weights used in NIIP2010. The review considered developments since the preparation of NIIP2010, most notably the release of the TSDF 2011-2014 and Government's new strategic vision and priorities as described above.

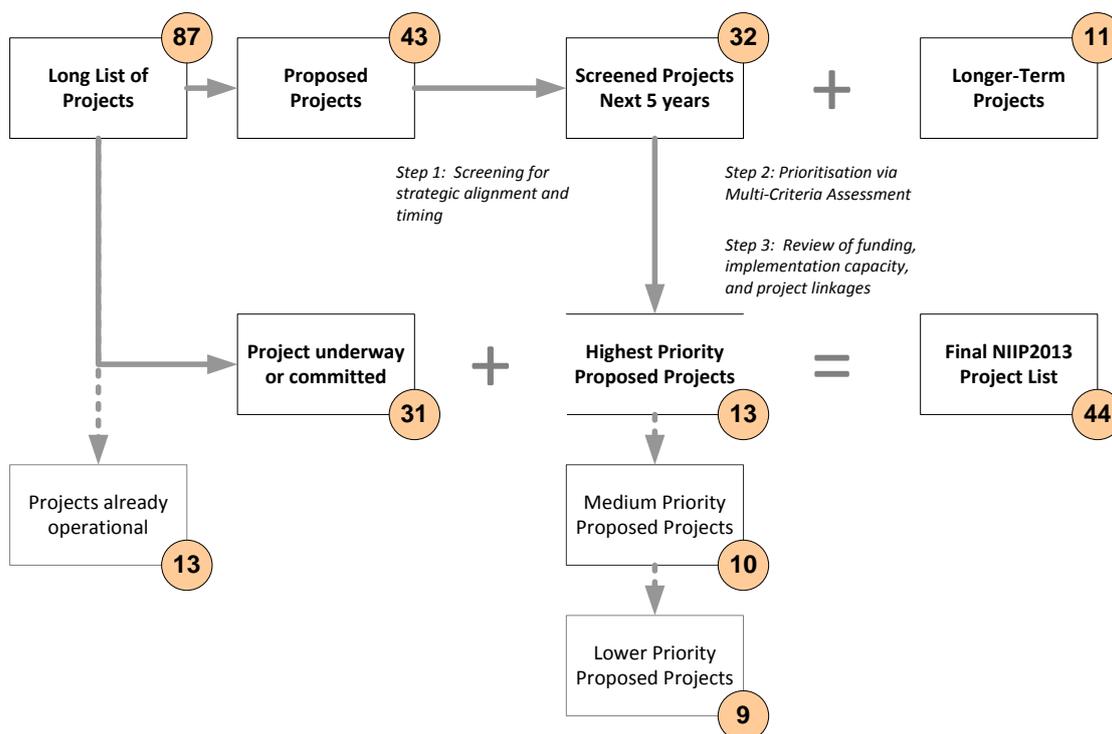
The major changes introduced in the criteria used in this NIIP were the addition of a headline criterion dealing specifically with climate change adaptation and disaster risk management, and broadening the scope of the readiness headline criterion used in NIIP2010 into a project sustainability headline criterion, with financial, technical and institutional dimensions. The review also considered the weighting attached to each criterion, with the aim of simplifying the weightings, better reflecting the balance of economic, social and environmental objectives of TSDF, and the need for project sustainability. In summary, the headline criteria and weightings used in the multi-criteria assessment were:

⁶ MCA provides a rapid appraisal for screening projects, but for all projects, detailed feasibility/economic/financial evaluation will be required to confirm their value-for-money before a final commitment to investment.

Economic	30%
Social	30%
Environmental	10%
Climate change / DRM	10%
Project sustainability	20%

As noted above, it will not be possible to deliver all of the proposed projects over the next five years. The last step was to divide the projects into high/medium/lower priority bands based on the results of the MCA and considering potential availability of finance (see Chapter 5 for more details); implementation capacity (both in relation to the institutions responsible for the projects and those implementing projects, in particular the construction sector); and potential linkages and synergies among projects. The overall process used to identify infrastructure priorities is shown in Figure 3.1.

Figure 3.1: Preparation of the NIIP project list



The outcome is 13 high priority proposed projects (Table 3.2) that are:

- planned to commence within the next five years and have strong alignment with the objectives of the TSDF;
- sustainable in terms of having adequate financial, technical, and institutional structures in place;
- expected to deliver the highest levels of economic/social/ environmental/resilience benefits to Tonga;
- consistent with available financial resources and implementation capacity.

The 13 priority projects have no confirmed source of funding and represent Government’s priority aspirations for additional infrastructure development over the next five years. In conjunction with ongoing and committed projects, they form the basis for strategies for each of the infrastructure sectors over the next five to 10 years. More details on each of these projects are provided in the following discussion of priorities for each sector. Note that each specific investment project has a reference code (such as E11) that is used to track the projects and the same code number is used throughout the NIIP.

Table 3.2: Highest priority proposed projects

Sector	Ref	Project	Estimated		FY2014-18
			Cost	T\$	
			x million		
Energy	E11	Additional 1-2MW of Solar PV on Tongatapu	24		
	E16	Outer Islands On-Grid Renewable Energy Project	9		
Telecoms	T9	Fibre-Optic Cable to Ha'apai and Vava'u ⁷	30		
	T10	Communications for Early Warning and Disaster Recovery	6		
Water	W3	Outer Islands water supply improvements	15		
	W4	Expand Nuku'alofa system to growth areas	11		
Solid Waste	S6	New Landfill or Transfer Station on Ha'apai	4		
Roads	R10	Outer Islands Roads Upgrading Program	10		
Ports	P9	Maritime Sector Safety and Resilience	20		
Airports	A11	Resurfacing Ha'apai Airport runway, apron, taxiway	9		
	A12	New Control Tower at Fua'amotu International Airport	7		
Multi-sector	M2	Coastal Protection - Eastern Tongatapu	15		
	M4	Disaster Response & Evacuation Infrastructure	12		
Sub-total – High Priority proposed projects			172		
+ Projects Underway			100		
+ Committed Projects			73		
TOTAL			T\$345		

The total package of investment priorities (underway, committed, proposed) of T\$345 million is smaller than the NIIP2010 priority program, which amounted to some T\$480 million. This reflects the unusually high level of infrastructure investment in the last five years. Government also intends to achieve a balance of new investment at a sustainable level, consolidate of existing infrastructure, and ensure that all parts of the country as much as possible share similar economic and social opportunities. For these reasons, the proportion of new investments in outer islands is higher compared to the previous NIIP, and the overall balance of investments of ongoing and new projects is about 70 percent in Tongatapu versus 30 per cent in the Outer Islands, which is close to the number of people living in the respective areas.

The investment projects listed in Table 3.2 are Government's highest priorities based on currently available information. However, it is recognised that needs change and new opportunities arise. When promising projects and activities are identified between each update of the NIIP, these projects will be analysed by the Government using a prioritisation methodology. In this way, the chances of developing projects that are not consistent with good planning principles used in this NIIP will be reduced significantly.

3.2 NIIP is an integrated strategy

The priority investment projects cannot be considered in isolation because 'hard' infrastructure cannot be separated from its supporting framework of 'soft' infrastructure (institutional/policy/regulatory/legal/financial/planning/training and capacity building). In addition, some projects rely on other initiatives happening first or at the same time so that they can deliver their full value.

As a result, the NIIP priorities for development of the economic infrastructure sector extend beyond investment projects. **The NIIP is an integrated program of investment projects and supporting complementary initiatives.** These complementary initiatives are mostly non-infrastructure measures that support the investments and will lead to achieving better long-term and sustainable value from the investments.

Taking into account all these factors, the overall NIIP priority program for each sector has four components:

- major projects and initiatives already underway or committed;
- proposed investment projects that are assessed to be a high priority;
- complementary initiatives that support these projects and their life cycle management; and
- linked projects that work in conjunction with or rely on another initiative (priority project, complementary initiative) to enable the full benefits to be realised.

Some of the priority measures relate to cross-sectoral issues, while others are specific to a particular sector. For convenience, the integrated strategy for development of the economic infrastructure sector as a whole is presented in

⁷ This project is linked to a proposed extension of the fibre-optic cable from Tonga to Samoa.

the following sections in two ways: firstly, on a sector-by-sector basis (energy, telecommunications, water, solid waste, transport, multi-sector), and then in terms of the cross-sectoral themes linked to the NIIP strategic framework described above.

3.3 Priorities for each sector

For each sector, the priorities are presented in a consistent way, starting with a brief overview of the current situation and initiatives already underway; then a discussion of the key challenges driving the need for investment in the sector; and concluding with a description of the integrated strategy of priorities for the sector. These priorities are also tabulated in Appendix A which provides a Summary Strategy Matrix for the NIIP.

ENERGY

Current status and ongoing programs

Tonga has one of the highest levels of access to electricity in the region with around 85 per cent of the population on-grid and high levels of supply reliability. But at the same time, Tonga has historically had one of the highest costs of electricity in the region.⁸ In part, this was a result of Tonga's almost 100 per cent reliance on diesel-powered generation for on-grid services. System losses were also high at around 17-18 per cent in 2011 but are coming down and are expected to be reduced to around 14 per cent by 2013, and reduce further to around 10 per cent through network improvements. This is more consistent with international benchmarks.

The energy sector is in a phase of rebuilding and transformation. Tonga Power is investing heavily from its own resources to rehabilitate the electricity generation and supply system to increase efficiency and safety; and is working with development partners (the Australian Agency for International Development (AusAID), European Union (EU), New Zealand Aid, and the WB) to upgrade village power supply systems and off-grid supply (Japan International Cooperation Agency (JICA)). It will be important to continue these initiatives as part of overall measures to increase efficiency and reduce the cost of electricity. At the same time, initiatives are underway to transform electricity production with a move towards greater stability and self-sufficiency. In 2009, Government responded to the twin challenges of reducing the Tongan contribution to global Greenhouse Gas (GHG) emissions and improving national energy security by endorsing a policy of 50 per cent of energy from renewable resources. This is a challenging target providing a clear indication that environmental sustainability and reducing the vulnerability of the country to future oil price shocks are key Government objectives. Renewable energy is a major element of the strategy to enhance energy security for the Kingdom.

Government's response to this target is set out in the *Tonga Energy Road Map (TERM) 2010-2020*.⁹ A number of projects are already underway that contribute to meeting the renewable energy target and TERM objectives. These include installation of a 1.3 MW solar generation facility on Tongatapu (with assistance from the New Zealand (NZ) Government); an on-grid solar generation facility on Vava'u (with assistance from Abu Dhabi); investment in off-grid solar power systems for households in outer-islands (with support from the Japanese Government); research into other sources of renewable energy (such as wind power, tidal power, producing bio-fuel from coconuts, etc); and investigation of options for stabilising and potentially reducing the cost of petroleum fuels by measures such as hedging and/or improving the fuel supply chain.

Challenges

Reducing the cost of doing business, improving the quality of life of people, and Government's commitment to addressing climate change are driving the need for improved energy infrastructure. Under current conditions, Tonga has sufficient generation capacity to meet current demand¹⁰ and growth in demand is not a major factor driving the need for investment in the short-medium term. As noted above, Tonga has historically had some of the highest costs of electricity in the region as a result of a high level of reliance on imported petroleum and past under-investment in the distribution network. This has a negative impact on business costs and on household budgets. In addition, the high level of reliance on imported petroleum creates energy security and price stability issues. The major challenge in the Energy sector is to diversify sources of energy and improve energy efficiency by rehabilitating and upgrading the distribution network to provide reliable, sustainable, safe, and affordable energy to households and businesses in Tonga.

⁸ Pacific Power Association, *Performance Benchmarking for Pacific Power Utilities- Benchmarking Report 2011(2012)*.

⁹ World Bank, *Tonga Energy Road Map 2010-2020* (2010).

¹⁰ As measured by capacity factor, see Pacific Power Association, *Performance Benchmarking for Pacific Power Utilities- Benchmarking Report 2011*.

Priority initiatives

The energy sector in Tonga is responding to this challenge. TPL is heavily investing from its own sources in improvements in the distribution network and in replacing old and inefficient generation capacity. In addition, the TERM outlines a range of investments and supporting initiatives. The major priorities for additional investment in the Energy sector are:

- an additional 1-2MW of solar generation capacity on Tongatapu (E11 - T\$24 million); and
- solar generation capacity on outer-islands (E16 - T\$9 million).

These priority investments continue and will accelerate the program of installing on-grid solar electricity generation and extend renewable energy generation to outer islands. This is supported by complementary measures and linked investments. The complementary initiatives involve implementing TERM initiatives, in particular:

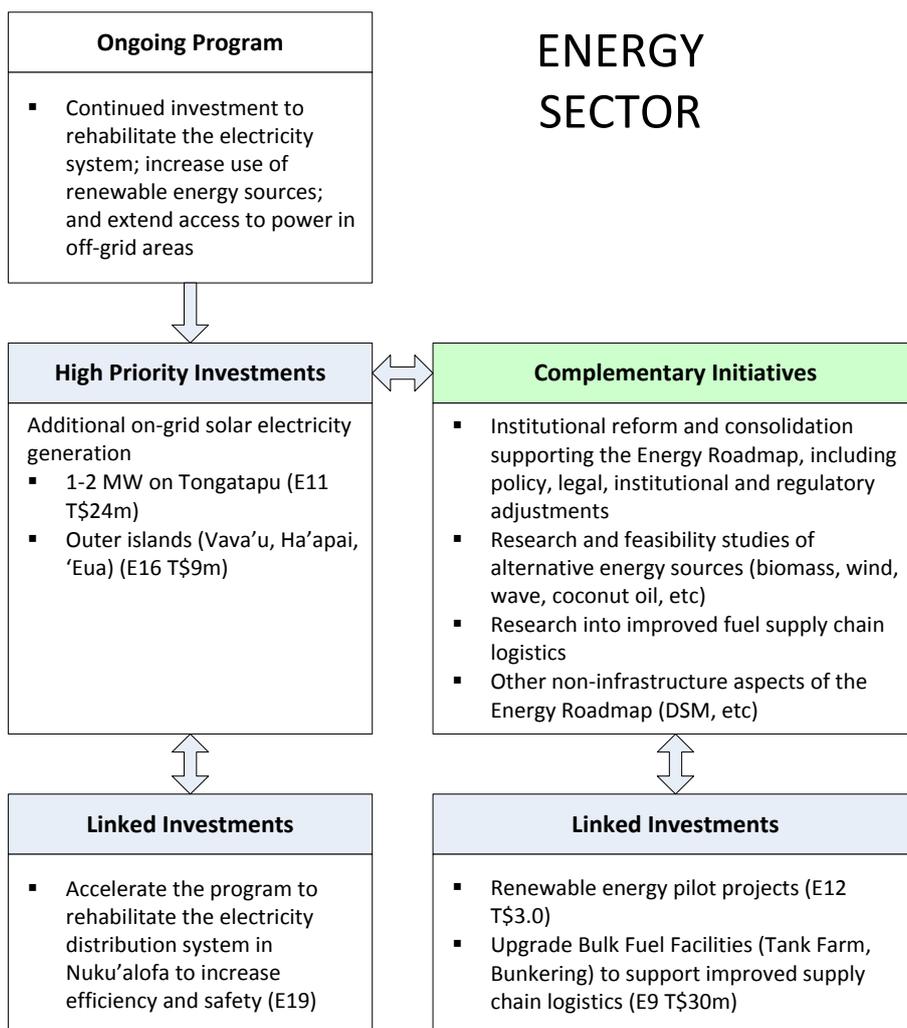
- technical assistance for institutional reform and consolidation in the energy sector, including policy, legal, institutional and regulatory adjustments;
- data gathering, resource assessments, and technical studies into options for diversifying energy sources, especially renewable energy options such as biomass, wind, wave, hydropower, etc. Depending on the outcome of research into these alternative renewable sources, the next step would be pilot plants to validate the concept. This is expected to require investment of an estimated T\$3-5 million for initial trials;
- end-use efficiency and DSM initiatives (such as energy awareness, energy efficient lighting, and appliances, etc) aimed at reducing inefficient use and waste of electricity; and
- initiatives to stabilise and potentially reduce the cost of fuel by measures such as hedging and/or improving the fuel supply chain. If the studies find that expanding the fuel storage capacity at Nuku'alofa is required, this would require investments estimated at around T\$30 million.

