



TIMOR-LESTE: POWERING INFORMATION COMMUNICATION TECHNOLOGY POLITICAL ECONOMY ASSESSMENT

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TIMOR-LESTE: POWERING ICT Political Economy Assessment

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LIST OF ACRONYMS

ADB	Asian Development Bank
AIFFP	The Australian Infrastructure Financing Facility for the Pacific
AMP	Alliance for Change and Progress
ANC	National Authority of Communications (Autoridade Nacional de Comunicações)
ANE	National Authority of Electricity (Autoridades Nacional da Electricidade)
APCICT	Asian and Pacific Training Centre for Information Communication Technology for Development
AP-IS	Asia-Pacific Information Superhighway
ATLTL	USAID's Advancing Timor-Leste's Autonomous Telecommunications Landscape
AUD	Australian dollar
CAGR	Compound Annual Growth Rate
CNEFP	Centro Nacional de Emprego e Formação Profissional
CNI 22	China Nuclear Industry 22nd Construction Company Ltd.
CNRT	National Congress for Timorese Reconstruction (Congresso Nacional de Reconstrução de Timor)
COBP	Country Operations Business Plan
CPS	Country Partnership Strategy
DFAT	Australian Department of Foreign Affairs and Trade
EDGE	Enhancing Development and Growth through Energy
EDTL	Electricidade de Timor-Leste
EDTL, E.P.	Public Electricity Company of Timor-Leste, E.P.
ETO	Esperanca Timor Oan
FEED	Front-End Engineering Design
FM	Frente Mudança
Fretilin	Revolutionary Front for an Independent East Timor
GNI	Gross National Income
GoTL	Government of Timor-Leste
ICT	Information and Communication Technology
IF	Infrastructure Fund
IoT	Internet of Things
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
KHUNTO	Kmanek Haburas Unidade Nasional Timor Oan
km	Kilometer

kWh	Kilowatt-hour
LNG	Liquefied Natural Gas
MPW	Ministry of Public Works
MTC	Ministry of Transport and Communications
MW	Megawatt
NWCS	Australia's North Western Cable System
O&M	Operations and Maintenance
OPWG	Optical Ground Wire
PEA	Political Economy Analysis
PLP	People's Liberation Party
PUDD	Party for Unity and Democratic Development
SDP	Strategic Development Plan
TIC Timor I.P.	Information and Communication Technology Agency
UDT	Timorese Democratic Union
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific

EXECUTIVE SUMMARY

The political economy of Timor-Leste is always changing and understanding the contemporary backdrop in the country's Information and Communications Technology (ICT) and power sectors is imperative to operationalize the dark fiber capacity of Electricidade de Timor-Leste's (EDTL) transmission lines. Timor-Leste, a young country with a population of 1.3 million, has an emerging ICT sector characterized by only one-third of its population having access to broadband services, an apparent digital divide, the presence of three major mobile operators (after liberalization in 2012), and persistent challenges in infrastructure availability and affordability. The country's power sector also faces a number of challenges related to high technical and non-technical losses, weaknesses in the distribution network, and high cost of generation. The country's vertically integrated electric utility, EDTL, is a monopoly and state-owned enterprise that lacks the technical capacity and commercial expertise to maintain a reliable power supply. The sector's newest stakeholder is the Autoridades Nacional da Electricidade (ANE), a regulatory authority within the Ministry of Public Works.

Timor-Leste's Strategic Development Plan 2011-2030 is a 20-year vision that underscores the country's commitment to update and improve electricity generation, transmission, and distribution systems and ensure that all citizens have access to reliable, affordable, and high-speed Internet. The country has issued legislation and regulations for the power sector, with additional legislation planned, but there are no existing regulations that guide the leasing of transmission dark fiber for connectivity purposes.

The following findings represent dynamics in both sectors that may impact the operationalization of EDTL's dark fiber capacity. EDTL is challenged by a lack of technically competent human resources, while its ongoing corporatization process is in a transition period that may be further delayed by political uncertainty as the country has elections scheduled in 2022 and 2023. The transmission operations and maintenance (O&M) contract with the Chinese firm CNI 22 expired in late 2021, but the contract was granted a short-term extension through June 2022. As part of the Asian Development Bank's technical assistance to EDTL, it supported the preparation of tender documents to procure O&M services. This procurement is expected to be completed in May 2022 with a new contract anticipated to start in June 2022. The procurement process for the new vendor is ongoing, with up to nine organizations having expressed an interest in bidding, including CNI 22. Selecting a firm that has the technical capability to maintain the transmission line's dark fiber capacity will help maximize the asset value of EDTL's transmission lines in the long term.

Regulatory improvements are needed to guide EDTL's dark fiber leasing to the ICT sector. Anecdotal information suggests the existing scheme involves EDTL as the asset owner, the National Communications Authority (ANC) as the entity that manages operations and maintenance of the dark fiber, and the Information and Communication Technologies Agency (TIC) and Timor Telecom as the users, with no compensation reported to be paid. The power sector already faces reliability issues and losses, while the expansion of ICT infrastructure may further burden the grid. As a result, development in other sectors such as mobile financial services are slowed due to constraints in rapid ICT development.

Moving forward, this political economy analysis will benefit from additional discussions with stakeholders from both sectors to obtain a better understanding of what regulatory framework would work best within the political economy landscape. In addition, a better understanding of stakeholders' institutional and human capital readiness for dark fiber operationalization is needed. As EDTL undergoes a corporatization process, more work needs to be done to assess capabilities, key roles, and organizational units required

to manage dark fiber operationalization. This is also an opportunity to collaborate with ADB in work on EDTL's corporatization process, such as the formulation of an investment plan and an assessment of human resource needs.

INTRODUCTION

According to the International Telecommunication Union (ITU), just one-third of Timor-Leste's population of 1.3 million has broadband access to the Internet. Although the country has three telecom companies offering broadband and wireless telecommunication services, affordability and reliability continue to constrain digital growth.

The Information and Communications Technology (ICT) sector plays a vital role in boosting social and economic development in Timor-Leste. Based on Timor-Leste's Strategic Development Plan for 2011-2030, the Government of Timor-Leste (GoTL) envisions opening the telecommunications market to competition, establishing a new independent regulatory body, and introducing a universal service policy that will dramatically improve access to affordable, reliable, and modern telecommunications services. Major strides have been made to achieve this vision.

