

## 4.4 INFRASTRUCTURE

### 4.4.1 Telecommunications

#### 1. Background

Telecommunications is part of human rights which is categorized into strategic infrastructure to overcome the issues of underdevelopment and poverty. In order that even more people getting access to telecommunication, there are quite a few instruments which could be utilized; among them are competition, good governance, introduction of new technologies (hardware, software, business process), as well as limitation of margin level (EBITDA). Nowadays, telecommunications is commonly combined with computers, control technologies and content providers to offer electronic services in many aspects of life which would subsequently form the so-called “electronised society”.

The role of telecommunications toward the advancement of a country/nation cannot be doubted. Therefore, the digital divide between developed and developing economies must be persistently dealt with by any means possible. Timor-Leste as a developing economy with lots of poor demography needs to find its own unique strategy to make the most of information technology.

#### 2. Global Telecommunications Condition

There are quite a few major global telecommunications themes which can be taken into consideration. Firstly, the digital technology base in which all data and information are stored in digital format. Secondly, an emerging convergence whereas one single device could perform multiple functions, such as for telecommunications, multimedia, entertainment, etc. In anticipation of the global economic crisis which was feared could discourage investment, ITU (International Telecommunication Union) finally decided that the convergence policy should be implemented not only for the terminal but also toward the infrastructure, which could then divided into passive- and active-convergence.

Thirdly, internet protocol will serve as a reference, whereas internet network can be used for a range of activities, from voice telecommunications,

multimedia, data telecommunications, television as well as radio broadcasting and many other activities online (e.g. e-commerce, e-government, e-education, e-health, etc.). Fourthly, demand for broadband connection has become an unwavering necessity. Fifthly, wireless telecommunications media are set to replace wired media which in turn will effectively encourage the dominance of mobile activity (for instance m-banking, m-internet, etc.). Sixthly, due to the rapid technological advancement, policy-making has also become even more dynamic; nonetheless, it should be noted that the vision to be achieved remains, which is to expand coverage to as many people as possible.

By taking the above-mentioned themes into account, it can be argued that a monopolistic telecommunications industry would lead to an uncompetitive service delivery which is in contrary with global tendency and the basic role of telecommunications as a means to improve the socio-economic condition.

### **3. National Telecommunications Condition**

Judging from the existing utilization level and growth rate, the national telecommunications condition in Timor-Leste is reasonably encouraging. There are two types of telecommunications service, i.e., the fixed line and mobile telecommunications. The following table shows the condition of telephone service condition in the country.

Table 4.30 - Telephone Service Density

Telephone Service Subscribers by Type	2007			2008			2009	Increase	
	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4		
<b>Fixed Phones</b>									
Residential*	435	440	339	328	337	326	331	348	-20.00%
Rate of change	XXX	1.15%	-22.95%	-3.24%	2.74%	-3.26%	1.53%	5.14%	
Business	779	801	815	798	780	831	853	953	22.34%
Rate of change	XXX	2.82%	1.75%	-2.09%	-2.26%	6.54%	2.65%	11.72%	
Government	752	749	753	792	831	817	847	910	21.01%
Rate of change	XXX	-0.40%	0.53%	5.18%	4.92%	-1.68%	3.67%	7.44%	
Others	598	541	550	564	588	588	610	437	-26.92%
	XXX	-9.53%	1.66%	2.55%	4.26%	0.00%	3.74%	-28.36%	
<b>TOTAL</b>	<b>2,564</b>	<b>2,531</b>	<b>2,457</b>	<b>2,482</b>	<b>2,536</b>	<b>2,562</b>	<b>2,641</b>	<b>2,648</b>	<b>84</b>
									3.29%
<b>Cellular Phones</b>									
Post-paid	2,116	2,152	2,192	2,444	2,546	2,685	2,764	3,012	42.34%
	XXX	1.70%	1.86%	11.50%	4.17%	5.46%	2.94%	8.97%	
Pre-paid	59,545	65,421	76,023	88,061	100,545	108,287	122,258	133,593	124.36%
	XXX	9.87%	16.21%	15.83%	14.18%	7.70%	12.90%	9.27%	
<b>TOTAL</b>	<b>61,661</b>	<b>67,573</b>	<b>78,215</b>	<b>90,505</b>	<b>103,091</b>	<b>110,972</b>	<b>125,022</b>	<b>136,605</b>	<b>74,944</b>
									121.54%

\* Embaixadas, Nacoes Unidas, Escolas, Igrejas/Embassies, UN, Schools, Churches

Source : Timor Telecom

From the table, it can be inferred that the growth rate of mobile telecommunications is fairly stunning. From the second quarter of 2007, the total fixed-line residential connection plummeted from 485 connections to 348 connections in the first quarter of 2009 or about 20% drop. At the same time, all categories of telephone utilization only expanded by 84 connections or a mere 3.29% increase. This condition is very different with the mobile telecommunications whereas in the same time frame, the number of subscriber grew by around 121.54% or about 42% for post-paid and 124% for pre-paid service. The following table shows the number of telephone subscribers for fixed and mobile phones during the period of 2004 -2008.

Table 4.31 - Growth Rate for Fixed and Mobile Telephones

Year	2004	2005	2006	2007	2008
<b>Telephone Subscribers by Type</b>					
Fixed phone	2,115	2,351	2,521	2,457	2,641
Annual rate of change	XXX	11.16%	7.23%	-2.54%	7.49%
<b>Cellular phone</b>					
Cellular phone	25,722	33,072	49,100	78,215	125,022
Annual rate of change	XXX	28.57%	48.46%	59.30%	59.84%
<b>Internet subscriber</b>					
subscriber	601	738	834	803	926
Annual rate of change	XXX	22.80%	13.01%	-3.72%	15.32%

The data above shows that in the last couple of years the growth of mobile telephone grew by more than 50%. The density level also showed significant improvements, as can be seen from the following table.