Linked investments are also required to accelerate the process of rehabilitating and improving the electricity distribution network (power lines, power poles, customer connections) to increase efficiency and safety, and reduce maintenance and operating costs. The relatively large number of existing connections and degraded state of the network make Nuku'alofa a priority for grid rehabilitation.

The Energy sector has been identified as one of the infrastructure sectors at greatest risk from the impacts of climate change and natural disasters. In the longer term, consideration will have to be given to initiatives to reduce this vulnerability, for instance by moving bulk fuel storage facilities on Tongatapu to a new location outside of the tsunami and storm surge risk zone, and by relocating power lines to critical infrastructure (such as hospitals) underground to reduce vulnerability to natural disasters.

The priority program for the Energy sector is summarised in Figure 3.2.

Figure 3.2: Priority program for the energy sector



TELECOMMUNICATIONS

Current status and ongoing programs

Tonga is well positioned in terms of access to basic telecommunications services. Mobile phone and internet services are already available throughout the country, including smaller and more remote communities. Around 70 per cent of households have a fixed line connection and there are more than 50,000 mobile phone customers (equivalent to an average of three mobile phones per household). The completion of an undersea fibre-optic link to Fiji, scheduled for 2013, will deliver a step-change in speed, capacity, and quality that will redefine telecommunications in Tonga; offset some of the geographical disadvantage experienced by the country; and create new economic and social opportunities. In addition, TCC is investing from its own resources in local reticulation of broadband internet, and local telecoms infrastructure and services (telephone, radio, internet) are being progressively improved by TCC and Digicel to accommodate emerging applications (such as mobile internet, multi-media, and interactive applications), and to improve coverage in less-populated islands. As a result of these developments, internet use is expected to grow rapidly in the short-medium term, especially through the upgraded mobile phone network. Competition and private sector involvement in the telecommunications sector has been a strong force driving these developments.

Challenges

Business and social connectivity and reducing the cost of doing business are key factors driving the need for improved telecommunications infrastructure. As noted above, high standard telecommunications can offset some of the geographical disadvantage experienced by Tonga and increase the international competitiveness of Tongan business, for instance in the tourism industry.

In addition, telecommunications also serves a vital role during natural disasters and other emergency situations. In particular, AM radio continues to play an important role in sending messages to outer island communities including information about scheduled arrivals of shipping and airline services. It also has a critical role in broadcasting regular weather reports and cyclone and tsunami warnings, and during disaster recovery. Some of the infrastructure supporting this role is currently in locations that are at high risk from natural disasters and flooding. A major challenge facing the telecommunications sector is the continuation of reliable AM radio coverage throughout the country under all conditions; as well as strengthening the CCA/DRM resilience of other telecommunications media, such as the mobile phone system.

Priority initiatives

In addition to initiatives already underway and committed, Government's priorities for investment in the Telecoms sector are:

- extension of the undersea optic fibre cable to Ha'apai and Vava'u (T\$30 million); and
- strengthening the resilience of AM radio in its communications role for early warning and disaster recovery (T\$6.0 million).

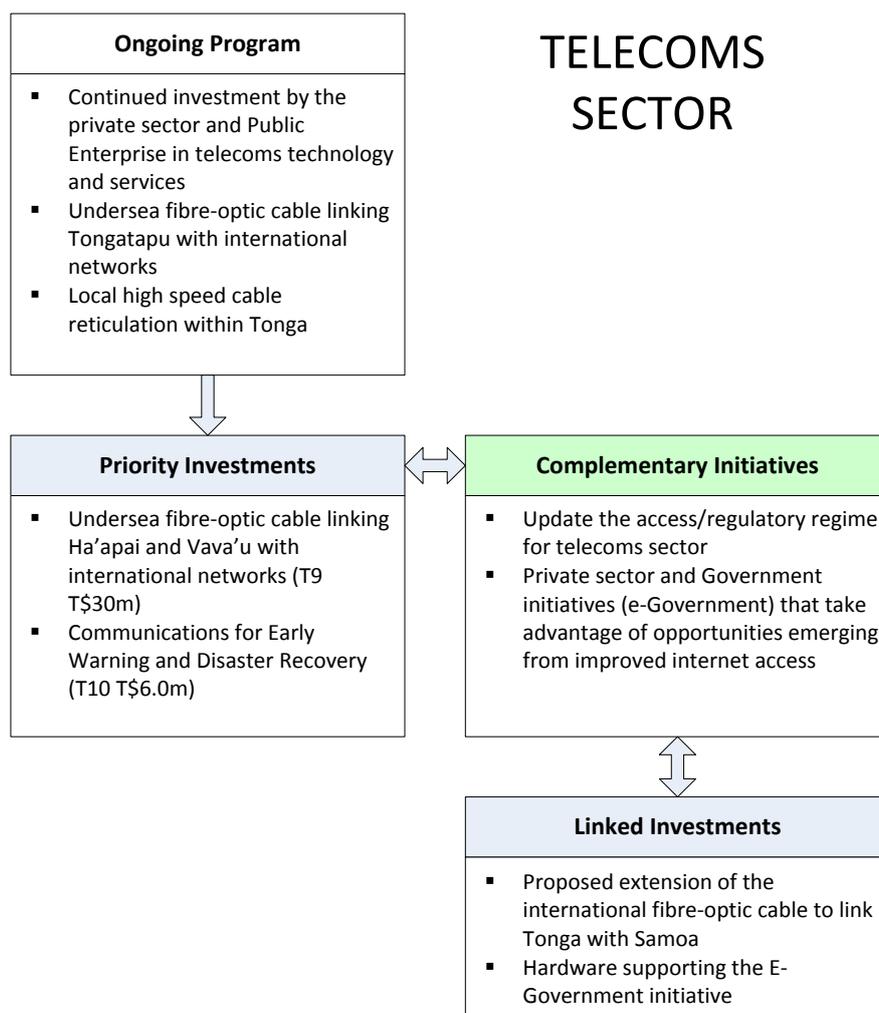
Government supports proposals to extend the international fibre-optic cable link to Ha'apai and Vava'u as soon as possible so that these northern island groups can share the economic development and social benefits of improved telecommunications within Tonga and internationally (estimated cost T\$30 million). This project is linked to a proposed extension of the international undersea cable from Tonga to Samoa. If this extension materialises, Government is eager to use that opportunity to link the two island groups. If the link to Samoa will not be implemented, additional feasibility analysis will be necessary to identify the feasibility of this project.

Government recognises that this project needs to be part of a broader and commercially viable telecommunications network strategy that builds on the experience that will be gained from maximising the potential of the undersea cable connection to Tongatapu. In addition, there are two complementary initiatives that support the fibre-optic cable links and high-speed internet distribution. These are firstly, the establishment of an appropriate regulatory and access regime for wholesaling of high-speed internet access; and secondly, follow-up private sector and Government initiatives that build on opportunities emerging from improved internet access, such as e-commerce and e-government services. These follow-up activities are critical to maximising the national economic benefits from investment in the cable.

The second investment priority in this sector is upgrading the resilience of the AM radio system in its role as an early warning system for cyclones and in providing vital information during disaster recovery. This involves the construction of a new transmitter tower on Vava'u (estimated cost T\$3.0 million) and climate-proofing of transmission facilities and studios in Tongatapu and Vava'u (estimated cost T\$3.0 million). A new transmission tower on Vava'u would address reception problems on northern islands, especially during cyclones and emergency situations. It will also provide a backup for the AM transmission tower on Tongatapu and provide resilience to AM system damage during natural disasters. The location of existing TBC studios and transmission equipment, especially on Tongatapu, is vulnerable to flooding from heavy rain and tsunami. Climate and disaster proofing of TBC facilities on Tongatapu and Vava'u is important for continuity of operation during natural disasters and in its everyday role in providing community information services.

A summary of the priority program for the Telecommunications sector is provided in Figure 3.3.

Figure 3.3: Priority program for the telecommunications sector



WATER AND SANITATION

Current situation

All Tongans have access to clean drinking water and around 85 per cent of households have reliable and continuous piped water supply. The TWB has sufficient production capacity from its well fields to meet demand. So in terms of meeting the MDGs and providing basic access to clean water, the water sector is performing well. However, problems exist in the efficiency of water supply, and a major challenge facing the reticulated water supply system is to reduce water losses. Significant progress has been made and current levels of non-revenue water¹¹ vary from 15-40 per cent, and average around 26 per cent overall. This compares to benchmark levels of 20-30 per cent achieved by some developing countries in the Asia-Pacific region and 10 per cent in developed countries.¹²

Ongoing projects in the water sector focus on reducing water losses and upgrading the efficiency of the Nuku'alofa water supply and distribution system under the NUDSP project. Additional programs include expert technical advice supported by the Government of Japan; upgrading village water supplies throughout the country; and upgrading the Neiafu water supply system on Vava'u. The TWB is implementing these projects in association with development partners.

¹¹ Non-revenue water is an important measure of efficiency. It refers to the difference between system input volume and the billed or authorised consumption, and includes un-billed consumption from faulty meters, illegal connections or under-billing as well as physical losses from leakages and overflows.

¹² Pacific Water and Wastes Association, *Benchmarking Report 2011* (2011); Asian Development Bank, *Asian Water Supplies: Reaching the Urban Poor* (2003).

Challenges

The need for infrastructure investment in the Water sector is driven by population trends; household consumption patterns; health and quality standards; and efficient management of valuable water supply resources. As noted above, the total population of Tonga is growing slowly (average of 0.2 per cent per year over the last five years), but the pattern is not uniform. In particular, the population of Nuku'alofa, especially in urban fringe areas, is growing much more quickly (up to an average 2.5 per cent growth per year). This creates a significant challenge for the TWB to keep pace with demand for system coverage and water quality in the Nuku'alofa system, whilst simultaneously monitoring and safeguarding water sources. Population growth on outer islands has not generated the same pressure, but similar challenges exist to improve water management, safeguard water quality, and improve the resilience of water supply systems to climate change.

Another challenge is reducing loss and waste of valuable water. The TWB is already working to reduce water losses and upgrade efficiency throughout its water supply and distribution system. There is also an opportunity for the TWB and village water supply managers to be proactive in promoting responsible use of water through DSM initiatives similar to the energy sector. This may involve measures such as reducing waste and leakage of water in houses; encouraging or mandating the use of water-saving fittings; and awareness campaigns that build an understanding of water as a scarce and valuable resource.

In many countries, the water sector also includes sanitation and drainage as part of the overall water cycle. Although Tonga does not currently have a central sewerage system in any urban area, important issues relating to disposal of grey water and septage (sludge pumped from septic tanks) are emerging and are likely to require a coordinated response in the short-medium term. As a partial response, a grey water collection system has been installed in central Nuku'alofa as part of the CBD redevelopment project. Sanitation is a growing challenge and an area where Government is planning to place greater emphasis in the future. In particular, there is an urgent need to develop a better understanding of current and emerging sanitation problems and issues, and options available for responding to these issues. A similar situation exists with drainage. Addressing the challenges of improved drainage, especially in the Nuku'alofa area, requires a better understanding of problems and available responses, a coordinated approach, and greater clarity on institutional responsibilities.

Priority initiatives

The priority program for the Water sector addresses these key challenges. In particular, the priority new investments are to:

- rehabilitate and expand the water systems on Vava'u, Ha'apai, 'Eua, and Niuafu'ou (wells, filtration, storage, distribution, etc) under an Outer Islands Water Supply Improvements Program (T\$15 million); and
- expand the Nuku'alofa water supply system to peri-urban growth areas of Nuku'alofa (T\$11.4 million).

The proposed outer islands water supply improvements will provide benefits to communities and businesses in terms of improved quality and reliability of water supply, and reduce the cost of water production. In particular, it will accelerate programs to replace pipes to reduce losses and lower costs; upgrade water treatment and storage facilities; replace diesel with solar pumps on well fields; extend the reticulation network to additional villages; and improve water supplies for around 24 schools and colleges. Where feasible, measures will also be put in place to improve the resilience of the water supplies to climate change and natural disasters. The projects will also include training and capacity building for the TWB outer island branches. In the longer term it will reduce the pressure on existing underground resources and delay the need for additional wells and other new investment.

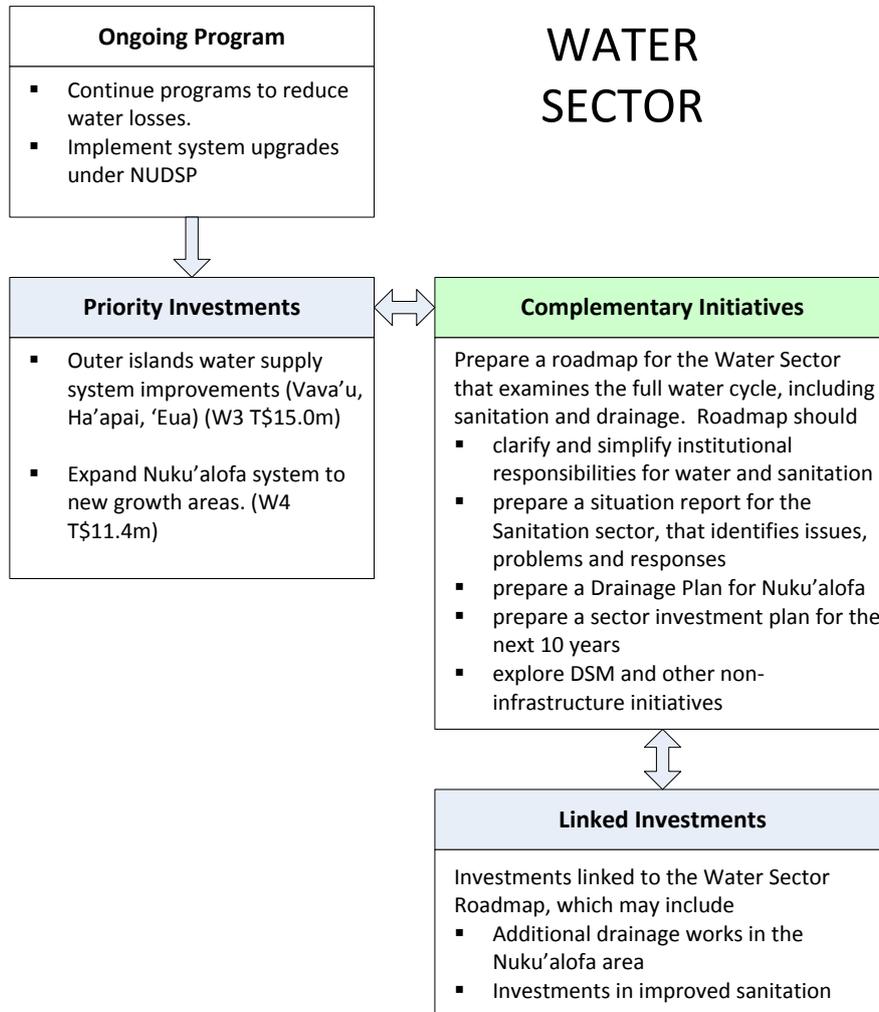
The second priority investment involves expanding the Nuku'alofa water supply. This will bring existing settlements on the edges of Nuku'alofa into the water supply system; deliver benefits to residents and businesses in terms of access to improved, reliable water supply; and also enable the TWB to obtain greater utilisation from existing systems. In addition, expanding services in a planned and systematic way can help to shape development in the rapidly growing peri-urban areas in conjunction with other urban planning initiatives, such as under the *National Spatial Planning and Management Act 2010*. Both investment priorities link with TSDf Outcome Objective 3 and Strategy 13, which prioritise "[m]aintaining and expanding access to safe water and sanitation for all communities."