However, an opportunity remains untapped: utilizing Timor-Leste's electricity transmission assets for telecommunications purposes. Electricidade de Timor-Leste (EDTL) could play a significant role in expanding Timor-Leste's digital connectivity by leveraging available dark fiber capacity on more than 600 kilometers (km) of optical ground wire (OPGW) cable on its 150 kV transmission network.

OBJECTIVE

Under the USAID Powering Information Communication Technology (ICT) activity, the USAID Southeast Asia EDGE Hub, implemented by Tetra Tech, conducted a political economy analysis (PEA) of the power and telecom sectors in Timor-Leste. The objective of this report is to identify drivers and resistance points for the operationalization of EDTL's dark fiber capacity. A political economy assessment (PEA) is an analytical approach to help understand the underlying reasons why things work the way they do and to identify incentives and constraints impacting the behavior of actors in a relevant system. The PEA will review key stakeholders and their interests, governance and compliance issues, and future sector policy and investment plans, including the desire to fully utilize optical fiber on the grid for broadband use to increase capacity, competition, and greater access. This task requires familiarity with the local economic, political, social, and operational environment of Timor-Leste and an understanding of efficient/effective power and telecom sectors in other markets of comparable size that could serve as potential models for OPGW dark fiber utilization.

METHODOLOGY

The political economy of Timor-Leste is always changing and understanding the contemporary backdrop in the country's ICT and power sectors requires comprehensive desk research and in-country stakeholder interviews. The Powering ICT PEA desk research is comprised of three important components: a preliminary overview of the ICT and power sectors including their stakeholders, a policy and regulatory review, and a review of recent findings pertinent to operationalization of EDTL's dark fiber capacity for telecommunications. These components provide a foundational landscape of the political economy that can be validated and expanded through a series of stakeholder interviews.

The PEA research was initiated by a literature review on Timor-Leste's ICT and power sectors. Documents were mined for references to ICT and power sector stakeholders, applicable policies and regulations, and the linkages between both sectors. This analysis is based on stakeholder mapping and the

policy and regulatory environment, as well as interviews to validate findings and collect insights on the ground. Given the dynamic nature of Timor-Leste’s political economy, this PEA will be a living document with continuous updates.

OVERVIEW OF TIMOR-LESTE’S POWER AND ICT SECTORS AND THEIR INSTITUTIONAL LANDSCAPE

This section identifies and describes the critical institutions regulating the ICT and power sectors and provides an overview of existing infrastructure in Timor-Leste.

OVERVIEW OF TIMOR-LESTE’S POWER SECTOR

Timor-Leste currently has a total generation capacity of over 300 MW. Since 2011, four new, large generation plants have been built, as shown in Table 1.

Table 1: Timor-Leste’s existing generation capacity

Generation Plant	Capacity (MW)	Commissioning Year	Fuel Type
Hera	119.5	2011	Diesel or heavy fuel oil
Betano	136.6	2013	Diesel or heavy fuel oil
Comoro	27.5	2022	Diesel
Inur Sakato in (Oe-Cusse)	17.3	2016	Light fuel oil

Timor-Leste’s national grid relies on the Hera Generating Station and Betano Generation Station, both of which are equipped with dual-fuel generators and dependent on imported heavy fuel oil. The Inur Sakato plant is operated to supply the Oe-Cusse district. The idle 27.5 MW Comoro power plant has never been connected to the transmission grid and the national dispatch center and has never been used. Currently, EDTL has sufficient installed capacity to meet demand until at least 2030, considering basic demand growth of 5 percent per year. The operations and maintenance of Timor-Leste’s generation facilities are managed by Wärtsilä Corporation, a Finnish company described in detail in Table 2. Timor GAP, Timor-Leste’s national oil and gas company, supplies fuel under a \$59 million three-year contract (from 2021 to 2023) with EDTL. It is also conducting a feasibility study to convert the Hera, Betano, and Inur Sakato power plants into natural gas plants to reduce fuel supply costs and greenhouse gas emissions. The study will identify the potential market supply for Liquefied Natural Gas (LNG) imports for Timor-Leste and develop a concept design for an LNG import terminal and associated LNG regasification facilities.

Timor-Leste’s power grid has a 150 kV transmission line of approximately 715 km. The China Nuclear Industry 22nd Construction company (CNI 22) signed a contract in 2009 to build EDTL’s transmission network and currently operates and maintains it. A 2018 assessment of Timor-Leste’s electricity transmission network found that the transmission lines had unresolved technical issues¹. Based on the assessment, Timor-Leste’s transmission system needs organizational and physical improvements to

¹ This assessment is part of the Asian Development Bank’s Electricity System Strengthening and Sustainability Program Due Diligence Activities Timor Leste developed in 2018 by Tetra Tech.

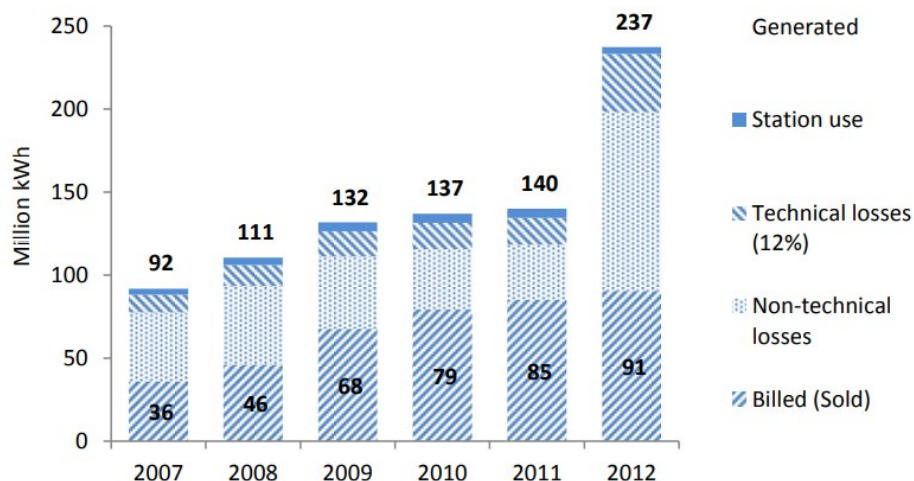
ensure its long-term viability in light of increased stress due to demand growth and aging infrastructure. Technical issues include the completion of several line modifications without proper engineering studies; broken glass insulators that could have been caused by vandalism or poor manufacturing from Russian, Chinese, and Indian vendors; and poor reliability, as seen in the failed structure at Maliana-Suai N34 that presents a high risk for an outage to occur.