Table 4.32 - Density Growth for Fixed and Mobile Telephones

Year	2004	2005	2006	2007	2008
<b>Telecom subscribers by type</b>					
Fixed phone	2,115	2,351	2,521	2,457	2,641
Population	952,002	983,369	1,015,187	1,047,632	1,080,742
Density	0.222%	0.239%	0.248%	0.235%	0.244%
Cellular phone	25,722	33,072	49,100	78,215	125,022
Annual rate of change	952,002	983,369	1,015,187	1,047,632	1,080,742
Density	2.702%	3.363%	4.837%	7.466%	11.568%
<b>Internet subscriber</b>					
Subscriber	601	738	834	803	926
Population	952,002	983,369	1,015,187	1,047,632	1,080,742
Density	0.063%	0.075%	0.082%	0.077%	0.086%

The mobile phone density growth is quite promising; even reached 11% (2008). However, in comparison with the total population, the number of subscribers needs to be improved.

#### 4. Regulatory Framework

The targets and policies of the government in the field of telecommunications is how to reap maximum benefits from the advancement of appropriate telecommunications technology so that the public can obtain affordable

services effectively and efficiently. This requires policies and arrangements to avoid distortion of market mechanisms.

To tackle the issues, there have been two regulations passed to govern telecommunications, which is:

- a) Decree-Law 11/2003 on Establishing the Bases for the Telecommunications Sector
- b) Decree-Law 12/2003 on Establishing the Communications Regulatory Authority and Approving the Statutes thereof

The main objective to be achieved by Decree-Law 11/2003 is to serve as a general guideline for development, management, and operation of the infrastructure as well as telecommunications service delivery.

The basic principles of the regulations are:

- a) Ensure the existence and availability of universal services, including minimum telecommunications services, throughout the nation, permanently, with adequate quality and affordable prices for all people;
- b) Ensure financial and economic feasibility of the universal service through the provision of exclusive services and funding (subsidy);
- c) Ensure that the competitive service is performed by providing equal access to markets, while implementing the rules to keep the competition intact;
- d) Ensure that consumers, in any circumstances, receive equal treatment in access to and utilization of telecommunications services.

Decree-Law 12/2003 on Establishing the Communications Regulatory Authority and Approving the Statutes was enacted to ensure that the regulation can be implemented well. Therefore, the Regulatory Communications Authority (ARCOM) is expected to work independently according to its authorities as a public institution with the following tasks:

- a) Publishes the appropriate telecommunications regulation and oversees the marketing agent behaviour;

- b) Provide permission and monitor the use of frequencies throughout the national territory;
- c) Evaluate the Timor Telecom contracts and review the system for telecommunications monopoly in reaping the benefits of competition for the progress of Timor-Leste;
- d) Connect phones to the districts and increase the coverage area;
- e) Increase permanent connection;
- f) Disseminate the internet connection throughout the country, and to improve the interconnection of computer networks of government agencies, the use of VOIP for government agencies, and to develop rural telecommunication;
- g) Development of Post Company capable of supporting administrative and financial autonomy of the region and to build the necessary postal infrastructure throughout the country.
- h) Establish mechanisms for natural disaster management system through the application of automatic data acquisition in order to detect possible seismology and tsunami. The system should also perform the function of weather forecasting and measuring rainfall.
- i) Bridge the admission of Timor-Leste as member of WMO (World Meteorology Organization).

## 5. Strategic Programs

### a) Regulation

Regulations on telecommunication which have been previously mentioned are:

- i) Decree-Law 11/2003 on Establishing the Bases for the Telecommunications Sector;
- ii) Decree-Law 12/2003 on Establishing the Communications Regulatory Authority and Approving the Statutes thereof

To implement policies on point 4 Part 4 regarding regulations, specifically regarding the need to form Telecommunications state-owned enterprises, there are a couple of regulations to be added as follows:

- i) Decree Law on the establishment of telecommunications state-owned enterprises
- ii) Decree Law on the purchase of Timor Telecom shares by the telecommunications state-owned enterprises

b) Policy

In order to fully utilize the advancement of telecommunications technology, by taking into consideration the buying power of the people and the development of G-3 or even G-4 telecommunications technology, there are several things to do:

- i) In the future, telecommunications will be done mostly on the internet platform (internet protocol) where all of communications services (voice, data, multimedia, broadcasting) can be done on top of it; therefore, low-cost broadband services need to be realized in the country;
- ii) Internet broadband backbone can be built on a fixed-line connection such as fibre-optic or fixed wireless like Wi-max or G-4 which are both technologically advanced and also more efficient in the use of bandwidth;
- iii) With many development priorities but only a limited amount of fund to be allocated, establishing backbone broadband wireless internet would be the most optimal choice;
- iv) In order to accelerate the implementation of government policy deployment in the field of telecommunications so that the development process of Timor-Leste can be accelerated, an establishment of telecommunications state-owned enterprises is seen as the best option. The enterprises could then bid and purchase a significant portion of Timor Telecom shares so that it could play a major role in determining company policy including public service acceleration which supports the implementation of government programs. In this case, there would not be a conflict

vis-à-vis government license which is disseminated by the government for Timor Telecom, which could also be an opportunity to gain knowledge of how to operate for Timor-Leste natives whenever the current license has expired.

## 6. Institutional

From earlier narratives, it has been pointed out the need to expand the role of telecommunications to accelerate development process in Timor-Leste. Therefore, as far as the institutional issues are concerned, the following institutions must be developed:

- a) Telecommunications state-owned enterprises, with the purchase of Timor Telecom shares, would become government representative as one of Timor Telecom shareholders.
- b) Task force of information technology utilization for various public services, among them are:
  - E-government, which is an IT application for government-related issues, in order that governmental tasks in all level can be well-implemented.
  - E-education, which is the use of IT to improve education quality, including quality improvement for the teachers and materials.
  - E-health, which is the utilization of IT to improve society health services quality, such as the preparation of human resources, data deployment for medical record.
  - E-commerce, which is the use of IT to enhance business, especially for local products of Timor-Leste which are feasible for going-global.
  - E-broadcasting, which is the use of IT to expand the TV and radio broadcasting coverage. With an intense and measured exposure, it is expected that a pro-development society behaviour can be cultivated.