These investments will address urgent gaps and deficiencies in the water sector, but in the longer term a strategic and coordinated approach is required that addresses the full water cycle. The Water sector currently does not have an up-to-date medium-long term development strategy. The preparation of a long-term master plan has been proposed

under the ADB-supported Urban Planning and Management System (UPMS) project and is supported by the TWB. Preparing a Water and Sanitation Roadmap is now a priority. The roadmap should examine the full water cycle, including waste water, sanitation, and drainage because of institutional gaps in these areas; include a long-term agenda for developments and investments in water supply and sanitation nationwide over the next 10-20 years; and a comprehensive drainage strategy for Nuku'alofa and investment plan for the next 10 years.

In summary, the priority program for the Water sector is shown in Figure 3.4.

Figure 3.4: Priority program for the water sector



SOLID WASTE

Current situation

In 2007, a new solid waste collection system was implemented on Tongatapu and the Waste Authority Limited (WAL) was established to take control of solid waste collection and disposal. This includes responsibility for the disposal of sewage sludge at the Tapuhia landfill facility on Tongatapu. WAL provides waste collection services covering all of Tongatapu, but on other islands, formal arrangements for solid waste collection are not in place. Likewise, formal arrangements for sanitary disposal of solid waste are not in place on other islands, except for Vava'u. WAL is progressively improving its performance but continues to require financial support from Government; is unable to fund adequate maintenance; and has a growing maintenance backlog. In addition there are problems with the design of WAL's existing equipment and facilities, and the illegal dumping of waste is an emerging issue.

Several projects are underway with the aim of improving solid waste management on Tongatapu and Vava'u. This includes activities under the NUDSP initiative to improve waste disposal operations at the Tapuhia landfill; improve solid waste collection services on Tongatapu; and strengthen WAL's financial and asset management systems and

capacity. On Vava'u, the existing landfill facility is being upgraded with assistance from the Government of Japan to improve its environmental performance. But this is a temporary measure, because the existing facility is in a vulnerable seaside location. In the longer term, it will be preferable to relocate solid waste disposal on Vava'u to a new site where a fully engineered sanitary landfill facility can be constructed.

Challenges

The need for infrastructure investment in the Solid Waste sector is driven by population trends; household consumption patterns; and health and quality standards. On Tongatapu, urban population growth at levels of up to 2.5 per cent per year in some areas is increasing the demand for collection and disposal services. This is straining the capacity of WAL to meet the demand, especially while WAL is in a rebuilding phase.

On outer islands, the challenge is to provide a long-term solution for sanitary and environmentally-acceptable disposal of solid waste. On Vava'u, current arrangements are not sustainable in the medium-long term; and on other outer islands, formal arrangements for solid waste disposal do not exist. A national, long-term approach to solid waste management is required.

Priority initiatives

Addressing the challenges facing the Solid Waste sector will require a combination of infrastructure investments and complementary initiatives. In conjunction with initiatives already underway and committed, the priority infrastructure investment for the Solid Waste sector for the next five years is:

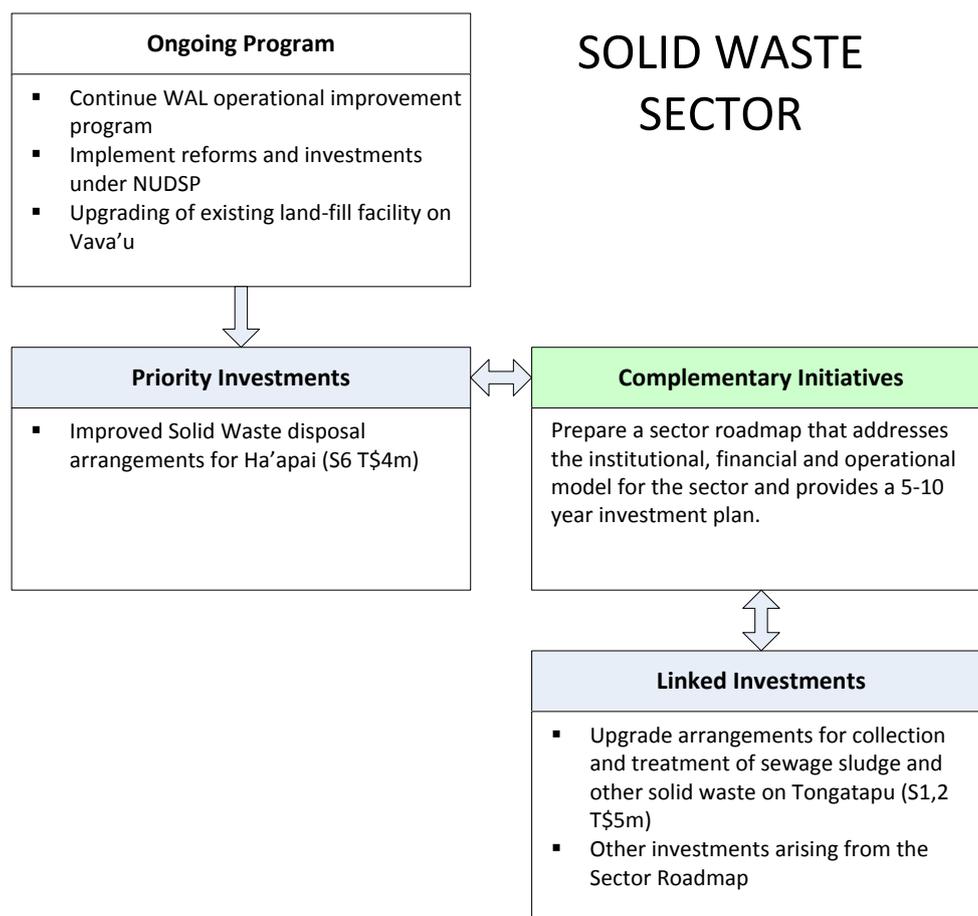
- Improved solid waste disposal arrangements for Ha'apai (T\$4.0 million).

This investment responds to the current lack of formal arrangements for solid waste disposal on Ha'apai and resulting public health and environmental issues, including potential contamination of the water supply. It links with TSDF Outcome Objective 3 and Strategy 12, which prioritises "Improving and where possible expanding the safe collection, disposal and recycling of solid and liquid waste to protect people's health and the environment." Several options have been suggested, including the development of an engineered sanitary landfill on Ha'apai, or establishing a transfer station on Ha'apai then transporting the waste to Tongatapu for disposal in the existing Tapuhia landfill. The first step is to complete a feasibility study of options, and then investment will be required to implement the preferred option. As noted above, investment will also be required in the medium-longer term on Vava'u to provide a long term solution to its solid waste disposal needs.

These investments and initiatives, which are underway as part of the NUDSP, will address urgent problems. However, national, long-term approach to solid waste management is required. Initial work has been done on preparing a (*Draft*) *National Integrated Waste Management Strategy for Tonga*, but it is important now to finalise the strategy and prepare an implementation roadmap. Based on the outcomes of the sector strategy, further infrastructure investment in solid waste management infrastructure is likely to be warranted. These linked investments are likely to include additional steps in the WAL equipment renewal program (septage trucks, compactor, etc); a weighbridge at Tapuhia; and refurbishment/expansion of existing facilities to increase capacity to treat septage at Tapuhia, at total cost of around T\$5.0 million.

In summary, the priority program for the Solid Waste sector is shown in Figure 3.5.

Figure 3.5: Priority program for the solid waste sector



ROADS

Current situation

Tonga's network of roads measures some 650km of which around 40 per cent is paved. Tonga has one of the highest levels of road network density in the region.¹³ This network provides good access links to communities in terms of connectivity, but in some areas the condition of roads has deteriorated significantly due to insufficient emphasis on maintenance.

Government is addressing this problem by implementing several road rehabilitation and upgrading programs in association with its development partners. The National Roads Improvement Project has rehabilitated selected trunk roads throughout the country; the Nuku'alofa Redevelopment program improved roads in the town centre; the IUDSP is upgrading major routes into Nuku'alofa from the south; and some rehabilitation of select road sections has occurred as part of the TSCP. In total, around 150km of roads out of a total network of some 650km have been rehabilitated over the last five years, predominantly on Tongatapu.¹⁴

The TSCP is also trialling a new approach to road maintenance that makes greater use of private sector involvement. Contracts for routine maintenance have been awarded to private firms and are underway. Studies underway as part of the TSCP program provide a strategy for road maintenance over the next five to 10 years, including recommendations for road maintenance programming, institutional reform, and the role of the private sector. In addition to these broader programs, commitments are already in place for specific investments to rehabilitate the Vaipua Bridge (Vava'u) and Foa Causeway (Ha'apai). Furthermore, Government has approved the establishment of a dedicated Road Fund to ensure long term sustainable maintenance of the road network. The Road Fund will be progressively implemented from the second half of 2013, and when fully operational by 2017, is expected to collect around T\$6-7 million per year for spending on routine and periodic maintenance of roads.

¹³ Measured in terms of road length/square km of land area. See: Pacific Region Infrastructure Facility, *Pacific Infrastructure Performance Indicators* (2011).

¹⁴ Of the 150km of roads rehabilitated under these programs, around 133km are on Tongatapu and 17km on outer islands.

Challenges

Roads play a vital role in social and business connectivity. Recent road improvement programs have addressed problems with some parts of the national road network (especially trunk roads on Tongatapu), but other branches of the network continue to be in poor condition, especially outer islands and agricultural roads on Tongatapu. This is exerting a significant negative impact on the cost of road transport; links to market for agricultural and fisheries producers; the tourism industry; and social connectivity. The main challenge driving the need for investment in roads is to accelerate the process of progressively clearing the backlog of road repairs and rehabilitate the road system to a standard where it can be sustainably maintained in a cost-effective way using local resources and expertise. In the longer term, routine and periodic maintenance will be provided under the Road Fund, but many roads have already degraded to a point where urgent intervention is required.

Priority initiatives

Government's priority for the Roads sector is to continue the emphasis on maintenance. This will require investments in road rehabilitation and changes to the way that maintenance is funded and managed. As noted above, Government has already approved the establishment of a Road Fund to finance routine and periodic maintenance of roads. In addition, it is important to consolidate the role of the private sector in delivering vital road maintenance activities. This is already happening under the TSCP and it is important that these reforms continue.

From an additional investment perspective, the highest priority is:

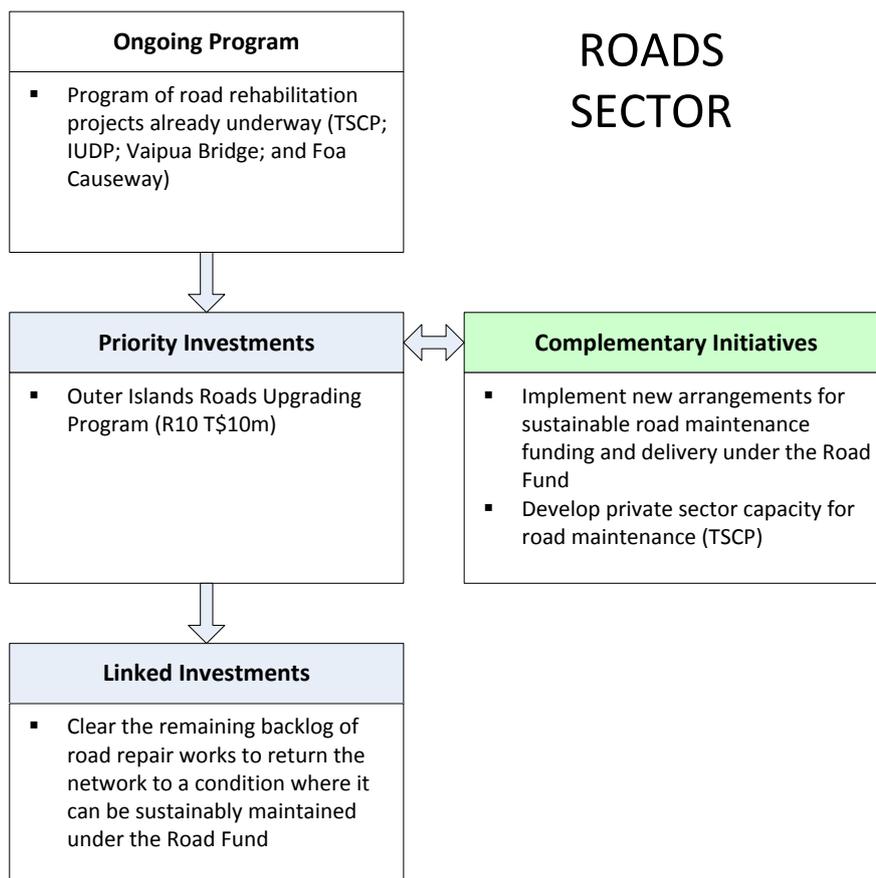
- Outer Islands Roads Upgrading Program (R10 - T\$10 million).

This program would involve rehabilitation and resealing of around 60km of roads on Vava'u, Ha'apai, 'Eua, and Niufo'ou. This will deliver significant benefits in terms of improved connectivity and economic development opportunities (especially for the priority sectors of agriculture, fisheries, and tourism); and will support strong inclusive communities in the outer islands. Priority will also be given to roads that could act as evacuation routes in times of natural disaster, or could be developed to incorporate a coastal protection function. In addition, the rehabilitation will improve the resilience of selected outer islands roads through the adoption of climate-proofing measures. Overall, the outer islands roads upgrading program will ensure that communities in outer islands share in the benefits from road upgrading programs. In the short-medium term, there is also a priority to clear the backlog of road repair works and rehabilitate trunk and agricultural roads on Tongatapu and other roads that were not addressed as part of recent road programs.

In the longer term, Government will continue the emphasis on road maintenance and rehabilitation, and may also consider options for a new road linking Nuku'alofa with the southern side of Fanga'uta Lagoon by bridge or causeway. This road would provide better access to the southern and eastern sides of Tongatapu and the airport, and could provide an alternative evacuation/access route in case of natural disaster. However, it will require detailed technical feasibility assessment, environmental approval, and identification of a suitable funding source. Issues related to evacuation routes in case of natural disasters are addressed further under the Multi-Sector category.

In summary, the priority program for the Roads sector is shown in Figure 3.6.

Figure 3.6: Priority program for the road sector



MARITIME

Current situation

The maritime sector plays a vital role in the Tonga economy and community. It supports tourism; inter-island and international commerce; and inter-island travel for social, educational and medical needs. Based on utilisation estimates from the Tonga Transport Sector Review 2005 and updated in 2012, the existing ports have sufficient capacity for foreseeable needs and there are no plans to build any new ports for commercial shipping operations. In addition, the international ports comply with relevant international and International Maritime Organisation (IMO) operating requirements. Although the port system meets basic needs for coverage, capacity, and compliance, the standard of infrastructure has suffered from a lack of investment in core infrastructure and facilities; and insufficient emphasis on maintenance of outer-island ports and channels.