Nine substations in Timor-Leste’s district capitals allow connection to 20 kV distribution lines. Unlike generation and transmission, whose operations and maintenance have been outsourced under short-term concession-type contracts, the operations and maintenance of the distribution network are performed by EDTL staff.

The power sector faces many challenges that affect its reliability. The current peak load of about 70 MW is less than 25 percent of the total installed capacity. Timor-Leste’s power grid suffers from high technical and non-technical losses and is dependent on imported diesel, which places a heavy financial burden on the country. Expenditures related to fuel import for generators grew from \$27 million in 2010 to \$95 million in 2013, subsequently declining to \$36 million in 2017 due to the sharp drop in fuel import prices between 2014 and 2016.

Technical losses comprise 12 percent of gross generation and non-technical losses through unmetered consumption, and electricity theft is estimated to account for 60 percent of generated electricity that is not billed to customers. From 2007 to 2012, EDTL estimated technical losses of 12 percent, as shown in Figure 1.

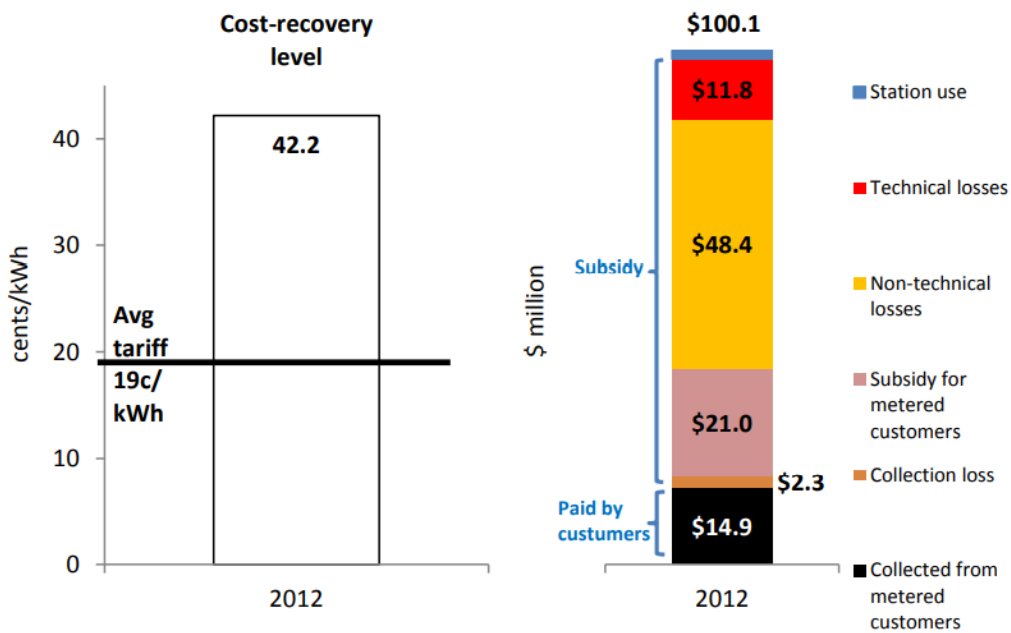
Figure 1: Generation and use of EDTL’s electricity from 2007 to 2012. (World Bank, 2015)



In 2012, only 91 million kilowatt hours were billed to EDTL customers, equivalent to 38 percent of the total. It is difficult to precisely quantify each element of non-technical losses, but a large portion of these losses was attributable to the expansion of service without corresponding metering and billing in addition to electricity theft. Figure 2 shows that the 2012 average tariff of \$0.19 per kilowatt-hour is roughly 45 percent of EDTL’s operational cost in 2012 of \$0.422 per kilowatt-hour. In 2012, EDTL’s operational

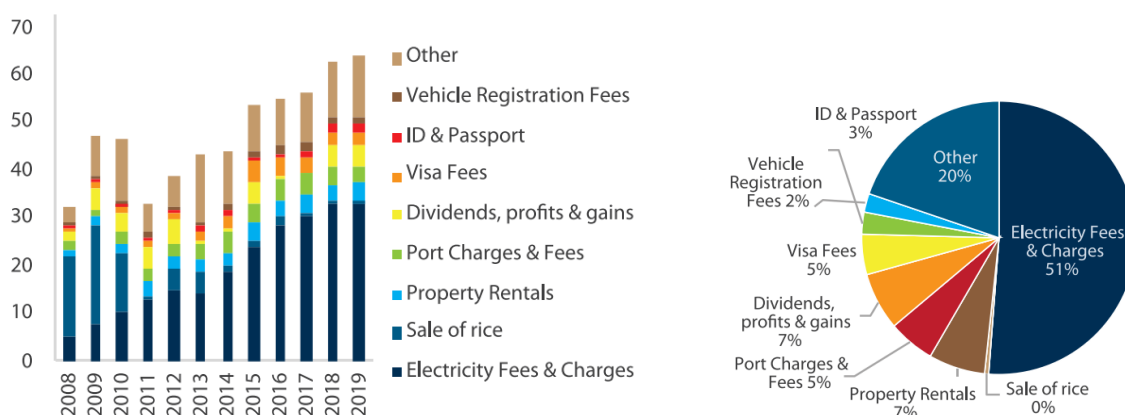
costs totaled \$100.1 million as shown in the chart on the right of Figure 2. Figure 1 shows that 45 percent of EDTL’s operational cost per kilowatt-hour does not correspond with the 14.9 percent of the cost of electricity paid by customers. If the 91 million kilowatt-hours (shown in Figure 1) sold to customers was billed at the operational cost (\$0.422 per kilowatt-hour), EDTL would have collected about \$38 million from its customers. However, at the average tariff of \$0.19 per kilowatt-hour, EDTL theoretically could have collected \$17.2 million paid by customers. However, in reality, EDTL collected \$14.9 million from customers, indicating a collection loss of \$2.3 million. Station use accounted for \$1.7 million, technical losses accounted for \$11.8 million, and non-technical losses are estimated at \$48.4 million in 2012.