## 4.4.2 Power

### 1. Overview

The power system in Timor-Leste is small and fragmented and mainly based on medium and small diesel power plants.

All the generators in Timor-Leste at present are thermal generator sets using diesel fuel. The total national installed capacity for the whole of Timor-Leste is about 40 MW of which the installed capacity in Dili alone is 20 MW, and in all other places are between 1.0 and 1.5 MW. There is a separate independent 50Hz 20kV local power network in Dili.

In first quarter 2009, about 194.998 households have access to electricity, amounting to an overall electrification rate of around 19.55%. Currently, all power generation is based on diesel generation, using automotive diesel oil as fuel. The Dili power station has several medium-speed diesel engines, while in all the other systems only high-speed diesel units are being used.

Table 4.33 - Electrification Ratio

Indicator	PLN - 1998	PSDP - 2003
Sucos with electricity	127	184
Total Sucos	442	498
Electrification Ratio (%)	28,7	36.9
Households with electricity	38.133	36.471
Total Households	189.600	175.860
Electrification Ratio (%)	20,1	20,7

Source: Ministry of Transport, Communication and Public Works

The Dili system operates 24 hours per day, but all district and sub-district power systems outside Dili operate approximately 5–6 hours per day, except for the Baucau, which operates 24 hours per day, Maliana (Bobonaro) which operates 12 hours per day and Suai (Covalima) which operates 12 hours per day.

Table 4.34 - Electricity Recapitulation at Timor-Leste in the First Quarter of 2009

No	District	Generating Type	Operating Hours	Generating Capacity (Kva)	Number Of Consumer	Number Of Household (Census 2004)	Electrification Ratio
1	Dili	Diesel	24 Hour	32.583,00	15.513	31.575	49,13%
2	Ermera	Diesel	6 Hour	2.452,50	1.807	21.165	8,54%
3	Aileu	Diesel	6 Hour	865,00	1.235	7.745	15,95%
4	Covalima	Diesel	12 Hour	3.156,00	1.252	11.820	10,59%
5	Bobonaro	Diesel	12 Hour	4.848,10	3.154	18.397	17,14%
6	Liquica	Diesel	6 Hour	125,00	74	11.063	0,67%
7	Manatuto	Diesel	6 Hour	2.585,00	2.270	8.338	27,22%
8	Ainaro	Diesel	6 Hour	1.692,50	1.184	11.527	10,27%
9	Manufahi	Diesel	6 Hour	973,00	1.432	8.901	16,09%
10	Baucau	Diesel	24 Hour	4.947,00	4.031	22.659	17,79%
11	Lautem	Diesel	6 Hour	3.228,00	2.106	12.998	16,20%
12	Viqueque	Diesel	6 Hour	1.796,00	2.737	15.115	18,11%
13	Oucusse	Diesel	6 Hour	2.305,00	1.127	13.695	8,23%
<b>TOTAL</b>				<b>61.656,10</b>	<b>37.922</b>	<b>194.998</b>	<b>19,55%</b>

Source : *Electricidade de Timor-Leste, 2009*

There is no reliable information on how power consumption is divided among residential, commercial, industrial, and public sectors. This lack of information systems is derived from the shortcomings in the billing system and the use of fixed connection and flat rates. Table ... gives an estimate on the electricity balances in Timor-Leste (only Dili).

In 2007, Manitoba Hydro International (MHI) signed a five-year management services contract with the Government of the Democratic Republic of Timor-Leste (GoTL) to manage the operations of the state-owned electrical utility Electricidade de Timor-Leste (EDTL). Five resident team members are supported by short term experts in the areas of Human Resources, Information Technology, Generation Planning, Service Quality, Procurement, and other areas on an as-required basis. EDTL is responsible for electricity generation, distribution and associated operations throughout the country's more than 60 districts and sub-districts.

Table 4.35 - Estimation of Electricity Balances at Timor-Leste (only Dili)

Description	Unit	2007	2008			2009	2010	2013	2014	2015
Consumption (Dili Only)										
Domestic	kWh	4.768	9.337	10.738	12.348	14.200	16.330	18.780	21.597	24.837
Commercial	kWh	13.251	22.985	26.433	30.398	34.957	40.201	46.231	53.166	61.141
Government	kWh	8.615	12.109	13.925	16.014	18.416	21.179	24.356	28.009	32.210
Others*	kWh	1.355	1.818	2.091	2.404	2.765	3.180	3.657	4.205	4.836
TOTAL	kWh	27.989	46.249	53.186	61.164	70.339	80.890	93.023	106.977	123.023
Consumption Increase Assumption	%			15	15	15	15	15	15	15
Losses (T&D)	%									
Own Losses	%									
Total Losses	%	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Load Factor	%	6.816	10.513							
Production	kWh	17.914	27.629	32.583	52.950	56.657	60.623	64.867	69.407	74.266
Peak Load	MW	30	30							
Current Capacity	MW		44	44	41	40	39	38	37	36
Current Capacity (**)	MW		180			0	0	0	0	0
RESERVE MARGIN	%					40%	40%	40%	40%	40%

\* Igrejas, Escolas, Embaixadas/Churches, Schools, Embassies

Source : Electricidade de Timor-Leste

As part of its five-year comprehensive corporate plan for EDTL, Manitoba Hydro International (MHI) has identified and begun to implement many improvements to the system, as well as developing plans for alternative sources of power supply, including hydroelectric development and a new barge-mounted Heavy Fuel Oil (HFO) power plant to replace the aging Comoro diesel generating station. Manitoba Hydro International (MHI) has also spearheaded the introduction of a staggered-tariff “user-pay” system, which will provide a lifeline subsidy for consumers with very low income levels.