Recent investments in the maritime sector include Government-funded minor works at all ports necessary for the operation of the new inter-island ferry; upgrading of navigational aids and other port upgrades under the TSCP; and investments by Ports Authority Tonga (PAT) from its own resources in upgrading ship and cargo handling facilities and equipment at Queen Salote Wharf (forklifts, fenders, pavements). The cruise ship terminal at Vuna Wharf (Nuku'alofa) has also been completed and commenced operation in December 2012. Responsibility for implementing these projects is split between the PAT which is responsible for Queen Salote International and Domestic Wharves at Nuku'alofa, and the MOI which is responsible for all other ports.

For the medium-longer term, investment planning for the port sector is less well developed. The sector does not have a current development roadmap, but studies supported under the TSCP are providing greater certainty regarding investment needs for outer-island ports. The PAT is also reviewing its long-term plans for development of Queen Salote International and Domestic wharves at Nuku'alofa. It is important that an integrated approach is applied that enhances the overall safety, efficiency, and resilience of the port system as a whole.

Challenges

Safety is Government's key priority for the maritime sector. Responding to this challenge will require investment in people, systems, and infrastructure. In particular, the arrival of the new inter-island ferry MV *'Otuanga'ofa* has given this service a boost in terms of quality and comfort, but the port infrastructure and shore facilities for passengers and freight are not of the same standard. Maritime training facilities have also suffered from a lack of investment, there is a need to upgrade safety standards and awareness, and rebuild capability in maritime safety oversight. Some of these issues are being addressed as part of the TSCP and other programs, but more needs to be done urgently.

The other major challenge driving the need for investment in the ports sector is building resilience to the impacts of climate change and natural disasters. With sea levels predicted to rise by up to 0.6 metres by 2090 and cyclones expected to become more intense, ports are especially at risk. Ensuring that ports can withstand these impacts and securing continuity of shipping services are high priorities for Government. This is especially important considering the role of shipping in outer islands economies and the critical role played by shipping in post-disaster recovery. It is important to start factoring CCA/DRM into port planning as soon as possible.

Priority initiatives

Government's highest priority for the Maritime sector is increasing the safety and resilience of all maritime activities, especially in relation to inter-island shipping. This will require investments in infrastructure and complementary initiatives to improve capabilities, facilities, and systems. Because an integrated approach is required, the various needs have been packaged into a single high priority investment program:

- Maritime Sector Safety and Resilience (P9: preliminary estimate of T\$20 million, but specific components could be split out as part of an integrated sector program)

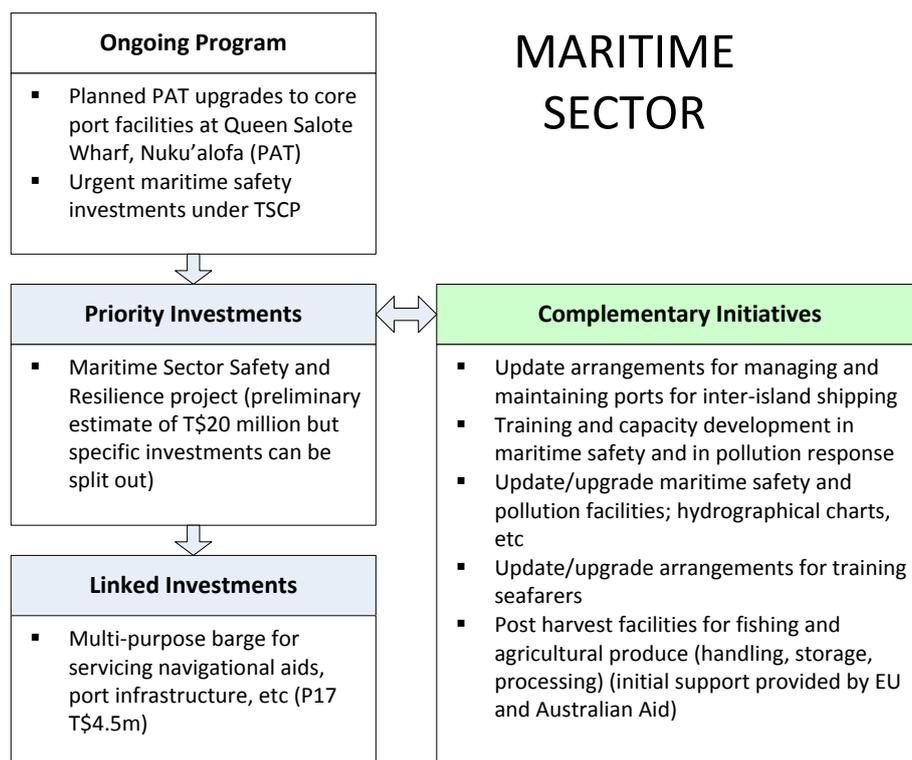
The *Maritime Needs Safety Assessment 2012* prepared under the TSCP provides a starting point, but more work needs to be done to fully define the components of this program. It is expected that investment will be required in the following areas:

- upgrading berths and related shore facilities to be more resilient to climate change and natural disasters, as well as improving safety and facilities for passengers and cargo;
- upgrading navigational aids and channel/mooring markers, and updating hydrographical charts;
- dredging channels and berths to increase safety in all weathers;
- building local capacity and systems for enhanced maritime safety oversight; and
- revitalising local training programs for seafarers and the associated facilities.

The other major priority for the Maritime sector is to update institutional arrangements for managing, maintaining, and financing the outer island ports. As noted above, responsibility for outer islands port operations is with the MOI, but this is inconsistent with the MOI's regulatory role in the maritime sector. The need for improved mechanisms for financing sustainable maintenance of outer-island ports is also a catalyst for reviewing current arrangements. Government is examining a range of options for the institutional structure of the ports system as part of the overall Government Structural Reform process.

In summary, the priority program for the Maritime sector is shown in Figure 3.7.

Figure 3.7: Priority program for the maritime sector



AIRPORTS

Current situation

Aviation also plays a vital role in connecting the Tongan economy and community in terms of tourism; inter-island and international commerce; and travel for social, educational and medical needs. The existing commercial airports provide sufficient coverage to all island groups, and at this stage, there are no plans to build any additional airports. The airports have sufficient capacity for expected growth in passenger demand, but the length and current condition of runways place limits on the operation of larger aircraft and much of the infrastructure is either nearing the end of its useful life or requires upgrade to continue to meet international and national safety and security standards. Tonga already meets required service standards and complies with International Civil Aviation Organisation (ICAO) requirements, or has been granted a temporary exemption from some requirements during a transition period. All commercial airports in Tonga are managed by TAL.

A significant investment program is already underway in the airport sector, with a focus on meeting safety and security compliance requirements in terms of fire and rescue capability, security screening, navigational aids, and runway condition. This includes resurfacing of runways at Fua'amotu and Vava'u, which were priority projects under the first NIIP. The investments are being managed by TAL, with support under the WB-funded TSCP and PAIP programs.

Challenges

Safety, security, and continuity of service are the key imperatives driving investment and reform in the aviation sector. In the medium-longer term, additional investments will be required to maintain compliance with increasingly stringent industry safety and security requirements; to ensure that current aircraft types and new international and domestic aircraft likely to be used on Tonga services can operate safely and without weight restrictions; and to keep Tonga competitive as an exporter and international travel destination.

The other major challenge in the aviation sector is to ensure that a supportive policy and institutional environment is in place for competitive and stable international and domestic air services; and to ensure that the necessary skills and qualifications for effective oversight of international safety and security standards are available in Tonga. This will

require ongoing capacity building to keep pace with aviation market developments; high industry standards; and rapid technology change. Aviation safety and maintaining vital air service connections is a high priority for Government.

Priority initiatives

In conjunction with initiatives already underway and committed, Government’s highest priority investments proposed for the Aviation sector are:

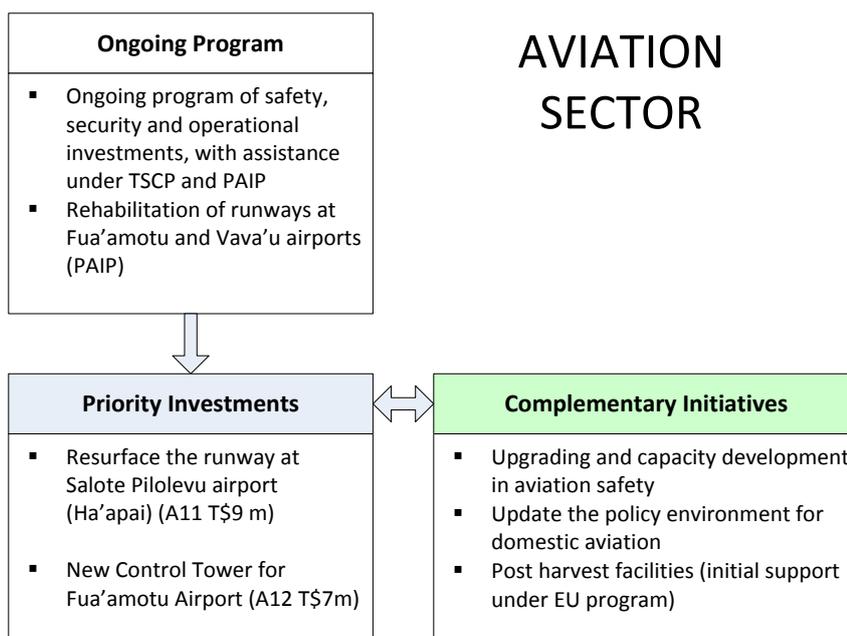
- construction of a new Control Tower at Fua’amotu International Airport (T\$7.0 million).
- resurfacing Ha’apai runway, apron, and taxiway (T\$9.0 million); and

The runway and associated aprons and taxiways at Ha’apai will require resurfacing within the next five years to ensure safe ongoing operations for aircraft types/sizes likely to operate to Ha’apai and for compliance with ICAO requirements. If not resurfaced soon, the continuing deterioration in runway condition will result in operations restricted to small, light aircraft, and eventually closure of the airport. The control tower at Fua’amotu is also in poor condition. It is poorly located relative to the runway and taxiways and lacks up-to-date equipment for communications and aviation traffic management. Construction of a new Control Tower in a new location is a high priority for the next three to five years. These priority investments will complement recent and planned investments in airports and aviation safety by TAL and under the TSCP and PAIP projects. In the longer term, expanding the airport apron and adding new taxiways at Fua’amotu will increase airport capacity and enhance the safety and efficiency of aircraft movements on the ground.

There are several high priority complementary initiatives that support the imperatives of safety and connectivity. Foremost is the need for upgrading and capacity development in aviation safety oversight. It is also important to update the policy environment, especially for the domestic aviation market. Over recent years, inter-island air services have been unreliable and the market unstable with several operators entering and leaving the market. This has adversely affected tourism and access to markets for the outer islands’ producers. Specialist advice supported under the TSCP has developed recommendations on issues such as market entry and regulation. Government will consider these recommendations with the aim of creating a market environment in which stable and reliable inter-island air transport can be assured. The third complementary initiative is to further develop post-harvest facilities (handling, storage, and processing) so that fishing and agricultural produce can be processed and stored for export markets.

In summary, the priority program for the Aviation sector is shown in Figure 3.8.

Figure 3.8: Priority program for the aviation sector



MULTI-SECTOR

Current situation

Multi-sector projects generally fall into two broad categories. The first involves complex construction projects with the need for coordination across several sectors, such as electricity, telecommunications, roads, and water. The Nuku'alofa CBD redevelopment is an example of this type of multi-sector project. It involved upgrading basic infrastructure in the CBD area, including roads, underground power and additional High Voltage supply, drainage, grey water collection system, footpaths, and street lighting. Another example is restoration of basic infrastructure on Niuatoputapu following the tsunami in 2009. Complex multi-sector projects expected in the next five to 10 years include preparation for the Pacific Games 2019 and the planned Government Ministerial Complex.

The second category involves cross-cutting issues, especially CCA and DRM. Government is committed to working with development partners to better manage CCA/DRM risks, and initiatives are already underway to strengthen Government capability in this area and ensure that adequate consideration is given to CCA/DRM issues in infrastructure development. The *Joint Action Plan on Climate Change Adaptation and Disaster Risk Management 2010-2015* (JNAP) has been prepared with assistance from the Global Environment Facility (GEF), Applied Geoscience and Technology Division of the Secretariat of the Pacific Community (SPC-SOPAC), and United Nations Development Program (UNDP), and implementation is underway. In addition, a *Strategic Program for Climate Resilience for the Kingdom of Tonga* has been prepared under the Pilot Program for Climate Resilience (PPCR) process. These documents provide a framework for developing and implementing infrastructure responses to CCA/DRM.

Challenges

Tonga is especially vulnerable to CCA/DRM impacts. Best available scientific advice¹⁵ indicates that Tonga's climate is changing and is expected to continue to change. The greatest risks to infrastructure result from the increase in extremes: more very hot days, increased rainfall intensity, and more powerful cyclones. Coupled with sea level rise and storm surge, this creates significant challenges for the future of infrastructure development. In addition, Tonga is at risk from earthquake and tsunami, and in places, volcanic eruption. The overall challenge is firstly to ensure that potential CCA/DRM impacts are considered in all aspects of infrastructure planning, design, construction, and management; and secondly that Tonga is well-prepared to respond quickly and effectively to disasters when they happen.

Another key multi-sector challenge is coordination of infrastructure construction and delivery of services. As noted above, major infrastructure projects generally have implications for a range of infrastructure services (electricity, water, sanitation, roads, telecommunications), as well as possible environmental impacts. The Nuku'alofa CBD redevelopment is a recent example, and as Tonga develops, infrastructure projects are getting larger and more complex. Even smaller projects such as road rehabilitation can affect electricity and water supply lines and drainage. To avoid delays and inefficiency, Government and Public Enterprises must be ready to respond to these opportunities quickly and in a coordinated way. The challenge also encompasses coordination of infrastructure development with broader spatial planning and urban development. The recent adoption of the *National Spatial Planning and Management Act 2012* is a major Government initiative towards a more systematic and integrated approach.

The third challenge is asset management, and especially maintenance. Even though maintenance is less 'visible', it is more likely to have a greater positive influence on economic output than new investment. Some Public Enterprises have effective maintenance programs in place, but overall, there has been under-investment and insufficient attention to maintenance in the infrastructure sector. The challenge is to look after existing and new infrastructure better through improved maintenance; and to develop a more systematic and effective approach to asset management across the infrastructure sector as a whole.

Priority initiatives

From a capital investment perspective, Government's highest Multi-sector priorities are in building greater resilience to climate change and natural disasters:

- Coastal Protection for Eastern Tongatapu (M2 T\$15 million); and
- Infrastructure to enhance Disaster Response & Evacuation (M4 T\$12 million).

¹⁵ Pacific Climate Change Science Program, *Current and future climate of Tonga* (2011), www.pacificclimatechangescience.org.

The first of the priority investment projects involves rehabilitation and construction of foreshore protection structures along approximately 8km of the north-eastern coast of Tongatapu between Nukuleka and Manuka. It will provide greater resilience against sea level rise, cyclone impacts, storm surges, and tsunamis for six villages with housing and road infrastructure located in close proximity to the shoreline. This location was rated as a very high priority because of its existing high degree of vulnerability to wave action and sea level rise; the proximity of development to the coastline; and the extent of erosion already taking place and degraded state of existing coastal protection. The second project involves a range of infrastructure to support disaster response coordination and capacity and to support community evacuation prior to natural disaster events. It would provide better and more resilient facilities for the National Emergency Management Office (NEMO) and Tonga Meteorological Office (TMO); construction of joint, climate-proof disaster command centres; improved communications through connection of this facility to the underground fibre optic cable that is currently being developed throughout Nuku'alofa; and the infrastructure required to support implementation of the Tongatapu Tsunami Evacuation Plan that is currently in preparation.