Figure 2: Electricity cost versus tariff in 2012 (left) and what the subsidy funded versus what is paid by EDTL customers in 2012 (right). (World Bank, 2015)



Timor-Leste’s power sector is undergoing utility modernization through the rollout of 140,000 smart meters with the help of a \$35 million loan from the Asian Development Bank (ADB). The installation of smart meters and a distribution automation system will enable EDTL to leverage energy prepayment, ensure customers are accurately billed, and reduce non-revenue electricity. This will also impact Timor-Leste’s non-tax revenue collection, which mostly consists of electricity fees and charges as shown in Figure 3. From 2008 to 2019, electricity fees and charges steadily increased and in 2019, half of Timor-Leste’s non-tax revenues consisted of electricity fees and charges.

Figure 3: Timor-Leste's non-tax revenue from 2008 to 2019 (left) and in 2019 (right). (World Bank, 2021)



In 2015, the government subsidized 85 percent of its operating costs as a result of high losses and under charging. As of 2015, the operating cost of electricity is \$0.42 per kilowatt-hour, 90 percent of which are fuel costs. The grid has aging assets that are operating beyond their design lifetime. Timor-Leste's low-voltage distribution network is in poor condition and requires investment for rehabilitation. In 2020, the GoTL approved two decree-laws to convert the public electricity utility known as the Department of National Electricity into a public enterprise (EDTL, E.P) in the hope it would deliver better services to its customers and improve cost recovery.

Table 2 outlines stakeholders in Timor-Leste's power sector.

Table 2: Stakeholders in Timor-Leste's power sector

National Regulators & Policymakers	
Ministry of Public Works (MPW)	<p>The MPW has the following responsibilities:</p> <ul style="list-style-type: none"> Operates and maintains the infrastructures of production, transmission, and distribution of electricity, and promotes the planning and expansion of the national electricity network. Ensures the coordination of the renewable energy sector to better satisfy users. Coordinates electricity production with other ministries and operators. <p>MPW oversees and manages EDTL. In January 2021, the Minister of Public Works appointed a new Chairman of the Board of Directors for EDTL, E.P.</p>
Autoridades Nacional da Electricidade (ANE)	<p>ANE is a public institute established in 2021 that serves as a control body supporting EDTL to establish regulations for the energy sector and tariff setting processes and monitor the implementation of energy sector regulations. ANE was established to build transparency in the sector and promote private sector participation.</p>

Timorese Companies	
Public Electricity Company of Timor-Leste, E.P. (EDTL, E.P.)	Under MPW, EDTL was a vertically integrated monopoly and a state-owned enterprise that generates, transmits, and distributes electricity, responsible for providing and improving the quality of electricity supply in Timor-Leste. In 2020, the GoTL approved two decree-laws to convert the public electricity utility known as the Department of National Electricity into a public enterprise (EDTL, E.P). As a public enterprise, EDTL, E.P. will be able to effectively plan, manage, monitor, repair, and/or replace existing infrastructure and expand the supply network while obtaining more revenue under the “user pays” principle.
Esperanca Timor Oan (ETO)	ETO is a company that handles the importation of diesel and has an exclusive supply contract with EDTL. The status of the contract at present is unknown.
International Companies	
China Nuclear Industry 22 nd Construction Company Ltd (CNI 22)	The GoTL contracted CNI 22 in 2008 through the Ministry of Infrastructure to build a national transmission network three weeks after the Ministry of Finance posted an “Invitation to Submit Expression of Interest and Proposal” on its website. The Chinese firm was subsequently awarded a contract to carry out operations and maintenance (O&M) services for the transmission line. The contract ended in late 2021 and CNI 22 has been granted a short-term extension until a new vendor is selected. This selection process is ongoing, with up to nine companies interested in bidding, including the incumbent. The Timor-Leste procurement agency is reviewing the bids and will select the winner.
Wärtsilä Corporation	Wärtsilä Corporation is a Finnish company that manufactures and services power sources and other equipment in the marine and energy markets. Wärtsilä and EDTL signed an asset management contract in 2015 that included operations and maintenance of the plants. Moreover, to ensure maximized lifetime and guaranteed performance of the Hera and Betano power plants, a five-year operations and maintenance agreement was signed in 2017 with GoTL, to provide electricity covering more than 90 percent of total domestic demand. In 2018, the contract scope was expanded to include the training of EDTL’s power plant operators to enable them to manage their plants independently. The contract will end in 2022 and may not be renewed.
International Organizations	
Renew (Alternative Technology Association Inc. trading as “Renew” Australia)	Renew is a not-for-profit organization that enables and advocates for people and communities to live sustainably. Renew has been working with communities in Timor-Leste to provide clean, renewable lighting and electricity. At the end of 2019, it was estimated that installed household solar PV systems provided modern energy services to over 10,700 people in Timor-Leste. Renew has partnered closely with a Timor-Leste training institution, Centro Nacional de Emprego e Formação Profissional (CNEFP), to ensure that the assembly, installation, and maintenance of solar projects will form the basis of a sustainable industry in the community. Renew provides refresher

	training and mentoring to CNEFP to deliver local technician training, oversee installations, and conduct audits.
International Donors	
Asian Development Bank (ADB)	<p>ADB’s work in Timor-Leste is guided by the Country Partnership Strategy (CPS) and the Country Operations Business Plan (COBP). ADB’s work in the energy sector includes two projects that will focus on: 1) improving electricity reliability and quality, reducing power grid loss, and enhancing energy efficiency by providing knowledge and capacity building and 2) supporting energy sector development and institutional reform with the aim to create an enhanced environment for private sector investment in the energy sector. Active projects include:</p> <ol style="list-style-type: none"> 1. <u>Support for Innovation and Technology Partnerships in Asia and the Pacific - Energy Sector High-Level Technology Application (Subproject 2)</u> 2. <u>Implementing Reforms for Growth and Competitiveness</u> 3. <u>Energy System Strengthening and Sustainability Project</u> 4. <u>Pacific Renewable Energy Program</u> 5. <u>Support for Innovation and Technology Partnerships in Asia and the Pacific</u> 6. <u>Power Distribution Modernization Project</u> (proposed) <p>Activities in the ADB’s most recent Timor-Leste COBP (2021 to 2023) include:</p> <ol style="list-style-type: none"> 1. Capacity Building of EDTL on Distribution Network Operation and Maintenance 2. Preparation of Power Grid Strengthening Project

OVERVIEW OF TIMOR-LESTE’S ICT SECTOR

Timor-Leste’s ICT sector has rapidly developed since the country gained independence in 2002. Until 2012, Timor-Leste only had one ICT company, Timor-Telecom, providing telecommunications services, including Internet. Accessibility and affordability of telephone and Internet services were two key issues under this monopoly. Timor-Telecom had limited coverage throughout the country and the majority of Timor-Leste’s rural population could not access telephone and Internet services either due to lack of coverage in the Timor-Telecom network or lack of affordability for these services. In 2012, Timor-Leste promulgated a telecommunication law that began to liberalize the ICT sector and introduced two new companies: Telemor and Telkomcel. As of 2020, these three operators jointly provide 98 percent of the network coverage nationally (Barton, 2021).