The economic, social, political and security development of a nation or region requires the support of a reliable supply of energy. Electricity has an important role in inducing various economic activities and for enhancing the welfare of the people. On the other hand, the development of electricity facilities and infrastructure requires very substantial investment as the investment in electric power is capital-intensive and technology involving high risk and has a long maternity period.

A major development for power generation and distribution in Timor-Leste is the purchase and installation of two heavy fuel generating plants (150 MW), a 90 MW power plant on the north coast in Manatuto and a 60 MW on the south coast in Manufahi, which will meet the nation's electricity requirements well into the future. With the addition of a 30 MW generating station in Hera (Dili district), Timor-Leste's new power capacity will reach to 180 MW of power. This initiative will also include a major program of developing, over the next three years, a transmission and distribution network (110 kV) that will deliver electricity to all major population centres.

**Table 4.36 - Power Generation and Distribution in Timor-Leste**

Service Area	Power Generation (net)		Peak Power Generation (net)	
	GWh	% of total	kW	% of total
Dili	53.3	84.7	12,500	67.2
Other district capitals	8.5	13.5	5,234	28.1
Rural areas	1.1	1.8	878	4.7
Total	62.9	100.0	18,612	100.0

Source: Ministry of Transport, Communication and Public Works

To guarantee that economic activities can run well in all of Timor-Leste, electricity plants will be built on both the northern shore line and southern shore line connected by a distribution line (110 kV). The connecting line will be built in the middle part of the country to connect the northern and southern networks.

As we know, an electricity crisis can make investor hesitant on investing in a country, because electricity is a primary need for their businesses. With the have adequately electricity levels, Timor-Leste can gain development in various sectors that can lead to people's access to level basic services, job creation, economic growth and poverty reduction.

## 2. Problems and Constraints

### a) Legal and Regulatory Frameworks:

- There is no framework to promote private sector involvement in the power sector;
- Lack of regulations for responsible, proper, safe and efficient operation of facilities and activities;
- A need for quality service regulations.

b) Data and Information:

- Need to calculate the number of subscribers and power consumption levels;
- Generate billing for all districts;
- Collect all outstanding payments and debts.

c) Capacity:

- The lack of natural resources to build supporting infrastructure;
- The lack of human capacity to plan, build, and operate the power sector facilities and services.

d) Technical:

- High cost of imported diesel fuel
- Low billing collection rates

e) Program:

- Weak implementation of renewable energy resources
- Need system rehabilitation to increase efficiency and reliability

### 3. Strategy

a) Target

Development for power generation and distribution in Timor-Leste through:

- The purchase and installation of two major heavy fuel generating plants (150 MW); a 90 MW power plant on the north coast in Manatuto and a 60 MW on the south coast in Manufahi, this will meet the nation's electricity requirements well into the future
- Adding a 30 MW generating station in Hera (Dili district)
- Timor-Leste's new power generating system will have 180 MW of power. This initiative will also include a major program of developing, over the next three years, a transmission and distribution network (110 kV) that will deliver electricity to all major population centres
- Increase electrification rate to 40% in 2015

- Reinforce the existing electricity network and create new networks of electrical power to the remote areas of the country
- Continue a program to remove illegal connections. This will improve public safety and reduce output on the system significantly, with the result of less power outages across the system
- Establishment of legal framework, regulations and institutions that will support the development of the electricity sector over the medium term and long-term

b) Policy Framework

- **Short Term:** increase power capacity, expansion of transmission and distribution networks, reaching an electrification ratio of 60%, strengthening the EDTL institution
- **Mid Term:** achieve 100% electrification ratio and the diversification of primary energy sources, commercial management of EDTL
- **Long Term:** increase service quality and energy conservation

4. Program

a) Short Term

- i) Establish a new generators, transmission and distribution lines;
- ii) Achieve a 24-hour standard of service at the district level;
- iii) Provision of new connections for priority areas;
- iv) Education and training for EDTL employees;
- v) Education of effective electricity use for customers.

b) Medium Term

- i) Expansion of distribution networks to reach all the houses in Timor-Leste;
- ii) Conversion to some plants to gas power;
- iii) Development use of alternative energy as a source of electricity;
- iv) Establish EDTL as a business entity managed by the Government run with business principles.

c) Long Term

- i) Strengthening the electricity system of through the redistribution of power and load;
- ii) Achieve an ideal energy mix of renewable and non-renewable energy sources.

### 4.4.3 Transportation

#### 1. Overview

Timor-Leste's transportation system framework will be addressed to three integrated transportation development, such as **land transportation, sea transportation and air transportation**. The integration of three transportation system will be synergy to enhance optimum capacity for internal and external mobility and other side to develop service area in wide area. Maritime transport, road and aviation sector in Timor-Leste have the potential to quickly deliver important social and economic development benefits. However, the state of the road network has become a bottleneck to development rather than a platform for growth. The condition of the road network is generally poor, and sections fail regularly during the rainy season, resulting in rural populations in particular having limited access to towns and markets.

Timor-Leste has a basic public passenger transport system, relying on overland buses which serve between Dili and all major district capitals as well as *microlets* and taxis, which serve the urban areas in Dili, Baucau and Maliana. While maritime linkages are operated through the Port of Dili which is operational, some additional landing sites are Suai, Baucau, Atauro. There are regular ferry services between Dili and Oecussi (twice a week) and Dili and Atauro (once a week). The ferry services are performed by the Ferry "BERLIM NAKROMA", which is owned by Timor-Leste.