There are also a range of priority complementary initiatives designed to improve the performance of the economic infrastructure sector as a whole. These include:

- **Institutional reform to clarify and simplify responsibilities across all sectors.** This is part of the Government's Structural Reform process designed to streamline delivery of Government services, with the aim to reduce costs while improving efficiency. It also has implications for improved arrangements for the coordination of major projects with multi-sector implications. Government intends to strengthen the role of the MOI and the National Spatial Planning Authority as focal points for coordinating the planning and delivery of multi-sector infrastructure projects. Another aspect of this priority is improved monitoring and enforcement of existing standards and requirements. This includes strengthening the EIA system and capacity, and ensuring that legislated environmental management standards are applied to all major infrastructure projects.

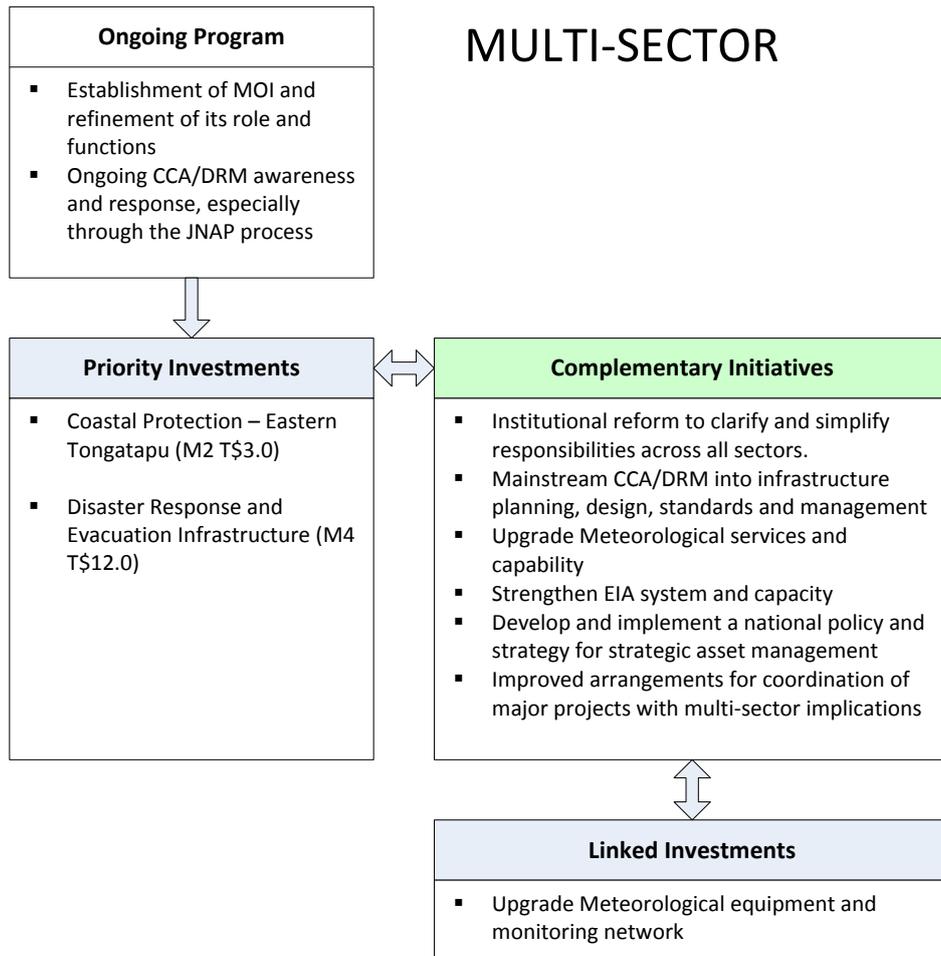
Mainstreaming CCA/DRM into infrastructure planning, design, standards, and management. This priority builds on and enhances initiatives under the JNAP process. An important foundation for this process is the availability of good quality and timely weather and climate data and predictions. Therefore, upgrading Meteorological services and capability is also an important part of this complementary activity.

- **Developing and implementing a national policy and strategy for strategic asset management.** The NIIP is an important step towards establishing asset management as a core function of Government and infrastructure managers; instilling a greater emphasis on maintenance; and incorporating a life-cycle approach to infrastructure management. An important step in this process is the NUDSP project, which will work with the Water and Solid Waste sectors to develop and implement asset management and maintenance systems appropriate for Tonga.

These and other multi-sector priorities are discussed further in the next Chapter in context of discussions about building the foundation of sustainability, safety, and resilience for the infrastructure sector.

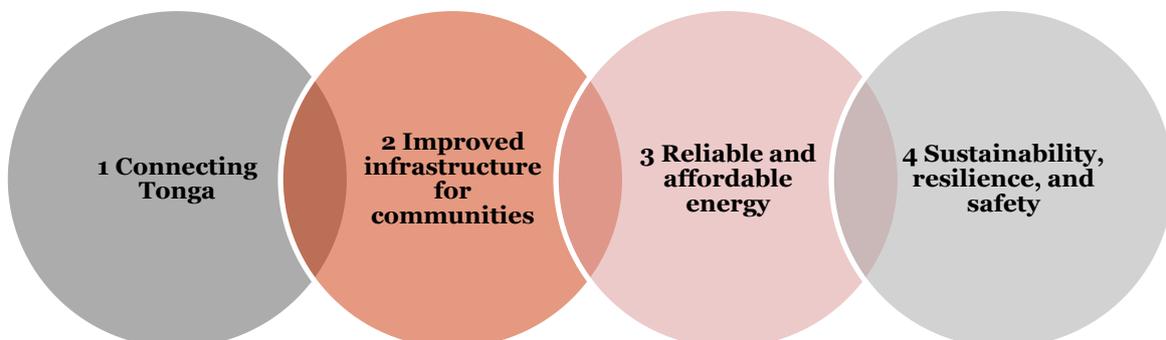
In summary, the priority program for the Multi-sector cluster is shown in Figure 3.9.

Figure 3.9: Multi-sector priority program



3.4 Priorities by strategic theme

Each of the priority investments and complementary initiatives contributes to achieving the goals of the TSDf and the NIIP strategic framework. Table 3.3 shows the key NIIP priorities in terms of their alignment with the NIIP’s four strategic themes:



It highlights that NIIP is an integrated response to the infrastructure challenges facing Tonga, with a balance of initiatives targeted at achieving Government’s key outcome objectives for the infrastructure sector.

Table 3.3: Priorities by strategic theme

Theme	Sector	Priority Investment Projects	Complementary Initiatives
Connecting Tonga	Telecoms	<ul style="list-style-type: none"> T9 - Undersea fibre-optic cable linking Ha'apai and Vava'u with international networks (T\$30m)¹⁶ T10 - Communications for Early Warning and Disaster Recovery (T\$6.0m) 	<ul style="list-style-type: none"> Update the access/regulatory regime for telecoms sector Private sector and Government initiatives (e-Government) that take advantage of opportunities emerging from improved internet access
	Roads	<ul style="list-style-type: none"> R10 - Outer Islands Roads Upgrading Program (T\$10m) 	<ul style="list-style-type: none"> Develop private sector capacity for road maintenance (TSCP)
	Ports	<ul style="list-style-type: none"> See <u>Sustainability, Safety and Resilience</u> theme. 	<ul style="list-style-type: none"> Post-harvest facilities for fishing and agricultural produce (handling, storage, processing) (initial support provided by EU and Australian Aid)
	Airports	<ul style="list-style-type: none"> A11 - Resurface the runway at Salote Pilelevu airport (Ha'apai) (T\$9 m) A12 - New Control Tower for Fua'amotu Airport (T\$7m) 	<ul style="list-style-type: none"> Update the policy environment for domestic aviation Post-harvest facilities (initial support under EU program)
Infrastructure for Communities	Water	<ul style="list-style-type: none"> W3 - Outer islands water supply system improvements (Vava'u, Ha'apai, 'Eua) (T\$15.0m) W4 - Expand Nuku'alofa system to new growth areas. (T\$11.4m) 	<ul style="list-style-type: none"> Prepare a roadmap for the Water Sector that examines the full water cycle, including waste water and drainage. Roadmap should <ul style="list-style-type: none"> - clarify and simplify institutional responsibilities for water and waste water - explore DSM and other non-infrastructure initiatives - prepare a Drainage Plan for Nuku'alofa - prepare an investment plan for the next 10 years
	Solid Waste	<ul style="list-style-type: none"> S6 - Improved Solid Waste disposal arrangements for Ha'apai (T\$4m) 	<ul style="list-style-type: none"> Prepare a sector roadmap that addresses the institutional, financial and operational model for the sector and provides a 5-10 year investment plan.
Reliable and Affordable Energy	Energy	<ul style="list-style-type: none"> Additional on-grid solar electricity generation <ul style="list-style-type: none"> - E11 - 1-2 MW on Tongatapu (T\$24m) - E16 - Outer islands Vava'u, Ha'apai, 'Eua (T\$9m) 	<ul style="list-style-type: none"> Non-Infrastructure aspects of the Energy Roadmap <ul style="list-style-type: none"> - Policy, legal, regulatory reform supporting the Energy Roadmap - Research and feasibility studies of alternative energy sources (wind, wave, coconut oil, etc.) - Improved fuel supply chain logistics - Other non-infrastructure aspects of the Energy Roadmap (DSM, etc)
	Sustainability		<ul style="list-style-type: none"> Institutional reform to clarify/simplify responsibilities across all sectors Develop and implement a national policy and strategy for strategic asset management Design and implement new arrangements for sustainable road maintenance funding and delivery (TSCP)
Sustainability, Safety, Resilience	Safety	<ul style="list-style-type: none"> Maritime Sector Safety and Resilience project (preliminary estimate of T\$20 million but specific investments can be split out) 	<ul style="list-style-type: none"> Update arrangements for managing and maintaining ports for inter-island shipping Strengthen EIA system and capacity Upgrading and capacity development in maritime safety and pollution response Update/upgrade maritime safety and pollution facilities; hydrographical charts, etc Upgrading and capacity development in aviation safety
	Resilience	<ul style="list-style-type: none"> M2 - Coastal Protection – Eastern Tongatapu (T\$3.0) M4 - Disaster Response and Evacuation Infrastructure (T\$12.0) 	<ul style="list-style-type: none"> Mainstream CCA/DRM into infrastructure planning, design, standards and management Upgrade Meteorological services and capability Improved arrangements for coordination of major projects with multi-sector implications

¹⁶ Linked to a proposed extension of the international fibre-optic cable from Tonga to Samoa.

4 Building the foundation of sustainability, safety, and resilience

The Government's strategic framework for the infrastructure sector sits on a foundation of sustainability, safety, and resilience that underpins all infrastructure in Tonga:

- *Financial sustainability* means that the infrastructure is affordable on a full life-cycle cost basis. This is a challenge in countries like Tonga with a relatively small population dispersed over many islands and located at a large distance from markets. As most infrastructure in Tonga is managed by Public Enterprises, the financial performance and management capacity of these organisations is key to the sustainable operation and maintenance of their assets. Any investment proposal will need rigorous economic and financial analysis, based on the whole of life costs of proposed projects. The capacity of Ministries and state-owned enterprises (SOEs) to carry out such analysis needs to be strengthened.
- *Operational sustainability* means making the best possible use of existing infrastructure and ensuring that the assets are properly managed and maintained by applying strategic asset management. The concept of strategic asset management encompasses a life cycle approach and provides a framework for guiding the process of “acquisition, use, and disposal of assets to make the most of their service delivery potential and manage the related risks and costs over their entire life”.¹⁷
- *Environmental sustainability* means that impacts of infrastructure development on the local and global environment are minimised. It is one of the key pillars of the TSDF. The policy and legislative framework for the treatment of environmental issues in the development and operation of infrastructure projects is already in place. Compliance with the environmental sustainability objectives of the TSDF is assessed during the process of obtaining development consent under the *National Spatial Planning and Management Act 2012* and, in many cases, as part of environmental approval under the *Environmental Impact Assessment Act 2003*. Sustainability during the construction and operation phases is managed through the application of the *Environmental Management Act 2010* which sets out processes for the environmental monitoring of projects and penalties for any environmental damage caused by projects.
- *Institutional sustainability* involves having in place adequate institutional frameworks and capabilities to support the development and operation of infrastructure. Significant progress has already been made through the Government's Structural Reform Process, which includes the creation of the MOI as the focal point for policy, planning, regulation, and multi-sector coordination in the infrastructure sector. It also involves developing the technical and management capacity within Ministries and SOEs to plan and manage infrastructure. Finally, it involves providing clear direction on infrastructure priorities by preparing this NIIP and by ensuring that Ministries and SOEs take into account the priority directions and initiatives of the NIIP when framing their Corporate and Annual Management Plans.
- *Safety* for users and operators is paramount in any infrastructure development. The Government has a lead role in developing appropriate national safety standards, and monitoring and enforcing compliance with national and international standards. In the past, insufficient emphasis has been placed on safety in some areas, and in some cases, complacency and inadequate maintenance has led to declining safety standards.
- *Resilience* means that infrastructure is planned, designed and constructed in a way that is adapted to expected climate change over the lifetime of the asset, and on the other hand, that infrastructure is there to help withstand the impact of natural disasters (cyclones, tsunamis, etc).

These aspects of infrastructure development are not optional extras, but are an essential part of any infrastructure development. Government is committed to improving performance in all of these areas. The next section will explain

¹⁷ Department of Treasury and Finance, *Developing Strategic Asset Management Plans*, Department of Treasury and Finance (Government of Tasmania: 2004).

Government's plans and actions to achieve sustainability. Section 4.3 provides more detail on the role of infrastructure in enhancing the resilience of Tonga against climate change and natural disasters.

4.1 Measures for enhancing the sustainability of infrastructure

Infrastructure investment, sustainability, safety, and resilience go hand in hand as parts of an integrated response to improved performance in the economic infrastructure sector. Government can facilitate better outcomes from the infrastructure sector and intends to strengthen its role in coordinating infrastructure management and place a greater emphasis on sustainability, safety and resilience. In particular, the preparation of the NIIP has highlighted a range of specific measures that the Government can take and is taking to achieve better outcomes. These measures include:

National infrastructure planning

- Using the NIIP to provide clear direction and information about Government's infrastructure development priorities, and making sure that it is widely available, both in electronic and printed forms, within Government and to the broader community.

Financial sustainability

- Working with Ministries and Public Enterprises to strengthen their capacity in financial planning; evaluation of the feasibility of proposed infrastructure investments; and preparation of a business case for Government or Board, with full consideration of life-cycle costs. This is part of ongoing initiatives by Government, with assistance from development partners, to strengthen the Corporate Planning process and implement the MTBF.
- Working with Ministries and Public Enterprises to further strengthen financial and cost recovery performance to help ensure that there are adequate financial resources for the sustainable management of infrastructure. Wherever possible, Government considers that infrastructure services should be delivered through a commercial model that fully recovers the cost of operation. The improved financial performance of Public Enterprises and approved implementation of a Road Fund are examples of progress in this area, but striving for improvement in financial performance is an ongoing process. Government, with assistance from development partners, will continue to work with Ministries and Public Enterprises to further strengthen financial performance.
- Retaining a clear commercial focus of Public Enterprises. This includes transparent identification of community service obligations and their funding; careful consideration of Board appointments; and continued monitoring and reporting of financial performance by the Ministry of Public Enterprises.

Operational sustainability

- Promoting the principles of strategic asset management as a framework for an improved approach to infrastructure management by Ministries and Public Enterprises, and facilitating a 'maintenance culture' within organisations that is driven at the Board and CEO level. The NUDSP will be a focus for broader progress in this area. In addition, the Government intends to formalise the imperative for improved asset management by incorporating asset management as a performance indicator for Ministries and Public Enterprises.
- Placing a greater emphasis on reducing the demand for new assets by making better use of existing infrastructure, through measures such as demand management techniques, improved efficiency of service delivery, and consideration of alternative service delivery options. In the long term, this can reduce or delay the need for major infrastructure investment. Strong progress has already been made on improved efficiency of service delivery in the electricity and water sectors, but more needs to be done. The Government will continue to work with Public Enterprises and development partners on further initiatives aimed at making better use of existing infrastructure.