Timor-Leste has the lowest rate of broadband Internet access in the Asia-Pacific region. A critical constraint to Internet access is the lack of submarine cable connectivity. Most telecom companies rely on satellite for international connectivity, but that is relatively expensive and has limited bandwidth. This affects the availability and quality of data traffic. There are three cross-border submarine fiber-optic cables in Timor-Leste: Mataram Kupang Cable System, Telkom, and XL Axiata. Timor-Leste also relies on low-orbit satellites for Internet connectivity as well as redundancy (UNESCAP, 2018). The list below highlights existing telecommunications infrastructure:

1. Island-wide optical fiber network deployed on the national power grid.
2. Island-wide optical fiber network owned by Telemor.
3. Broadband microwave transit links operated by Telkomcel.
4. Kacific – a new broadband satellite operator pursuing plans to install facilities at health clinics. Kacific uses a spot beam system with dynamic bandwidth reallocation to respond to changes in market demand pre- and post-launch. This advanced technology allows Kacific to respond rapidly to new growth opportunities and provide a broader range of services for each market by changing bandwidth configuration even when the satellite is already in orbit.
5. Internet connectivity primarily via satellite: Submarine cable connections to Indonesia/West Timor are used to reach the Palapa Ring.

Figure 4: Timor-Leste's fiber-optic infrastructure. The solid red line depicts operational microwave, the dashed red line depicts planned microwave, and the brown line depicts operational fiber-optic cable. (ITU and ESCAP, 2019)



As of 2018, the penetration of fixed-broadband services was just 1.5 percent and as of 2017, the penetration of mobile-broadband service was 34 percent. Telephone line infrastructure was limited and available mainly in urban areas. From 2015 to 2019, fixed-broadband subscriptions in Timor-Leste had declined at a 10 percent compound annual growth rate (CAGR). This reflects a shift away from fixed-broadband to mobile-broadband services among existing subscribers, while new subscribers preferred mobile-broadband services. Moreover, regarding affordability, the fixed-broadband service cost per year is roughly 32 percent of a Timorese's average income (GNI per capita).

Table 3: Stakeholders in Timor-Leste's ICT sector

ICT-affiliated National Regulators & Policymakers	
Ministry of Transport and Communications (MTC)	<ul style="list-style-type: none"> • Develops and regulates transport and communications and optimizes communications. • Promotes management and adoption of technical and regulatory standards regarding the public use of communications services.

	<ul style="list-style-type: none"> Ensures the provision of public telecommunications services and the use of radio space through public undertakings or by granting the provision of public service to private entities.
The National Communications Authority (Autoridade Nacional de Comunicações - ANC)	<p>ANC is a statutory authority established by Telecommunications Decree Law Number 15 in 2012 to ensure the availability, affordability, and quality of telecommunications services through:</p> <ul style="list-style-type: none"> Establishing and maintaining an open, non-discriminatory, technologically neutral, objective, transparent, and proportionate telecommunications regulatory regime. Promoting effective and fair competition among service providers. Ensuring efficient use of scarce resources required for telecommunications. Encouraging investment in, and efficient use of, the infrastructure used to supply telecommunications services. <p>According to the 2020 Investment Climate Statement Report by the U.S. Department of State, ANC, which is currently under the Ministry of Transport and Telecommunications, will eventually become an autonomous and self-funded institution.</p>
TIC Timor – Information and Communication Technologies Agency	<p>TIC Timor is a public entity established under Decree Law Number 29 in 2017 and is responsible for:</p> <ul style="list-style-type: none"> Implementing policy and approving strategy on ICT. Managing the ICT network of the government and other public entities. Providing support for the ICT and information systems. <p>Under the authority of the Prime Minister’s Office, TIC Timor aims to improve the effectiveness and efficiency of service delivery through e-government platforms. This includes initiating and implementing a stable and secure IT delivery system, defining standards to guarantee compatibility and interoperability of systems and applications, and maintaining the security and integrity of citizens’ information collected by the government.</p>
ICT Companies	
Timor Telecom	Timor Telecom held a monopoly in the telecommunications sector until the GoTL liberalized the ICT sector and issued operating licenses to Telkomcel and Telemor. Timor Telecom is owned by the GoTL (20.6 percent), Telecomunicações Públicas de Timor (54 percent), Investel from Brazil (3.1 percent), VDT Holding Limited from Macau (17.9 percent), and private stakeholders (4.5 percent).
Telkomcel/TCELL	Telkomcel, an operator owned by the Indonesian company Telin, launched in March 2013.
Telemor	Telemor, a network operator launched in July 2013, is owned by the Vietnamese company Viettel, which has the largest fiber-optic network in the country.

<p>Ceslink, S.A.</p>	<p>Ceslink, S.A. is the fourth network operator in Timor-Leste. In November 2021, the ANC issued a Certificate of Registration to Ceslink, S.A., which had submitted an application to become a network operator in 2019. Ceslink, S.A. plans to install a satellite in Timor-Leste and start operations in 2022. Ceslink is a Timorese consortium made up of Ceslink, a computer technology company, and the Oka-D'tel consortium.</p>
<p>Kacific (Kacific Broadband Satellites Group)</p>	<p>Kacific is a broadband satellite operator, as well as a wholesale business selling to telecommunications operators, Internet service providers, governments, and other service providers. Its first Ka-band satellite, Kacific1, was launched in 2019 to stream high-speed, low-cost, ultra-reliable broadband to rural and suburban areas in the Pacific and Southeast Asia. Supported by a \$50 million loan from the Asian Development Bank (ADB), Kacific1 is expected to significantly improve communications throughout the Asia-Pacific region.</p> <p>In 2018, Kacific powered digital healthcare in Timor-Leste, connecting 75 clinics to improve the distribution of vital medicines, equipment, and patient information nationwide. In 2020, the ITU and Kacific partnered to boost the capacity of Pacific Island states, in particular on remote and outer islands, using satellite communications.</p>
<p>International Organizations</p>	
<p>Catalpa International</p>	<p>Catalpa is a global development nonprofit organization from Australia that partners with the GoTL to support the computerization of services and the promotion of proximity, quality, and efficiency of service delivery. Catalpa is a human-centered design and technology agency that provides innovative, simple, and effective solutions in a development context. Catalpa focuses on how technology can be used to improve the management of information in various sectors, including health, agriculture, finance, enterprise, governance, telecommunications services, and advocacy in Timor-Leste.</p> <p>Catalpa also partners with Telemor on a project named The Tender Information Management Service, which aims to improve public-private links and develop the local business environment. In Timor-Leste's education sector, Catalpa developed an online communication chat system called "Conversa" through which school principals working in the most remote areas can inform the Ministry of Education about the schools' physical condition and logistical problems. In the health sector, Catalpa is developing applications aimed at improving the quality and speed at which rural communities can access health services using mobile phones to connect expectant mothers with health providers.</p>
<p>Asian and Pacific Training Centre for Information Communication Technology for Development (APCICT)</p>	<p>Guided by the 2030 Agenda for SDGs, APCICT aims to build and strengthen the capacity of members and associate members of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) to leverage ICT for the purpose of socio-economic development. APCICT's work focuses on training, knowledge sharing, and multi-stakeholder dialogue and partnership. APCICT provides training for Timorese government officials on the use of ICT for</p>