#### 2. Transport Demand

Current transport demand in Timor-Leste is modest. A road investment study<sup>7</sup> estimated the operational vehicle fleet in first quarter 2009 to be about 40,595 vehicles, comprising 24,774 motorcycles and 9,929 Station

<sup>7</sup> The Louis Berger Group and Kai Watu Kmanek (2005) "Transport Sector Improvement", prepared for the Asian Development Bank .

Wagon / Mini Buses / Jeep / Automobile (private cars and taxis), 3,320 Mini Track / Pick-up / Vans, 58 buses, and 2,311 trucks and 101 Heavy Vehicles / Forklift / Loader / Farm Vehicles and 2 Ambulance. More than three-quarters of the vehicles are registered in Dili District.

Vehicle ownership in Timor-Leste is low, at 24 vehicles per thousand people. A 2001 household survey indicated that only three percent of people live in households with a motorbike and less than one percent in households with a car or truck. Small vehicles dominate the bus fleet, with micro- and mini-buses having up to 20 seats accounting for 90 percent of buses.

Traffic counts conducted for the recent road investment study shows that only 10 percent of the national road network (i.e., which excludes urban roads) carries more than 600 motorized vehicles per day. The heaviest traffic flows (in excess of 500 vehicles per day) are on the northern coastal road (Liquica-Dili-Manatuto) and the north-south link between Dili and Aileu. About half of the national road network carries less than 200 vehicles per day. The average traffic volume on national roads was 260 vehicles per day, comprising motorcycles (28 percent), cars (3 percent), four wheel drive and pickups (22 percent), buses (19 percent), and trucks (28 percent). Traffic movement on district roads is considerably lower, averaging 36 vehicles per day.

Estimated that traffic growth would typically be about 20 percent faster than economic growth (i.e. with traffic growing at 6 percent per annum given potential medium term economic growth of 5 percent per annum estimated by the IMF). Higher rates of traffic growth can be expected where roads are substantially improved, with the study estimating up to 40 percent additional traffic on roads improved from a very poor to good condition.

At Dili Port, 20,613 containers (twenty-foot equivalent units - TEU) passed through the port in 2003, rising to 22,058 containers in 2004. The 15,154 containers passed through the port in 2005, rising to 15,141 containers in 2006. The 22,198 containers passed through the port in 2007 and increase to 22,867 containers passed through the port in 2008. Traffic through the port is highly imbalanced. In 2004, virtually all incoming containers were full but 91 percent of outgoing containers were empty.

The Transport Sector Master Plan (TSMP) prepared by the Asian Development Bank in 2002 forecast that total movement through the port would decline by almost a half from the 300,000 tonnes in 2001 when the UN Peace-Keeping Force (UNPKF) and related assistance was completed, but would then rise by an average of almost five percent per annum due to economic growth. The TSMP estimated that the number of containers moving through the port would recover to the level in 2001 by about 2011. The number of container was increase again in 2007 and 2008. So we hope that the number of container will be increase for the coming year. Virtually all incoming containers were full but 95 percent of outgoing containers were empty.

The number of passengers passing through Timor-Leste's international airport in Dili fell from 118,300 in 2002 to 93,000 in 2003 and 81,300 in 2004 as UNPKF and related assistance was wound down and has kept similar level until 2008. Airfreight is heavily influenced by the presence of external assistance, and hence was 488 tonnes in 2002, 476 tonnes in 2003 and 254 tonnes in 2004. The trend in freight demand in the period 2005 – 2008 has been up, linked to mobilization/demobilization of external assistance. The TSMP forecast that passenger movement would rise at a rate five percent higher than growth in GDP in the longer term.

### 3. Legal and Regulatory Framework

The Government has implemented five laws to establish the essential framework for the transport sector (Table 1). All were passed in 2003. Implementing regulations for the laws are generally yet to be prepared. There will be a need for a road law at some stage to define, amongst other matters, the right-of-way for roads, conditions for land resumption for road development, and to formalize administrative responsibilities for roads. The Government has joined the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO) in 2005, which will impose new obligations on the aviation and maritime sub-sectors (Table 1. Principle Transport Law).

The Ministry of Infrastructure is the Government's main body responsible for civil works, urbanization, water and power supply, land, sea and air transportation, auxiliary communications services, including postal, telegraphic and telephonic services, as well as the other telecommunications,

use of radio frequencies, meteorological services and computers, besides the management of State equipment, heavy machinery and vehicles.

#### 4. Sector Responsibilities Within Government

The Secretary of State of Transport, Equipment and Communications (SETEC) is responsible for the maritime and aviation sub-sectors regulation of land transport and management of the government's equipment pool, and the Secretary of State of Public Works (SEOP) is responsible for provision and management of roads. Both ministries have responsibilities in other sectors besides transport. The Directorate of Roads, Bridges and Flood Control (DRBFC) in SEOP is responsible for provision and management of all road infrastructure, including rural and feeder roads. It operates through a central administration and five regional offices (in Dili, Baucau, Same, Maliana and Oecussi). The National Directorate for Land Transport (NDLT) is a regulatory agency, while the Directorates of Sea Transport (DST) and Civil Aviation (DCA) are responsible for both the provision and management of infrastructure and regulatory activities in their respective sub-sectors. Transport sector responsibilities are summarised in Table 4.37.