Environmental sustainability

- Ensuring that EIA and environmental management planning is undertaken for major infrastructure projects, and strengthening environmental monitoring and enforcement of legislative requirements. In particular, Government intends to put in place procedures for systematic follow-up on the environmental performance of approved projects, and apply legislated penalties where appropriate. This will encourage greater compliance with environmental management requirements. Consideration will also be given to the future development of national environmental pollution standards that can be applied to infrastructure development.
- Harmonising environmental legislation and the role of institutions in operational terms to avoid duplication and inconsistencies, and simplify processes. In particular, the Government will introduce administrative

measures to clarify responsibilities and harmonise the *Environmental Impact Assessment Act 2003*, *Environmental Impact Assessment Regulation 2010*, and *National Spatial Planning and Management Act 2012* in operational terms and to avoid duplication and inconsistencies.

Institutional sustainability

- Setting the ground rules appropriately because infrastructure relies on having effective public policies, institutions, and legislation. The establishment and strengthening of the MOI is a key Government initiative towards improved governance in the infrastructure sector.
- Continuing initiatives under the Government Structural Reform process to clarify and simplify institutional responsibilities and streamline Government procedures, so that lines of responsibility are clearly drawn and there is a single coordinating agency for each sub-sector. The Change Management process currently underway in the MOI with assistance under the TSCP will help to clarify and streamline Government involvement in the infrastructure sector.
- Working with development partners to build technical and management capacity in Ministries and Public Enterprises for infrastructure planning, management, operation, and regulatory oversight (as appropriate). Government will continue to maintain an emphasis on technical and management capacity building as an integral part of development assistance projects.

Safety

- Taking a leading role, with MOI as the lead agency, in developing appropriate national safety standards, and effective monitoring and enforcement of compliance with national and international standards. Government's highest priority is maritime safety. Progress is being made with maritime safety, as well as aviation and road safety, under the TSCP and PAIP programs but more needs to be done urgently. The Government is committed to working closely with development partners to improve safety, especially in the transport sector.

Resilience

- Mainstreaming CCA/DRM into infrastructure planning, design, standards, and management; upgrading the enabling environment through better decision support information and tools; updating planning processes, policy, and legislation to better reflect the priority that Government places on infrastructure resilience and broader CCA/DRM issues; and building institutional frameworks and capacity to support these initiatives. Initiatives are already underway and progress on mainstreaming CCA/DRM issues has been made under the JNAP process. Further progress is expected as part of implementation of the *Strategic Program for Climate Resilience for the Kingdom of Tonga* that has been prepared under the PPCR process.

4.2 Resilience

Resilience is about protecting infrastructure assets, people, and the economy against climate change and natural disasters, and the ability to recover quickly and effectively when disasters happen. Tonga is particularly vulnerable to natural disasters, and to the effects of climate variability and long-term climate change. Tonga averages T\$30 million per year in losses from cyclones and earthquakes, has a 50 per cent chance of experiencing a loss exceeding T\$300 million, and casualties exceeding 440 people in the next 50 years.¹⁸ Much of the economic loss from natural disasters results either directly or indirectly from damage to infrastructure. In addition, infrastructure can have a very long operational life, up to and exceeding 100 years for some types. Therefore, it makes sense to now start planning, designing, building, and operating infrastructure with a view to resilience to long term climate change and natural disasters. This is recognised in the TSDf which includes "... disaster risk management and climate change adaptation, integrated into all planning and implementation of programmes ..." as part of the headline Outcome Objectives.

Mainstreaming CCA/DRM into infrastructure processes

The Government has adopted the *Joint National Action Plan on DRM and CCA for 2010 to 2015* as a guiding document for initiatives in CCA/DRM, and is working with development partners to mainstream CCA/DRM into infrastructure planning, design, standards, and management. A key objective of this NIIP is to incorporate consideration of DRM and CCA issues into the infrastructure planning process. To achieve this in a systematic and participatory manner, a framework for the integration of DRM and CCA aspects, including a vision and a series of principles, was developed and discussed with stakeholders. The following vision statement was agreed upon:

¹⁸ Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), Country Risk Profile for Tonga (2011).

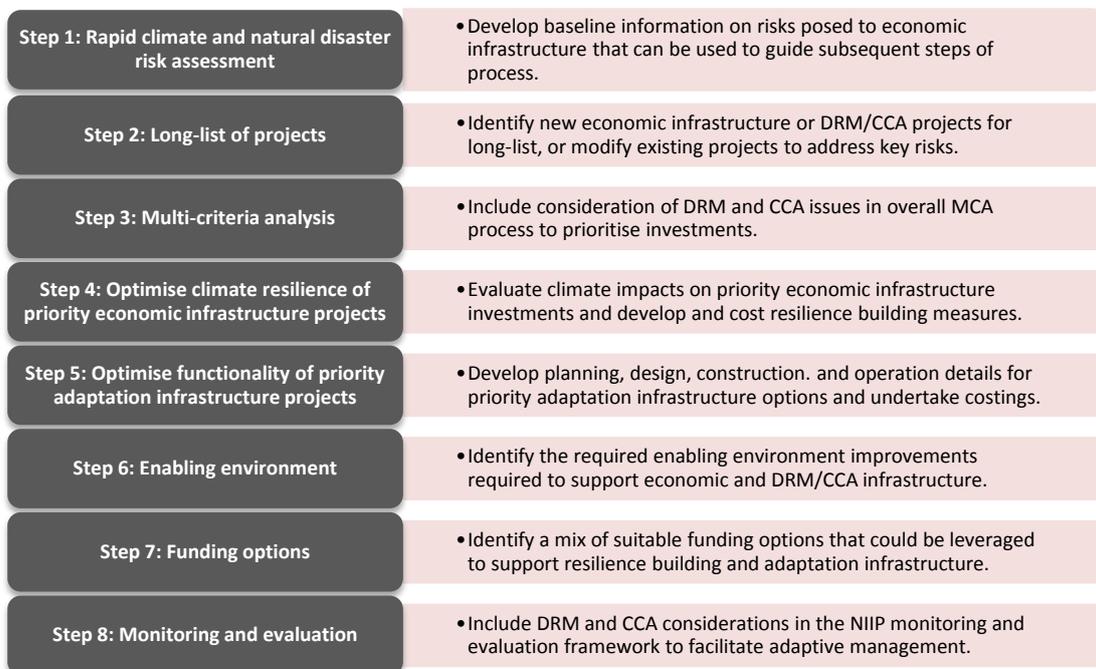
“Infrastructure projects contained in the NIIP have optimal levels of climate resilience¹⁹, and where relevant have been developed to maximise their climate change adaptation and/or DRM function.”

The following principles were developed to allow realisation of this vision:

1. **Mainstreaming of DRM and CCA issues:** DRM and CCA are mainstreamed throughout all stages of NIIP2 development; this includes consideration of CCA/DRM issues in project identification and prioritisation, project development and costing, and monitoring and evaluation.
2. **Short-term and long-term climate risks:** Consideration is given both to existing and short-term future climate risks, and, as relevant to the lifespan of infrastructure included in the NIIP2, future changes in the frequency and/or intensity of extreme events and long term changes in average climate.
3. **Integration throughout infrastructure life-cycle:** DRM and CCA issues are considered throughout the life cycle of planned investments; i.e. throughout planning, design, construction, operation, maintenance, costing, and budgeting.
4. **DRM and CCA enabling environment:** Actions to enhance the enabling environment for DRM and CCA are considered in line with infrastructure investments to ensure that the necessary ‘software’ is in place to maximise the effectiveness of investments.
5. **Cost-effectiveness of actions:** Actions relating to DRM and CCA issues are based on a ‘no-regrets’ and ‘low-regrets’ approach to project identification to optimise the cost effectiveness of future investments.
6. **Adaptive management approach:** Integration of DRM and CCA issues will be viewed as a flexible and ongoing process that is subject to adaptive management principles; the results of monitoring and evaluation will allow future review and refinement of the consideration of DRM and CCA issues in the future iterations of the NIIP.

The steps that were followed in applying these principles are illustrated in Figure 4.1.

Figure 4.1: Actions to integrate DRM and CCA issues in the NIIP



¹⁹ Climate resilience is defined as the ability of assets, networks and systems to anticipate, absorb, adapt to and / or rapidly recover from a disruptive climate event.

Climate-proofing measures in priority projects are discussed in Section 3. To build resilience for infrastructure, improvements will also be required to strengthen the CCA/DRM enabling environment, including decision support tools; planning, policy and legislation; and institutions and capacity building. This will require an integrated program of investment in technical resources and capacity building. Further progress on mainstreaming CCA/DRM issues is expected as part of the implementation of the Strategic Program for Climate Resilience for the Kingdom Of Tonga, prepared under the PPCR process.

Priorities for strengthening the enabling environment and mainstreaming CCA/DRM into infrastructure planning, design, standards and management, are outlined in Table 4.1.

Table 4.1: Priorities for strengthening the CCA/DRM enabling environment

Key areas	Priorities
Decision Support Tools	<ul style="list-style-type: none"> ▪ Reinforcement of the Hydro-Meteorological Monitoring Network by the installation of additional monitoring equipment, including weather radar stations, oceanic parameter monitoring equipment (e.g. sea surface temperature and tidal gauges), and upgraded monitoring stations on outer islands. ▪ Risk Modelling and Mapping for tsunami and storm surge. ▪ Climate Projections at a level of detail required to feed into the revision of Building Code and Road Design Standard Revision. ▪ Groundwater Capacity Analysis, because there is currently little information on groundwater capacity on outer islands yet groundwater resources are already subject to saline intrusion as a result of sea level rise and storm surge.
Planning, Policy and Legislation	<ul style="list-style-type: none"> ▪ Revision of National Building Code and Road Design Standard to take into account predicted future climate change. This is one of the highest overall priorities for enabling environment improvement. ▪ National and Sub-National Climate and Natural Disaster Risk Plan Preparation, based on the results of risk mapping. ▪ DRM/CCA Checklist for Infrastructure Planning, to help ensure systematic consideration of DRM and CCA issues in the early stages of planning. ▪ Infrastructure Post-Disaster Response Planning, that includes adoption of a <i>Build Back Better</i> policy that requires adoption of climate resilient design standards for post-disaster rehabilitation or upgrading works so that climate resilience of the infrastructure stock is progressively increased. ▪ Planning for Climate Resilient Infrastructure Monitoring and Maintenance, including development of a manual that addresses standard requirements for pre- and post-wet season and pre- and post-cyclone event monitoring and maintenance. ▪ Revision of Legal Framework, with priority actions for integration of CCA/DRM issues into legislation that regulates environmental approvals for infrastructure development (<i>i.e. the Environmental Assessment Act 2003, Environmental Impact Assessment Regulations 2010 and the Spatial Planning and Management Act 2012</i>). ▪ Guidelines on Coastal Protection and Resilient Water Supply, including development of user-friendly, non-technical guidelines on the development of foreshore protection and climate resilient rural water supply schemes.
Institutions and Capacity Building	<ul style="list-style-type: none"> ▪ Strengthening of CCA and DRM Focal Points, by targeted capacity building for personnel in the MLECCNR, JNAP Secretariat, Tonga Meteorological Service (TMS) and NEMO in relation to climate change projections, climate and natural disaster risk analysis for infrastructure, and disaster response planning. ▪ Strengthening of the Coordination Role of JNAP, and establishing arrangements for continuity of the functions of the JNAP Secretariat. ▪ Capacity Building within Line Ministries, especially the MLECCNR and the National Spatial Planning Authority to ensure adequate technical resources and capacity in relation to CCA/DRM issues. ▪ Technical Training related to Revised Building Code and Road Design Standard. ▪ Ongoing and regular capacity building for personnel and community leaders on outer islands, and broad community awareness raising on climate and natural disaster risks and response planning, and disaster response drills.

5 Funding strategy

The function of the NIIP is to set out Government's priorities in terms of infrastructure investments; strengthening the foundation of sustainability, safety, and resilience; and also to set the scene in terms of delivery mechanisms. This part of the NIIP looks at the overall demand for infrastructure financing, potential financing options, and develops an overall funding strategy for how the infrastructure priorities will be delivered.

5.1 Demand for infrastructure finance

Demand for infrastructure finance comes from three sources: capital investment in new or upgraded infrastructure; complementary initiatives that support the operation and management of the infrastructure sector; and ongoing maintenance of the infrastructure.

Capital investment

Capital expenditure on infrastructure projects over the period 2013/14 to 2017/18 will come from four sources:

- Projects that were identified in NIIP2010 and whose implementation is currently underway and will continue during the NIIP2013 timeframe. As shown in Table 3.2, this component is estimated at T\$100 million over the period 2013/14 to 2017/18;
- Projects that were identified in NIIP2010, have committed funding, and will commence implementation during the NIIP2013 five-year timeframe at an estimated cost of T\$73 million (see Table 3.2);
- High priority additional projects identified in this NIIP (see Chapter 3). If all of the high priority projects forge ahead as planned, this will involve an estimated T\$173 million in additional infrastructure investment; and
- Other smaller investments (mostly by Public Enterprises) that are part of their own investments programs but are not major projects captured by the NIIP process. Based on current expenditure patterns, this is estimated to total around T\$8 million per year.

If all of these investments go ahead as planned, demand for capital investment over the period 2013/14 to 2017/18 is estimated at total T\$385 million. Phasing of expected capital expenditure over the period 2013/14 to 2017/18 is shown in Table 5.2 and reveals high levels of investment in 2013/14 and 2014/15, after which levels will decline.

To put these investments in perspective, the peak level of investment in 2013/14 is equivalent to almost 15 per cent of GDP, while the average annual level of investment over the period 2013/14 to 2017/18 is equivalent to eight per cent of GDP. These levels of investment in infrastructure are high, particularly in the first two years of the plan period. In part, this is a result of several large projects that are already underway or committed and being scheduled for implementation over the 2013/14-2014/15 period. This includes laying of the undersea fibre-optic communications cable to Fiji and resurfacing of the Fua'amotu and Vava'u airport runways. These three projects have some T\$90 million of committed expenditure. This tends to distort the expected expenditure profile. However, it should also be recognised that the peak level of T\$110-120 million in the first two years of this Plan is lower than recent peaks in infrastructure investment (T\$140 million in 2010/11 on projects covered by NIIP2010); and the overall average level of investment of eight per cent over the five-year plan period is consistent with international norms for developing countries, though at the upper end of the scale.²⁰

Complementary initiatives

Chapter 3 set out the full range of complementary activities required to support implementation of the NIIP. At this stage, it is not possible to precisely estimate the cost of each individual activity, but in total it is anticipated that all the complementary activities, which mostly involve consulting services, may amount to T\$15 million over the five-year priority period covered by this NIIP.

²⁰ According to the World Bank's World Development Report for 1994, *Infrastructure for Development*, public investment in infrastructure in developing countries ranges from two per cent to eight per cent (and averages four per cent) of GDP.

Maintenance

Turning to maintenance, Table 5.1 shows the annual maintenance expenditure requirements for NIIP projects (underway, committed high priority proposed) at the end of the first five years of this NIIP (2017/18), with a breakdown by project status and responsibility. These maintenance requirements are separate from the capital expenditure requirements set out above. Estimated forward maintenance costs were calculated using rules of thumb for maintenance requirements of different types of infrastructure. Infrastructure was classified as fixed or mobile, and as having a short, medium, or long lifespan, and maintenance rates were specified accordingly. It is assumed that mobile infrastructure with a short lifespan requires the highest level of maintenance (3.5 per cent of capital cost per annum), while fixed infrastructure with a long lifespan requires the lowest level of maintenance (two per cent of capital cost per annum, or lower in some cases).