	<p>sustainable socioeconomic development. Additionally, APCICT provides advisory support to the GoTL on the development of its national e-government framework and strategy, as well as other policy issues in the areas of ICT infrastructure, ICT skills development, and e-government applications, among others. These APCICT initiatives are conducted in partnership with the Government of the Republic of Korea.</p>
Asia-Pacific Information Superhighway (AP-IS)	<p>AP-IS is an intergovernmental platform initiated by member states of ESCAP that was set up to facilitate regional and subregional dialogue on promoting cross-border connectivity. The initiative aims to increase the availability and affordability of broadband Internet across Asia and the Pacific, including in Timor-Leste, by strengthening the region’s underlying Internet infrastructure. Following the Regional Cooperation Framework Document 2019-2022 (AP-IS Master Plan 2019-2022), the platform has identified four thematic pillars:</p> <ul style="list-style-type: none"> ● Physical infrastructure upgrades and interconnection ● Internet traffic management ● Building regional network resilience ● Promoting broadband access in underserved areas
International Development Partners	
Australian Department of Foreign Affairs and Trade (DFAT)	<p>Australia is Timor-Leste’s largest development partner, and their bilateral cooperation focuses on three objectives:</p> <ul style="list-style-type: none"> ● Improving livelihoods and economic development ● Enhancing human development ● Strengthening governance and institutions <p>In 2019-2020, DFAT contributed \$120.7 million in Official Development Assistance to Timor-Leste. DFAT supports Timor-Leste’s connectivity by the subsea cable project that connects Darwin to Timor-Leste.</p>
The Australian Infrastructure Financing Facility for the Pacific (AIFFP)	<p>AIFFP partners with Pacific governments and the private sector to design high-impact safeguarded infrastructure projects, providing up to AUD1.5 billion (\$1.1 billion) in loan financing and up to AUD500 million (\$367 million) in grants.</p> <p>The AIFFP is investing AUD1.5 million (\$1.1 million) to complete a Front-End Engineering Design (FEED) to scope various cable design options, route options, and technical and engineering requirements with high-quality analysis and design information to construct a quality undersea telecommunications cable that meets the needs of Timor-Leste. The FEED provides legal and regulatory analysis and business and strategic advice on the telecommunications market. Vocus Group, an international telecommunications company headquartered in Australia, is the contractor selected to implement this work.</p>
World Bank	<p>The World Bank’s work in Timor-Leste from 2020 to 2024 is guided by its Country Partnership Framework. Under its third focus area, the</p>

	<p>World Bank Group will assist the government to raise economy-wide productivity through policy reforms and investments in connective infrastructure (ICT, road, and aviation), focusing on the digital economy and the transport sector. Objectives and indicators for the ICT sector include:</p> <ul style="list-style-type: none"> ● Increase mobile broadband penetration rate to 70 percent by 2024 from 33 percent in 2018. ● Attain fixed broadband penetration rate of 20 percent by 2024 from 1.5 percent in 2018. <p>Supplementary indicators include:</p> <ul style="list-style-type: none"> ● The commissioning of new international optical fiber backbone communications infrastructure by 2022. ● The establishment of a new entity to manage the international backbone network by 2022. ● The drafting of new regulations on open access and non-discriminatory pricing for wholesale Internet bandwidth by 2021.
Asian Development Bank (ADB)	<p>Based on ADB’s latest Timor-Leste COBP, ADB’s support in the ICT sector focuses on digitalizing and developing applications to improve government services, with prospects for scaling up. The ICT project will promote good governance and improve the country’s public service delivery. Feasibility studies will be undertaken on e-government readiness, which will also help identify investment projects and strengthen the institutional capacity of the newly established ICT institute.</p>
USAID	<p>USAID’s Advancing Timor-Leste’s Autonomous Telecommunications Landscape (ATLTL) is working to promote business-friendly policy and investment in the ICT sector. This activity provides advisory support to TIC on expanding its national ICT policy and supports the U.S. government’s Digital Connectivity and Cybersecurity Partnership initiative.</p>

OVERVIEW OF TIMOR-LESTE'S POLITICAL SITUATION

Timor-Leste is a democratic republic led by President Francisco Guterres, known as Lú-Olo, of the Revolutionary Front for an Independent East Timor (Fretilin). Guterres was elected in 2017. The directly elected president is a largely symbolic figure, with formal powers limited to the right to veto legislation and make certain appointments. The president may serve up to two five-year terms.

Timor-Leste's prime minister is former independence fighter and former President José Maria Vasconcelos, popularly known as Taur Matan Ruak, of the People's Liberation Party (PLP). Vasconcelos was sworn in as prime minister in 2018. The prime minister is the leader of the majority party or coalition in Parliament and serves as head of government. Members of the 65-seat, unicameral Parliament are directly elected and serve five-year terms.