Table 4.37 - Principal Transport Laws

Law	Name	Function
Law No. 1/2003	Basic Law for Civil Aviation	Aircraft and flight safety and security; defining airspace; institutional arrangements; industry regulation and airport charges.
Law No. 2/2003	Basic Law for Vehicle Transport	Vehicle registration; road charges; regulation of passenger and freight transport services and passenger fares; planning and coordination of public infrastructure provision.
La No. 3/2003	To Establish a Ports Authority of Timor-Leste (APORTIL)	Establishment of a port authority with its own Board and finance committee; relationship between the authority and the Government; tax-free status; cost recovery.
Law No. 4/2003	Establishing Minimal Conditions for Security and Management of Sea Transport Not Covered by SOLAS Convention of 1974	Applies to vessels less than 500 tonnes used for international transport; empowers Harbourmaster to inspect vessels.
Law No. 6/2003	Road Code	Road rules; traffic management; classification and use of roads; vehicle categorization; fines; vehicle emissions; accident reporting; driving licensing

Table 4.38 - Transport Sector Responsibilities

Function	Land Transport	Aviation	Maritime
Sub-sector policy	MPW, DLT	DCA	DST
Transport infrastructure			
- Planning	DRBFC	DCA	DST
- Management	DRBFC	DCA	DST
- Operation	DRBFC	DCA	DST
- Delivery of works and maintenance	DRBFC, DEM, private sector contractors, community	private sector contractors, DCA	private sector contractors
Transport services			
- Delivery	Private	Private	Government/private
- Regulation & enforcement	DLT, police	DCA	DST

## 5. Objectives & Institutional Setting

As indicated in the National Development Plan, the Government recognizes that “Having effective systems of physical infrastructure and services is crucial for agricultural productivity and poverty reduction, a determinant of business investment, instrumental to human development, and the foundation for private sector development” (NDP, 2002:263). The Government’s supporting vision is “To plan for, provide and manage physical infrastructure that is efficient, cost-effective, and financially sustainable, and which supports the social and economic development priorities of the people of Timor-Leste” (NDP, 2002:263). Effective development of the transport sector will support these objectives by enhancing the potential for the sector to be self-financing in the longer term; aid regional development to support food security, poverty alleviation and to discourage a population drift to Dili; support social development through improved access to health and education services; improve environmental outcomes; and make effective use of the private sector.

### a) Land Transport

The Government’s objectives for roads, bridges and flood control are to: identify the national, district and rural road network essential for the

support of economic and social development; initiate policies with a legal and regulatory framework, for order of the territory that improves quality of life, encourages private enterprise, and improves access and safety particularly in impoverished areas; develop roads, bridges and topologies of flood control that provide environmental protection and reverse existing ecological damage; ensure development and regulation for the safe circulation of transport; ensure transport infrastructure meets national defence imperatives, establish technical standards for a national road network; to preserve existing road assets as the first priority through sustainable maintenance and long-term management plans for support systems; establish an institutional structure and develop technical and administrative capacity of Timorese staff to manage, maintain and improve the road network; implement sustainable strategies for the maintenance of rural access roads; and establish and implement erosion control measures to prevent damage to physical infrastructure and economically valuable property (NDP, 2002).

Objectives for land transport management are to: establish institutional capacity to support growing demand for land transport services; create sustainable regulatory processes for ensuring safe vehicular utilization, effective traffic control, and appropriate licensing and registration of all vehicles; coordinate service requirements with those of road building, urban and rural road construction, and infrastructure systems that can achieve the national objectives of economic growth and poverty reduction; resolve the problem of saturation of major road arteries through improved accessibility for outlying and remote population areas; reduce import dependence on oil through increased use of public transport and improve energy efficiency of road vehicles; pursue optimal models of regulation and technical knowledge from established and comparable land transportation systems, incorporating these into Timor-Leste; implement a national public safety program for driving and maintaining all road vehicles through driver awareness campaigns and public information services; formulate regulations with traffic and vehicular rules governing safe and legal vehicle operation, and enforcement capabilities with appropriate penalties; and establish an effective policy for public transportation fees and charges, and a

To implement, support and monitor a public transport system an appropriate institutional structure will need to be introduced (Transport Authority). This is a prerequisite for implementing a reformed public transport system.

xi) Improved infrastructure

The provision of supporting infrastructure for public transport operations should be part of the development of the reformed public transport system.

The above strategies will form the basis for developing a future public transport system and were considered when evaluating the Scenarios for the long-term development of public transport.

- Improvement of national transportation system services
- Improvement of transportation safety and security
- Improvement of transportation business
- Improvement of manpower quality and development of transportation science and technology
- Improvement of environmental quality and energy consumption efficiency
- Augmentation of transportation development fund
- Improvement of transport related public administration quality

xii) Sustainable transport system (environment and economic)

The transport system has to be sustainable; both from an environmental as well as from an economic point of view. An improved public transport with increased ridership also has the advantage of decreased emissions from vehicles.

xiii) Support social & economic development

A well functioning public transport system that gives good access to activities in the community will have a positive impact on the possibilities for social and economic development.

xiv) Increased mobility

Increased mobility will make it easier to travel to and from work, school, and community services and to recreational areas. Increased mobility should be the overall goal that the public transport system has to support. The need for a passenger demand approach is obvious in contrast to the current supply-driven situation.

- Safety
- High accessibility
- Integrated
- Sufficient capacity
- Regularity
- Smooth and Speedy
- Convenience
- Punctuality (on time)
- Comfort
- Affordable tariff
- Discipline
- Security
- Low pollution
- Efficiency

**Table 1** – Estimated Average Daily Traffic in 2018

b) Sea Transport

The Government's objectives for maritime transport are to: develop a code of commercial maritime law; conclude ratification procedures on behalf of Timor-Leste of the United Nations Convention on the Law of the Sea; establish a registry of shipping for Timor-Leste; establish a modern system of port taxes and tariffs with effective enforcement capabilities that preclude contraband and corruption; pursue enactment of the law on public maritime domain in conjunction with the MEAD and with the MOJ; establish a public passenger sea transport service between Dili and Atauro, and between Dili and Oecussi; create a plan and institute a policy for regulation of national coastal traffic; achieve a national capacity for essential survey and inspection procedures, and thereon, for certifications regarding ship conditions,

materials safety, and hazards; train and develop East Timorese in special maritime studies abroad; improve port container and bulk handling while reducing congestion at Dili.

c) Air Transport

The Government's objectives for its civil aviation authority are to: attain a high standard of safe and efficient passenger service; establish effective air cargo systems for international and national transport; generate a reliable staff with qualifications required to ensure safe and effective airport operations comparable to the best airport facilities in the region; establish reliable and secure systems needed for an efficient mail and postal expediting hub and internal national postal support services; establish an appropriate financial system that allows the civil aviation administration to recover its full costs of operation; provide the ground facilities required to support military, air and land priorities; and support national development priorities and poverty reduction initiatives through indigenous staff recruitment, training, employment and district services (NDP, 2002:298).

d) Intermodal Transport

The need for management of intermodal linkages between sea and land transport at Dili is explicitly recognized in the NDP. Intermodal linkages are also important for the movement of goods from farms to markets, and for people who need to use more than one public transport vehicle to travel between their origins and destinations.