Table 5.1: Annual maintenance expenditure requirements at the end of 2017/18 (T\$ million)

	Government	Public Enterprises	Total
NIIP2010 investments (underway, committed)	0.9	4.8	5.7
NIIP2013 high priority proposed investments	1.2	2.1	3.3

Around 35 per cent of the estimated total annual requirement of T\$9.0 million relates to high priority proposed projects; most (75 per cent) accrues to Public Enterprises; and almost all of the Government component relates to road maintenance. However most of this is not 'new' maintenance. Many NIIP projects upgrade/repair/rehabilitate existing infrastructure and so do not produce 'new' maintenance liabilities and in some cases may lead to a reduction in required maintenance spending. Therefore to avoid double-counting, it is necessary to consider demand for maintenance spending from three sources:

- maintenance of existing infrastructure, including investments from the NIIP2010 program that were already operational in 2011/12. This is estimated to total some T\$10.5 million per year, including T\$6.8 million on road maintenance (sustainable maintenance level from calculations conducted for establishment of the Road Fund), around T\$0.3 million on maintenance of outer islands ports, and around T\$3.4 million by Public Enterprises with maintenance spending at an average of two per cent of asset value;
- new maintenance requirements from NIIP2010 projects that are underway and committed. This figure will be lower than the T\$5.7 million shown in Table 5.1 because about half of the required maintenance spending relates to the upgrade/repair/rehabilitation of existing infrastructure assets; and
- new maintenance requirements from high priority projects proposed by this NIIP.

Table 5.2 shows the estimated annual maintenance expenditure requirement for the first five years of this NIIP for each of these components.

Total demand for infrastructure finance

Table 5.2 combines the requirements for capital expenditure on infrastructure over the period 2013/14 to 2017/18 with requirements for expenditure on complementary initiatives and the maintenance of infrastructure (including pre-existing assets) to provide a picture of the total demand for infrastructure finance over this period.

Table 5.2: Total demand for infrastructure finance (T\$ million)

	2013/14	2014/15	2015/16	2016/17	2017/18	Total
<i>Capital Investment</i>						
NIIP2010 underway and committed	104	49	7	8	5	173
NIIP2013 high priority	16	62	60	24	10	172
Other smaller items of capital expenditure	8	8	8	8	8	40
<i>Complementary initiatives</i>						
NIIP2013	3	3	3	3	3	15
<i>Maintenance</i>						
Pre-existing assets ¹	10.5	10.5	10.5	10.5	10.5	52.5
NIIP2010 underway and committed	0.5	2.5	2.5	2.5	2.5	10.4
NIIP2013 high priority	0.3	0.8	1.5	2.0	2.1	6.7
Total	142	136	92	58	41	470

Notes: ¹ Including NIIP2010 assets operational in 2011/12

5.2 Overview of the infrastructure financing environment

Traditional sources of finance for investment in infrastructure in Tonga have been:

- grants from development partners;
- concessional loans from international financial institutions;
- self-financing by Public Enterprises; and
- limited financing by Government from consolidated revenues.

In recent years, additional sources of finance for investment in infrastructure have emerged which include:

- grants and concessional loans from non-traditional development partners (mirroring an international trend for non-Organisation for Economic Co-operation and Development (OECD) nations to play a more significant role in development cooperation);
- grants, rather than the traditional concessional loans, from international financial institutions (though this form of assistance may be considered a temporary response to difficult economic conditions);
- regional development assistance programs, which have begun to combine south-south cooperation together with the financing of some quite major infrastructure (commitment to finance investments in airports in Tonga under the PAIP being an important example);
- private sector involvement in the provision of infrastructure, in particular the opening of the telecommunications market to competition and the entry of Digicel; and
- dedicated funding for adaptation to climate change, disaster risk management, and more general environmental management.

Not all of these developments in relation to sources of funding, and notably, the availability of funding for airport redevelopment under the PAIP were foreseen at the time NIIP2010 was prepared.

In relation to the financing of this NIIP, the tight fiscal situation facing Government will restrict the options available to finance the investment priorities. In particular, the Government is unlikely to be in a position to finance major infrastructure from domestic revenues, and an announced interim 'no new loans policy'²¹ will remove additional concessional borrowing as an option at least in the early years of the plan period. Most economic infrastructure in Tonga is now managed and operated by Public Enterprises,²² so the Government will be looking to work closely with Public Enterprises and also with the private sector and development partners to make the infrastructure development in this NIIP a reality.

5.3 Assessment of financing options

As noted above, a range of options are available for the financing of capital and ongoing expenditure. The following sections describe possible funding sources and their suitability for financing investment in infrastructure under this NIIP.

²¹ See summary of fiscal policy in Government of Tonga Budget Statement for the year ending 30 June 2013, p. 8.

²² Government retains direct responsibility only for the road network and outer island ports, but remains involved in the planning and financing of major infrastructure owned and operated by Public Enterprises.

Government finance

Tonga is emerging from a period of high budget deficits resulting from imbalance between domestic revenues and expenditures, and a high level of capital expenditure (with a high proportion financed from concessional borrowing). The fiscal deficit was equivalent to roughly six per cent of GDP in 2009/10 and 2010/11, and a projected 2.7 per cent of GDP in 2011/12. However, this is expected to turn around in the short-medium term. Government has budgeted for a small surplus in 2012/13, and surpluses in the order of one per cent of GDP are projected in the next three financial years. This has been achieved through fiscal tightening, access to budget support funding from development partners, and a reduction in capital expenditure. Although more Public Enterprises are paying dividends to Government (total around T\$1.7 million in 2011/12), dividends are not significant in the infrastructure financing context nor are they likely to be so in the medium term.

Overall, this means that the Government has very limited capacity for financing economic infrastructure investment either from its Budget or through borrowing. At the end of 2011/12, the Government carried T\$350 million of indebtedness by way of direct borrowings and loan guarantees, and the most recent Debt Sustainability Assessment (DSA) undertaken jointly by the International Monetary Fund (IMF) and WB in early 2012 concluded that Tonga remains at a high risk of debt distress. As a result, the Government has adopted an interim 'no new loans policy'. On the other hand, with the improving Budget position and establishment of a Road Fund, Government funding of maintenance of infrastructure is in a position to increase, as discussed below.

If the proposed extension of the fibre-optic cable from Tonga to Samoa materialises, part of the costs of the high priority project T9 (Undersea cable linking Ha'apai and Vava'u) would be covered by linking into this international connection. If the international cable project is not pursued, further analysis will be necessary to establish the preferred least cost technological option of connecting the northern island groups.

Public Enterprise finance

With the exception of roads and outer island ports, Public Enterprises manage all economic infrastructure in Tonga. There has been improvement in the financial performance of Public Enterprises since NIIP2010, with more recording profits and more paying dividends to Government (despite the continuing fragility of the economy and difficult business environment). Table 5.3 summarises the results of an analysis of the capacity of Public Enterprises to self-fund infrastructure maintenance and renewal.

In terms of financial performance, Public Enterprises can be classified as *large and strong* (TPL and TCC), *medium and capable* (PAT, TAL and TWB), and *small and marginal* (TBC and WAL). The stronger Public Enterprises can self-finance operations, maintenance, and all but major capital expenditures; others can self-finance operations, maintenance, and small capital expenditures, while the WAL requires a level of Government subsidy to cover the costs of operation. Only TPL, TCC, and PAT can support commercial borrowing on any significant scale.

The high priority proposed projects included in NIIP2013 tend to be large projects of national significance, which are beyond the capacity of Public Enterprises to self-finance (the control tower at Fua'amotu International Airport and the expansion of the Nuku'alofa water system are two projects that could involve at least partial self-financing by the Public Enterprise responsible). However, Public Enterprises currently finance a significant amount of capital expenditure from their own resources. This has averaged around T\$15 million per year over recent years, but can be expected to increase in line with the general trend of improved financial performance. Over the five-year period 2013/14 to 2017/18, roughly half of this capital investment by Public Enterprises is expected to go towards NIIP2010 projects underway or committed, and half to smaller investments which are nonetheless critical to the overall performance of infrastructure. Public Enterprises also spend an estimated T\$4.0 million per annum on infrastructure maintenance, and with the exception of the WAL, have the financial capacity to fund maintenance of new investments.

Table 5.3: Analysis of capacity for self-funding infrastructure costs

Sector	Agency	Operations	Maintenance	Small CAPEX	Medium CAPEX	Large CAPEX
Energy	Tonga Power Ltd	High	High	High	High	Medium
	Tonga Communications Corp	High	High	High	High	Medium
Telecommunications	Tonga Broadcasting Corp	High	Medium	Medium	Low	Low
	Tonga Water Board	High	High	Medium	Low	Low
Water	Waste Authority Ltd	Medium	Low	Low	Low	Low
Waste	Ports Authority of Tonga	High	High	High	High	Low
	Tonga Airports Ltd	High	High	High	High	Low
Transport						

Development partner finance

Over recent years, development partners have been very supportive in assisting Tonga with investments in the infrastructure sector. This has involved some T\$380 million in recent and planned support from development partners in the financing of investments in economic infrastructure. Government expects that support will continue to be available, provided infrastructure investments are demonstrably well managed and maintained. Beyond current commitments, development partners do not have specific forward allocations dedicated to infrastructure. One opportunity that may emerge is a possible regional maritime initiative, which could fund improvements in maritime safety and port infrastructure.

Domestic financial institutions

Domestic financial institutions with a current or potential interest in financing economic infrastructure include the private commercial banks and the Tonga Development Bank. These institutions already have dealings with some Public Enterprises, and are open to lending for infrastructure projects. However, they are only interested in lending for projects which can establish commercial viability. An indicative analysis of the borrowing capacity of Public Enterprises has concluded that only TPL, the TCC, and PAT have the capacity to fund investments through commercial finance. None of the high priority proposed projects included in this NIIP appear to lend themselves to direct commercial borrowing by Public Enterprises.

Pension funds including the newly formed Tonga National Retirement Benefits Fund are also potential investors in economic infrastructure. Again, interest would be confined to projects which are commercially viable.

Funding for climate change adaptation and disaster risk management

Due to the high levels of climate and natural disaster vulnerability of Pacific countries, the region has been a focus of CCA and DRM support for many donors. In recent years the funding available for CCA and DRM activities has increased. Traditional donors are paying greater attention to mainstreaming climate issues in their operations and are providing enhanced support for targeted CCA and DRM activities. A number of new sources of funding that focus on CCA related interventions have also been created both at the national and international level. In particular, a *Strategic Program for Climate Resilience for the Kingdom of Tonga* has been prepared and assistance with implementation funding is expected under the PPCR program.

Maintenance funding

Government policy is that the cost of operations and maintenance of economic infrastructure should be funded from user charges wherever possible. Public Enterprises (with the exception of WAL) have the capacity to self-finance a reasonable level of expenditure on maintenance, but some are neglecting maintenance and most would benefit from greater attention to improvements in asset management. Public Enterprises currently spend around T\$4 million per annum on maintenance, which in aggregate is above basic maintenance requirements (around two percent of asset value on average). The main sectors which appear to have a significant gap in maintenance expenditures are water and aviation. In the aviation sector, this can be at least partly explained by the major infrastructure renewal program

underway and the high asset value. Asset management in WAL and the TWB is being addressed under the NUDSP with the intention that the principles developed under this project will be adopted more broadly.

In recent years, Government spending on the maintenance and rehabilitation of roads and outer island ports has been patchy and below sustainable levels. As noted above, Government has approved the establishment of a Road Fund that will provide dedicated financing of routine and periodic maintenance of the road network at a long term sustainable level, with most work contracted out to the private sector. The next step is to update the institutional arrangements for managing and maintaining outer islands ports. This is identified in this NIIP as a priority initiative for the ports sector.

Private sector involvement

Inputs in the provision of infrastructure can range from *design to construction to operation to financing to ownership*. Private sector involvement in the implementation of this NIIP is likely to focus on design and construction which will be undertaken by local and international contractors. There is also scope for increased outsourcing of some aspects of the operations of Public Enterprises to the private sector, including some aspects of service delivery and asset maintenance. In particular, road maintenance and construction is increasingly being contracted out to the private sector, and more opportunities will emerge from increased funding under the Road Fund. The private sector is also active in service provision in the telecommunications sector, and in providing specialist technical services across all sectors. More complex arrangements covering the operation and ownership of infrastructure are unlikely to be realistic prospects during the term of this NIIP, but have potential for the future. In summary, the private sector is not expected to contribute significantly to capital investment in infrastructure in the short-medium term, but will play a critical and increasing role as a service provider in terms of design, construction, operations, maintenance, and specialist technical services.

5.4 Overall funding strategy

If all of the ongoing, committed, and proposed high priority investment projects and complementary initiatives go ahead as planned, it will involve around T\$385 million in new investments (underway, committed, additional high priority), T\$15 million in complementary initiatives, and around T\$70 million in the maintenance of new and existing assets over the first five-year period of this NIIP (Table 5.2).

Maintenance of existing and new infrastructure is a high priority. As noted above, Government policy is that the cost of operations and maintenance of economic infrastructure should be funded from user charges wherever possible. Government intends to work closely with Public Enterprises, the private sector, and development partners to lift the overall performance of the infrastructure sector, and as a minimum, achieve self-funding of operations and sustainable maintenance by Government and Public Enterprises. In particular, appropriate maintenance expenditure levels need to be established, which means having effective asset management plans in place and ensuring that service prices include provision for maintenance. Progress has already been made towards improved cost recovery, maintenance, and asset management, and further progress is expected with assistance under the NUDSP program.

However, the capacity to self-fund major capital investment in infrastructure is limited. **Tonga does not currently have the capacity to finance substantially more infrastructure assets without assistance from development partners**, even if those investments are high priorities. As already noted:

- the Government is facing very tight fiscal constraints in relation to funding investment from domestic revenues or concessional borrowing, and as an interim measure has adopted a 'no new loans policy';
- the capacity of Public Enterprises to finance infrastructure from internal sources is improving, but generally is insufficient to replace/rehabilitate major infrastructure items, or introduce significant new innovations to transform the sector; and
- in the short-medium term, the private sector is unlikely to be a significant source of investment in additional major economic infrastructure.

Overall, Tonga will need to adopt a partnership approach to infrastructure delivery with Government, Public Enterprises, and the private sector working closely together with the support of development partners. In particular, **support from Development Partners in the form of grants will be needed to help finance the high priority investment projects and technical assistance for complementary initiatives identified in this NIIP.**

Taking these factors and the above analysis of potential funding sources into account, the key aspects of the funding strategy for infrastructure development and asset management over the next five-years are:

- Improving Budget conditions are expected to enable Government to make a small contribution to infrastructure investment (average around T\$1 million per year) and to increase spending on maintenance of outer islands ports to sustainable levels, either through direct Budget allocation and/or improved cost recovery. Development and implementation of improved mechanisms for management and financing of outer islands ports is an important planned complementary initiative of this NIIP.
- The Road Fund recently established by Government will transform financing of road maintenance. The Fund will be phased in over several years and when fully operational will provide more than T\$6 million each year for routine and periodic maintenance.
- Public Enterprises are expected to continue their strengthening their financial performance, and cover required maintenance and make infrastructure investment from their own resources. Based on current levels of expenditure and assuming some strengthening in financial resources, it is expected that Public Enterprises will lift spending on infrastructure, and contribute around T\$35 million of spending on required maintenance; and around T\$80 million to financing capital expenditure in infrastructure over the five-year period. This includes contributions to NIIP2013 high priority projects, to major investment projects already underway or committed, and to planned smaller investments that are part of the Public Enterprises' own investment program. The proposed new control tower at Fua'amotu and the expansion of the Nuku'alofa water system are two NIIP priority projects that could involve at least partial self-financing by the Public Enterprise responsible, in this case by TAL and the TWB respectively.
- Development partners are expected to continue to provide support for economic infrastructure and associated technical assistance and capacity building, but the mix of sources may change. As noted above, major development partners have committed some T\$380 million in assistance for recent and planned infrastructure projects. With the Government's 'no new loans' policy in place, it is expected that the balance of sources will change, with an increase in grant finance to make up for lower utilisation of concessional loan finance, and a greater contribution from new sources, including regional and global funds, such as growing support for CCA/DRM activities. Government will take a lead role in facilitating CCA/DRM investments, a key emerging priority in the NIIP process.
- It is not expected that the private sector will contribute significantly to capital investment in infrastructure in the short-medium term, but as noted above, will play a critical and increasing role as a service provider in terms of design, construction, operations, and specialist technical services.