SHIFTING ALLIANCES AMONG TIMOR-LESTE'S POLITICAL PARTIES

The past three years have been tumultuous for Timor-Leste politics, marked by a reconfiguration of political alliances and a rising generation of small parties. Fretilin participated in governments formed in 2017 and 2020, while the National Congress for Timorese Reconstruction or Congresso Nacional de Reconstrução de Timor (CNRT), a political party in East Timor founded by former President Xanana Gusmão in March 2007, participated in the Alliance for Change and Progress (AMP) coalition when it entered government in 2018. The PLP, which is led by Vasconcelos, participated in the 2018 and 2020 governments. Two new parties, the youth aligned KHUNTO and the PLP, won 13 legislative seats between them in the 2017 elections. They joined AMP in the 2018 elections and formed a governing coalition with Fretilin in May 2020.

The 2018 national elections marked the third time since independence that governing power transferred between parties. Because the minority government seated after the 2017 elections could not pass a budget, the president dissolved Parliament in January 2018 and called for new elections, which were held in May 2018. Following the 2018 elections, Prime Minister Vasconcelos's government won support with support from the AMP coalition, which comprised three parties: CNRT, the People's Liberation Party (PLP), and the Kmanek Haburas Unidade Nasional Timor Oan (KHUNTO) Party. The AMP coalition won an outright majority of 34 seats. Fretilin won 23, the Democratic Party won five, and the Democratic Development Front won three.

In 2020, however, the government was remodeled. In early 2020, disagreements with the CNRT blocked the vote on the 2020 budget, which led to the formation of a new coalition. CNRT, led by Gusmão, left the governing coalition and a new coalition including the PLP, KHUNTO, and Fretilin was finalized in May 2020, with Vasconcelos retained as Timor-Leste's prime minister.

DISHARMONY IN PARTISAN POLITICS

There appears to be a lack of consensus among the two largest political parties, CNRT and Fretilin, on the national priorities for economic development. Although development in Timor-Leste has been guided by the Strategic Development Plan (SDP), CNRT and Fretilin are still at odds regarding the mechanisms to materialize strategic national programs. This lack of agreement from the main two ruling parties hinders the continued implementation of initiatives. Therefore, political parties need to have open and in-depth discussions about the viability of key economic development strategies in order to formulate national programs that are acceptable for all and persist through changes in government administrations.

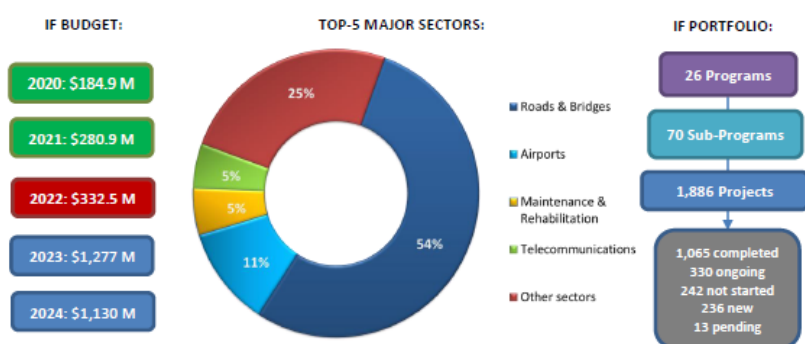
ALLOCATION OF TIMOR LESTE'S INFRASTRUCTURE FUND FOR ELECTRICITY AND TELECOMMUNICATIONS

The Infrastructure Fund (IF) was established in 2011 by the GoTL as a special fund to finance strategic projects and improve infrastructure in Timor-Leste as outlined in the country's Strategic Development Plan for 2011-2030. After operating as a special fund from 2011 to 2016, the GoTL transformed the IF into an autonomous fund to allow it to operate in a more efficient way, as the payment process is linked directly to Timor-Leste's Central Bank. IF investments provide financial support for capital development in the following sectors:

- 1) Transportation infrastructure including roads, bridges, ports, and airports
- 2) Social infrastructure, including hospitals, schools, and universities
- 3) Flood control and landslide protection infrastructure
- 4) Water treatment and sanitation facilities
- 5) Power generators and distribution lines
- 6) Telecommunications
- 7) Logistic facilities, including storage infrastructure
- 8) Public buildings and public facilities
- 9) Other infrastructure that promotes strategic development

From 2011 to 2021, \$5.1 billion was approved for the fund, \$3.2 billion (62 percent) was executed, and 1,065 projects were completed. In 2022, the GoTL in its approved state budget issued an update to the fund and identified telecommunications as one of its priority sectors, as shown in Figure 5. In 2022, the IF has a budget of \$332.5 million and the portion dedicated to the telecommunications program is \$16.8 million.

Figure 5: Summary of the Infrastructure Fund portfolio (Ministry of Finance of Timor-Leste, 2022)

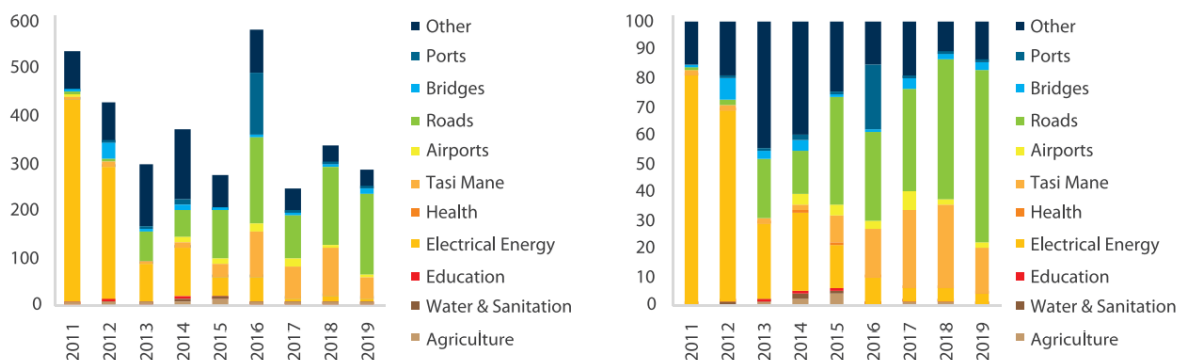


In the power sector, notable achievements of the Infrastructure Fund include the following projects:

- The construction of the Hera and Betano power stations
- The rehabilitation of the Inur Sakato power station in Oecusse
- The construction of high voltage 150 KV transmission lines
- The installation of nine substations 10-20 MVA and 63 MVA

Capital investment in the country’s large electricity program occurred in 2011 and 2012, as seen in Figure 6, for the construction of the Hera and Betano power stations. The program averaged \$356 million in 2011 to 2012 and \$70 million in 2013 to 2016 for the purchase of generators and rehabilitation of distribution lines.