## 6. Transportation Policies and Programs

The improvement and increase in circulation of people and goods is a fundamental factor to encourage the economic growth the sustainable development throughout the entire the country. With regard to the transportation sector, the Government programmed shall accomplish the following objectives:

- a) Review the legislation relating the Road Traffic Law;
- b) Create public road transports, with tariffs that may benefit the poorest sections of population;

- c) Regulate the private transport sector, such as the taxi sector;
- d) Repair and increase traffic signage in the entire territory for the prevention of accidents;
- e) Encourage the expansion of a truck network for rural areas, with a view to support farmers and other sectors in the commercialization of agricultural surpluses and other goods;
- f) Review vehicle import taxes;
- g) Create mechanisms to decentralize the inspection of vehicles;
- h) Implement operability mechanisms of the compulsory insurance policy;
- i) Repair/renovate and increase the maritime ports in some regions to facilitate load/unload and passenger transport;
- j) Implement an adequate control system of the equipment and vehicles owned by the State and their respective maintenance.
- k) In the area of land transport, bring about support services in the Districts to promote the inspection and registration of vehicles and the concession of driving licenses in a timely fashion
- l) Adopt a competitive system for the international flight companies; With regard to air transport, it is important to note the need to regulate the airport activity and the construction of domestic airports in Same, Suai, Maliana and Oe-Cusse Ambeno and revitalize the Baucau airport;
- m) Create international sea lines or passenger trips, mainly in Timor-Leste Indonesia and Australia;
- n) With regard to sea transports, review the regulations on the port activity, on the construction of an inclined seaport at Tíbar Bay, in cooperation with the German Government, including a feasibility study plan of a commercial port in the same place;

The Government will continue to focus on developing a transport system that meets the needs of the economy and ensures essential community linkages

at the lowest possible cost. The short term need for emergency work to simply keep the transport system operational has been completed.

## 7. Traffic And Transport Management

### a) Urban traffic management

Investment in traffic management through improved signage, lane markings and traffic islands will enable more efficient and safe use to be made of urban roads. At present there is no significant expenditure on these works. Annual expenditure of \$0.2 million per annum needs to be allowed, giving a total of \$0.8 million over the period 2006/07 to 2009/10.

### b) Land transport management

A system for improved management of land transport is needed to enhance the safety of vehicles, enforcement of transport regulations, security of services, and Government revenue. A simple computerized vehicle registration system that provides information on the vehicle fleet in use in Timor-Leste is essential to allow annual vehicle registration fees to be imposed to generate increased revenue, to support environmental and road safety objectives, and to facilitate enforcement of transport regulations. The system needs to use regional offices for vehicle registration and inspection. Also needed is an accident reporting system and means for enforcing vehicle load limits. Implementation of these systems needs to occur within the context of a strategy for managing land transport.

### c) Public transport development

Public transport services in Timor-Leste are provided by the private sector in a generally competitive manner at present. However, there is a need to develop a clearer, light-handed regulatory system that improves the responsiveness of services to the needs of customers and ensures that reduced transport costs that will result from improvements to the road network are passed on to customers through lower fares and improved service quality. Appropriate regulations will be prepared in this study. There is also a need to rehabilitate current

terminal and develop new terminals. Terminals will preferably be placed in locations that meet the needs of bus users (e.g. in the centre of towns or by markets) – this may also require traffic management measures, including bus priority, to facilitate bus access to the terminals. Some of these issues were implemented before FY 2009.

d) Capacity building and staff development

The MLT needs technical assistance to develop its capacity for policy analysis to support optimal regulation and management of the transport sector, and to prepare implementing regulations for the current transport-related laws. The assistance would also better equip MLT to address unsolicited representations that are made to it by community, business and interest groups.

**8. Maritime and aviation infrastructure**

Maritime and aviation infrastructure is generally a better condition, though some essential works are required. The Government's vision for the maritime and aviation sub-sectors for the short period: Establish the basis for financially sustainable provision of port and airport facilities from user charges; ensure adequate commercial domestic services, supplementing commercial services for disadvantaged groups; facilitate international trade and tourism.

**9. Institutional Development**

Institutional development for road maintenance and development, and for technical support to enable these works to be designed and implemented; attention should now turn to the task of developing the capacity for Government agencies to plan and manage the road network. These are not tasks that can be outsourced to the private sector. Developing this capacity will require an overall Institutional Development Strategy which *reviews the organizational structures, establishes the functions and business processes that need to be retained within Government*, sets out the institutional and capacity building requirements, and a training program which recognizes that the business of these agencies has to continue while their staff are trained to take on new roles and responsibilities, this is not a short term task. A Project Management Unit (PMU) has been established within SETEC to manage the

implementation of the ADB funded projects. This PMU could be used as the basis for the development of a permanent project management function in SETEC, which over time could take over responsibility for management of all the projects in the road development program.