The funding strategy as explained above is summarised in Table 5.4 below with the indicative breakdown of funding sources for the NIIP.

Table 5.4: Indicative Infrastructure Budget for 2013/14 - 2017/18 (T\$ million)

	Funding Source			
	Demand for Funding	Government	Public Enterprises	Development Partners
Capital Investment	\$385	\$5	\$80	\$300
Complementary Activities	\$15	-	-	\$15
Maintenance	\$70	\$35	\$35	-
Total	\$470	\$40	\$115	\$315

Government will continue to invest in the economic infrastructure sector, but as outlined above, its capacity to fund additional infrastructure, beyond what is already committed, is extremely limited. A key role that Government will continue to play is to facilitate a partnership approach to infrastructure delivery by brokering arrangements for funding infrastructure and working with key stakeholders in the infrastructure sector to improve the environment for infrastructure financing. This will involve:

- identifying and building awareness of traditional, new and innovative financing sources and mechanisms (such as new opportunities emerging for funding CCA/DRM initiatives from regional and global programs);

- helping to coordinate the dialogue between sources of funding and infrastructure managers;
- working with infrastructure managers to design and implement financing packages for major projects. This may involve a combination of one or more sources such as Public Enterprise resources, development partner grants, commercial loans, and in some cases, Government budget and private equity. Development of the Tonga-Fiji undersea communications cable is an example of a project with a more complex package of funding modalities. The MFNP has a key role to play in this area and the Government is strengthening its capability to coordinate infrastructure financing;
- working with infrastructure managers (with support from development partners) on complementary initiatives aimed at improving the financial and operational performance of infrastructure management, improving asset management and maintenance, and thereby creating an improved environment for infrastructure development and financing; and
- engaging further with the private sector with a view to it taking on more significant roles in infrastructure in the future.

6 Monitoring and updating the Plan

6.1 Monitoring progress

The NIIP is a high-level strategic Plan with an ongoing role in guiding the development of the infrastructure sector. Priority projects will vary from one NIIP to the next update, but the underlying key outcome objectives and enabling themes will stay the same. Accordingly, the monitoring and evaluation (M&E) framework for NIIP focuses on a relatively small number of high-level indicators that are linked to NIIP's outcome objectives of Connecting Tonga; Infrastructure for Communities; Reliable and Affordable Energy; and the foundation of Sustainability, Safety and Resilience. The framework also includes a number of performance indicators for each of the sub-sectors to measure access to and the quality, affordability, and efficiency of service delivery.

The monitoring framework for NIIP draws on the approach adopted for the TSDF to maintain consistency and practicality. As with the TSDF, the focus is on indicators that are specific and measurable, and targets that are achievable, realistic, and timely. The M&E indicators for NIIP, along with targets and M&E responsibilities, are listed in Appendix 2. Benchmark levels and targets for the indicators will be confirmed as part of the first NIIP Monitoring Report.

Progress against the NIIP M&E framework will be reported on an annual basis. Each year, the MFNP in collaboration with the MOI will prepare a brief NIIP Monitoring Report that will provide an update on the status of funding and implementation of all projects in the NIIP portfolio, especially the high priority planned projects; and on the M&E indicators listed in Appendix 2. The Monitoring Report will also note major and outstanding issues in the infrastructure sector to determine if the current NIIP needs adjusting. The Report will be presented to Cabinet and after that will be publicly available to enable interested stakeholders to follow progress with the implementation of this NIIP. As the implementation and funding of the NIIP will to a large extent depend on external support, the Government intends to discuss the NIIP Monitoring Report in annual meetings with development partners.

6.2 Updating the Plan

The NIIP is an integral part of the Government's national planning and budgeting process. With many infrastructure projects and reforms already underway and more in the NIIP priority pipeline, it will be important to keep the NIIP updated so it stays relevant to emerging challenges and opportunities. The Government intends to update the NIIP on a regular basis to reflect latest planning and budget priorities, and track progress on implementation. The MFNP, with support from the MOI and other agencies, will be responsible for managing the NIIP update process as part of its national planning role.

The update cycle will align with the MTBF process that is being introduced by Government from 2013 and with updates to the TSDF:

- Every two to three years, a NIIP Update will be prepared. This will be a brief report containing an update of the list of high priority projects and complementary initiatives; highlight emerging challenges; and note any major changes to overall Government policies and priorities for the infrastructure sector. The exact timing will be decided by the Government taking into account changing needs and guided by the annual NIIP Monitoring Report.
- Every four to five years a full update of the NIIP priorities and NIIP document will be prepared. Since the focus of each NIIP is on a detailed priority program for the next five years, it is essential that the NIIP has a full update at intervals of no more than five years so it remains current and relevant. The exact timing of this update will be guided by the release of a new TSDF to ensure the NIIP reflects latest Government thinking on priorities and goals for national development.

In years when there is a partial or full update of the NIIP, this will replace the annual NIIP Monitoring Report.

Appendix 1: NIIP summary matrix

Sector	Major Ongoing Projects	T\$ m	Additional Priorities (next five years)	T\$ m	Preferred Timing		Responsible Agency
					FY2014 - 2018	FY19-23	
ENERGY							
	E1 TPL Distribution Network Upgrade Program	\$5				↔	TPL
	E2-5 TPL Diesel Generators Upgrade Program	\$30				↔	TPL
	E6 Village Networks (electricity pole replacement)	\$14					TPL
	E7 Outer-island Off-Grid power (solar)	\$5					TPL
	E14 Solar Generation (Vava'u)	\$10					TPL/TERM
			E11 Additional 1-2MW of Solar PV on Tongatapu	\$24			TPL
			E16 Outer Islands On-Grid Renewable Energy	\$9			TPL
TELECOMMUNICATIONS							
	T1,2 TCC Fixed line and Mobile Upgrade Program	conf.					TCC
	T4 Outreach – Expanding Services to small islands	\$2					MCI
	T6 International Fibre-Optic Cable to Fiji	\$53					TCL
	T7 Local Reticulation of High Speed Internet	\$8					TCC/TCL
			T10 Comms for Early Warning & Disaster Recovery	\$6			TBC
			T9 Fibre-Optic Cable to Ha'apai and Vava'u ²³	\$30			TCL
WATER							
	W2 Rehabilitate the Nuku'alofa water system	\$7					
			W3 Outer Islands water supply improvements	\$15			TWB
			W4 Expand Nuku'alofa system to growth areas	\$11			TWB
WASTE							
	S5 Sustainable Solid Waste Services in Nuku'alofa						WAL
			S6 New Landfill or Transfer Station on Ha'apai	\$4			MLECCNR
ROADS							
	R2 Integrated Urban Development Sector Program	\$12					MOI
	R3 Transport Sector Consolidation Project (Roads)	\$12					MOI
	R4 Vaipua Bridge (Vava'u)	\$8					MOI
			R10 Outer Islands Roads Upgrading Program	\$10			MOI

²³ Linked to the proposed extension of the international fiber-optic cable between Tonga and Samoa.

Sector	Major Ongoing Projects	T\$ m	Additional Priorities (next five years)	T\$ m	Preferred Timing		Responsible Agency
					FY2014 - 2018	FY19-23	
MARITIME							
	P6 Replace Fender at QSW International Wharf	\$1			■		PAT
	P3 Reseal Queen Salote Wharf (Int. and Dom.)	\$11			■	■	PAT
			P9 Maritime Sector Safety and Resilience	\$20	■	■	MOI
AIRPORTS							
	A6 Upgrade International Arrivals (Fua'amotu)	\$2			■		TAL
	A8 Resurface Fua'amotu runway, apron, taxiway	\$38			■		TAL
	A10 Resurface Vava'u runway, apron, taxiway	\$11			■		TAL
			A11 Resurface Ha'apai runway, apron, taxiway	\$9		■	TAL
			A12 New Control Tower at Fua'amotu Airport	\$7		■	TAL
MULTI							
			M2 Coastal Protection - Eastern Tongatapu	\$15	■	■	MLECCNR, MOI
			M4 Disaster Response & Evacuation Infrastructure	\$12		■	MOI, MLECCNR

Appendix 2: Monitoring and evaluation framework

The following Table describes the Monitoring and Evaluation (M&E) framework for the NIIP. It lists key indicators that measure the impact of NIIP in terms of outcome objectives of the TSDF and NIIP. The Table is structured in line with the NIIP Strategic Framework described in Chapter 2 and includes the following information for each M&E indicator:

<i>Indicator:</i>	a brief description of the indicator in terms of what it aims to achieve
<i>Target:</i>	the desired outcome (benchmark levels and targets to be confirmed as part of the first NIIP Monitoring Report)
<i>Source/ Responsibility</i>	the agency(s) that are responsible for monitoring progress and providing data
<i>Linkages:</i>	links to other key strategic and monitoring documents, especially TSDF and MDGs

Indicator	Target	Source/ Responsibility	Linkages
NIIP AWARENESS, IMPACT AND MANAGEMENT			
NIIP is widely available in electronic form	Available on GoT/MFNP/MOI websites	MFNP, MOI	
NIIP is widely available in printed form	Brochure version of NIIP prepared and distributed	MFNP, MOI	
Percentage of projects in NIIP with identified funding within 3 years	More than 50%	MFNP, MOI	
NIIP has an incremental update every 2-3 years	Completed	MFNP, MOI	
NIIP has a full update every 3-4 years	Completed	MFNP, MOI	
Institutional arrangements in place for monitoring and updating the NIIP	Completed and adopted	MFNP, MOI	
CONNECTING TONGA			
Speed of internet services available to all parts of the Kingdom	Increased	MCI	TSDF; MDG 8.F
Cost of internet and mobile phone services to all parts of the Kingdom	Decreased [in real terms from 2012 level]	MCI	TSDF
Percentage of road network rated in good/fair condition	Increased [consistent with TSCP targets]	MOI	TSCP
Number of airports meeting relevant international safety and security requirements	All	TAL, MOI	TSDF
Number of sea ports meeting relevant international safety and security requirements	All	PAT, MOI	TSDF
INFRASTRUCTURE FOR COMMUNITIES			
Proportion of population with access to basic services (electricity, water, improved sanitation)	Maintained and Improved	TPL, TWB, MOI, MLECCNR	TSDF, MDGs
RELIABLE AND AFFORDABLE ENERGY			
Proportion of Tonga's energy needs met by renewable energy	Increased [target 50%]	TERM	TSDF
Percentage of villages/towns with 24 hour energy supply	Increased	TPL	TSDF
Cost of electricity	Stable or reduced [in real terms from 2012 level]	TPL	
SUSTAINABILITY, SAFETY, RESILIENCE			
National asset management policy developed and adopted	Completed	MOI	
Review of Government functions in the infrastructure sector to streamline processes and address gas/overlaps	Completed and Implemented	MOI, MFNP	
EIA conducted for major infrastructure projects	100%	MLECCNR	TSDF

Indicator	Target	Source/ Responsibility	Linkages
Arrangements for sustainable funding and maintenance of roads	Implemented	MOI	
Arrangements for sustainable funding and maintenance of outer islands ports	Implemented	MOI	
Number of fatal accidents on roads	Reduced (target 50% reduction from 2012 level)	MOI, Police	
CCA/DRM issues integrated into legislation that regulates environmental approvals for infrastructure development (Environmental Assessment Act 2003; Environmental Impact Assessment Regulations 2010; Spatial Planning and Management Act 2012)	Completed and adopted	MLECCNR	TSDf
Revised Building Code and national Road Design Standard that take into account latest information on CCA/DRM risks	Completed and adopted	MOI	
CCA/DRM Checklist for Infrastructure Planning	Completed and adopted	MOI, MLECCNR	

Key Performance Indicators per sub sector

Subsector	Indicators
Energy	<ul style="list-style-type: none"> ▪ <i>Access:</i> Access to Electricity Electricity Production (Capacity and Actual) ▪ <i>Affordability:</i> Electricity Tariffs (Commercial and Residential) ▪ <i>Energy Use:</i> Total Fuel Imports TOE per capita Renewable Energy Share Clean Energy Contribution ▪ <i>Efficiency:</i> Distribution Losses
ICT/ Telecommunications	<ul style="list-style-type: none"> ▪ <i>Access:</i> Fixed Line, Mobile Subscriptions and Internet Users per 100 People Total Teledensity Fixed Broadband Subscribers per 100 People ▪ <i>Affordability:</i> Telecommunications Service Price as % of Average Monthly Income (Fixed Line, Mobile and Internet) Number of Service Providers (Fixed Line, Mobile and Internet) ▪ <i>Quality:</i> International Internet Bandwidth per Person Secure Internet Servers per 1 Million People
Solid Waste Management	<ul style="list-style-type: none"> ▪ <i>Access:</i> Access to Regular Waste Collection (Urban) Frequency of Household Waste Collection ▪ <i>Sustainability:</i> Recycling Services and Waste Sorting ▪ <i>Quality:</i> Environmental Standards of Landfills ▪ <i>Efficiency:</i> Cost Recovery
Transport	<p>ROADS</p> <ul style="list-style-type: none"> ▪ <i>Access:</i> Total Road Network Paved Roads Unpaved Roads Paved Roads as % of Total Road Network Road Density Population Density Private Motor Vehicle Registrations ▪ <i>Quality:</i> Paved Roads ▪ <i>Affordability:</i> Vehicle Registration Tariffs <p>AVIATION</p> <ul style="list-style-type: none"> ▪ <i>Access:</i> Number of Operational Airports (Paved/Unpaved) Scheduled Take-Off and Landing by Airport Average Passenger Numbers National (and other) Airline Carriers Inbound Flights per Week Inbound Seats per Week Domestic Air Services in PICs ▪ <i>Affordability:</i> Air Travel Costs International Air Freight Rates ▪ <i>Efficiency:</i> Average Waiting Time for Services Institutional Arrangements for Pacific Airports <p>MARITIME</p> <ul style="list-style-type: none"> ▪ <i>Access:</i> Frequency of International Shipping Services per Month Shipping Traffic in Ports (Vessels per Year) Number of Main Ports ▪ <i>Affordability:</i> Stevedoring Charges ▪ <i>Efficiency/Productivity:</i> Cargo Handling Equipment and Facilities in Major Ports Vessel Turn-Around Times Port Administration
Water and Sanitation	<ul style="list-style-type: none"> ▪ <i>Access:</i> Access to Improved Water Source (Urban and Rural) Access to Improved Sanitation (Urban and Rural) Incidence of Water Borne Diseases ▪ <i>Quality:</i> Availability of Water Supply in Piped Water Supply Systems ▪ <i>Efficiency:</i> Estimated Non-Revenue Water Metered Connections Employees per 1000 Connections Cost Recovery ▪ <i>Affordability:</i> Average Tariff (Water and Sewerage Services)