#### 10. Challenges , Outlook and Implications To Other Sector

There are a number of issues which continue to provide challenges to the Government in the Transport Sector, the new issues are:

- Need to focus on capacity building as well as project delivery
- Increase in funding for road infrastructure requires a strengthening of road program implementation
- Increase in funding for infrastructure also requires a strengthening of program development
- More focused 5 and 10 Transport Strategies are required to support the National Development Plan

Emerging transport issues in urban areas Issues and challenges from the previous SIP that remains, but with some changes are:

- Expenditure on infrastructure rehabilitation (especially road rehabilitation) should remain high for the next five years
- With rehabilitation underway, attention should turn from reactive and emergency rehabilitation to preventive maintenance and asset management
- Limited improvements to the infrastructure capacity justified by transport demand are now affordable
- Access in rural areas is not getting sufficient attention
- Creation of employment (especially for the youths) and (Social Impacts)
- Encouraging the private sector (sustainable construction industry)

Strengthening the agencies in RDTL to perform the government functions needed to manage the transport system is vital. The proposed scale of expansion of the program would test any agency anywhere, but SETEC does not have the level of staff or expertise to be able to scale up to meet this increased demand.

Increase in funding for infrastructure also requires a strengthening of programs for road, port and airport development. The investment programs currently being used were developed very much to deal with rehabilitation of assets to a safe working condition so as to provide a basic transport service, and to ensure a basic level of connectivity within the country. There were prepared in a context of funding being scarce, so the actual projects that could be implemented in any year were limited. Decisions on which projects to implement and in which order did not require more than fairly simple economic analysis. A clear process needs to be in place to ensure the most efficient and effective use of financial resources. Further development of Government capacity for transport planning and evaluation is needed to ensure that development of transport infrastructure (and road infrastructure in particular) continues to be integrated with economic development plans in other sectors and maximizes economic and social returns to Timor-Leste. In the last few years has been to restore the operability of the transport system.

The rehabilitation programs will restore and strengthen deteriorated pavements to their originally design standard and width, using low cost treatments. As the road sections are returned to good condition, they will need to be included in a maintenance program that ensures they remain in good condition, through regular routine and periodic maintenance that is adequately funded.

The challenge is to develop cross agency and cross sector programs that provide the access that is needed in rural areas for farming, schools, clinics, health services and economic growth.

Gaining community consensus and support for the development and maintenance of roads is essential for the efficient implementation of projects and maximization of project benefits. Community support and contribution will also be essential for the sustainable maintenance of the extensive rural and feeder road network in Timor-Leste. The risk for transient transport operators and workers to introduce adverse health impacts on local communities will also need to be addressed.

Transport is affected by the environmental circumstances in which it operates and also impacts the environment. The Government recognizes the effect of factors such as deforestation on increasing the quantity and velocity of water

run-off, which contributes to land slips and erosion of roads. These matters are being addressed through other policy initiatives of the Government. Emissions of greenhouse gases and other pollutants from road transport are modest given the small number of motor vehicles in use in Timor-Leste. Modest traffic volumes, limited congestion and low population density reduces the health impact of the emissions on the community.

Key concerns for the Government are to ensure that transport users can be confident about the safety and security of services and the reasonableness of fares. The recent road investment study has also noted the need for regulations to ensure a competitive transport industry so that reduced vehicle operating costs resulting from improvements to the road system are passed on to users of transport services as lower fares and improved services rather than retained as excess profits by service providers. The latter will be achieved by encouraging an efficient and competitive private sector transport industry. As regulations increase business and government costs, the Government will avoid excessive intervention. It will ensure that regulations focus on ensuring vehicles are safe, drivers are well-trained and respectable, and that the community can be certain about maximum fares for basic services. Operators will be permitted to charge lower fares than these maximum rates. New operators will be allowed to enter the transport industry to maintain competitive pressure for lower costs and service innovation. There will be no regulation of fares or services for freight transport or premium bus services.

Appropriate user charges improve economic efficiency and social equity. This is especially so in the road transport sector, where the low level of **fuel tax** and the absence of registration fees encourage more travel than is optimal, especially by large vehicles that consume more fuel, and thus increase the demand for foreign exchange. They also provide an effective subsidy to the small group in the community who are sufficiently well-off to own vehicles. Moreover, raising revenue from other taxes to cross-subsidize the provision of transport infrastructure may withdraw resources from other expenditures that provide services to the socially and economically disadvantaged.

Over time, consideration will be given to **vehicle registration fees and fuel taxes** that share the cost of providing roads equitably amongst road users in

relation to the damage caused and use made of the road system. A balanced approach is needed, including *assessment of the willingness and ability to pay of road users and of the implications of using other sources of revenue to finance roads*. A rise in fuel prices of 10 percent will increase the cost of travel by public transport, for example, by about 3 percent. The need to improve the level of cost-recovery is not urgent given the other issues facing the Government, though some refinement of current charges may improve their equity.

The retail price of fuel in Timor-Leste is not high by international standards. However, it is high given the low level of fuel tax (e.g. see Pacific Islands Forum Secretariat 2004). Consideration will be given to means for reducing the cost of imported fuel to a level comparable to countries similarly situated to Timor-Leste. Introducing an off-setting fuel tax could raise additional revenue to the Government of about \$1.5 million per annum. An annual vehicle registration fee of \$100 per vehicle plus an administrative charge could generate net revenue to the Government of \$1 million per annum.

#### 4.4.4 Road and Bridges Development

##### 1. Overview

Roads provide access to rural Timor-Leste, where the majority of the poor live. They link rural communities to markets, to services and to participation in the wider society. Urban roads sustain important commercial, industrial and service activities in towns. Timor-Leste has an extensive road network, but it is in poor condition. The road network is strongly influenced by its spatial and physical environment. A main arterial road runs along the semi-arid northern coast, serving the economic activity around Dili and along the coast. Connections with the southern economic zone cross a mountainous and midland area, which includes steep lands of unstable rock and poor soils that are highly susceptible to erosion and landslides. The southern coastal zone, which has higher population density, agricultural production and energy reserves, has a moister climate and comprises alluvial formations and numerous rivers which aggrades and are prone to changing course during the monsoon rain period.