Figure 6: Infrastructure assets in \$ million (left) and percentage (right). (World Bank, 2021)



In the 2022 state budget, the IF allocation for the electricity program reaches \$11.4 million. The remaining projects in the IF’s electricity program include completion of the grid’s central control systems, street lighting improvement, and operation and maintenance of the electric grid. The 2022 state budget also includes the ADB-funded Power Distribution Modernization Project.

RULES OF THE GAME: EXISTING PROGRAMS, POLICIES, AND REGULATIONS IN TIMOR-LESTE’S POWER AND ICT SECTORS

This section lays out the policy and regulatory framework governing Timor-Leste’s power and ICT sectors.

OVERARCHING GOVERNMENT POLICIES AND PROGRAMS

STRATEGIC DEVELOPMENT PLAN (SDP) 2011-2030

The SDP 2011-2030 is Timor-Leste’s 20-year vision that lays out a path to implement Timor-Leste’s national strategy and covers three areas: social capital, infrastructure development, and economic development. The GoTL has indicated its commitment to ensure a reliable power supply by updating and improving electricity generation, transmission, and distribution systems while promoting investment in the expansion of renewable energy systems. Under the SDP, Timor-Leste aims to electrify all households by 2030 through the implementation of a Rural Electrification Program, which targets communities in isolated areas that will not connect to the national grid in the medium term. The SDP also lays out necessary actions to promote renewable energy deployment in the country and the use of carbon credits to stimulate renewable energy projects.

In the ICT sector, Timor-Leste aspires to be part of the technology-enabled world. The SDP lays out goals to ensure that all citizens have access to reliable, affordable, and high-speed Internet and that all students and health professionals have portable Internet access devices.

PROGRAM OF THE EIGHTH CONSTITUTIONAL GOVERNMENT 2018-2023

The Program of the Eighth Constitutional Government is a five-year policy instrument derived from the SDP 2011-2030 and incorporates a roadmap developed by the GoTL to comply with the United Nations' 2030 Sustainable Development Agenda. Under this plan, Timor-Leste prioritizes improvement in the ICT sector, indicated by the following goals and actions:

1. Implement a reliable fiber-optic submarine cable system that connects Timor-Leste to a cable landing facility in the region, allowing the country to acquire capacity and competitive transmission lines for connection to a global IP distribution center.
2. Create a cybersecurity structure and infrastructure that will function as the national agency for oversight of cybersecurity strategy, operations, and capacity development, as well as oversee the policies, projects, and programs of related critical infrastructure development.

The GoTL also acknowledges that reliable electricity is crucial to economic and social development in rural and urban areas. The GoTL has identified priority actions and goals that include increasing access to electricity, improving electricity production and distribution, reorganizing the electricity sector, and implementing a tariff policy that differentiates tariffs based on consumer categories.

POLICIES AND REGULATIONS IN TIMOR-LESTE'S POWER SECTOR

ESTABLISHING THE BASIS FOR THE NATIONAL ELECTRICITY SYSTEM: DECREE-LAW NUMBER 13 OF 2003

Decree-Law Number 13 of 2003 presents the principles that govern activities related to the production, transmission, and distribution of electricity. Electricity tariffs and rates are fixed annually by joint instruction of multiple ministries in the GoTL. The law covers tariff principles, consumer categories, tariff categories, and connection fees. Based on this, tariffs shall reflect the costs for the supply of electricity to the various consumer categories and shortcomings in the production, transmission, and distribution systems, notably those resulting from technological obsolescence. However, tariffs for the sale of electricity to clients, as well as for other complementary services, shall not reflect the costs of assets that are not investments made by the concessionaire. This highlights the importance of making a clear distinction between assets invested by the concessionaire, or EDTL, and by other entities, if any.

DECREE-LAW NO. 40 OF 2012 ON THE NATIONAL ELECTRIFICATION PROGRAM

This decree-law aims to establish requirements for installing new electric lines for the energy supply within the territory under national jurisdiction.

DECREE-LAW NO. 40 OF 2020

By the Decree-Law No. 40 of 2020, the GoTL created the Autoridade Nacional da Electricidade (ANE) and approved its respective by-laws. The authority is responsible for proposing, monitoring, and ensuring the execution of the national power strategy, regulation, and inspection of all production, transportation, distribution, sale, and use of electricity and related services in the National Power System, as well as the standardization of electrical components and installations.

Following this decree-law, ANE began work in June 2021 on recruiting staff, establishing an office, and other startup tasks. As of mid-2021, it included only 13 individuals, and by January 2022 no new laws or regulations had been issued.

2021 LEGISLATIVE PRIORITIES IN THE POWER SECTOR

Based on Timor-Leste's legislative plan published in March 2021, the following energy sector legislative interventions are planned:

- Review of tariff regulations for the supply of electric energy, approved by Decree Law No. 22/2006
- Renewable energy regulation
- Establishing standards for electric materials

POLICIES AND REGULATIONS IN TIMOR-LESTE'S ICT SECTOR

TIMOR-LESTE'S NATIONAL TELECOMMUNICATIONS POLICY

Timor-Leste adapted Política Nacional para as Tecnologias de Informação e Comunicação, or the National Policy for ICT, which was implemented from 2017 to 2019 with the aim to:

- Facilitate the use of ICT in the provision of e-government services involving citizens.
- Use ICT to stimulate and diversify the domestic economy and fully integrate Timor-Leste into the regional and global economy.
- Create a safe and quality ICT ecosystem in the country to secure citizens' trust.

DECREE-LAW NO. 15/2012 ON THE REGULATION OF THE TELECOMMUNICATIONS SECTOR

As part of the GoTL's efforts to liberalize the telecommunications market and introduce effective competition through private sector participation, this decree-law was issued to establish a legal framework for telecommunications and issue a national authority for communications, Autoridade Nacional de Comunicações (ANC), to monitor its implementation. The ANC has responsibilities, including overseeing registration of service providers; granting radio spectrum licenses; monitoring compliance with legislation, regulations, and licenses; regulating interconnection, competition, and consumer protection; resolving disputes among and between operators and service providers; and allocating, assigning, and supervising the use of radio spectrum and numbering; among other responsibilities.

The ANC will be funded mainly from licenses and other fees from telecommunications service providers. It will be accountable for its budget and required to report annually to the Council of Ministers on its activities and finances. Whether and to what degree this goal will be achieved remains to be seen. Board member terms will be staggered to ensure continuity.

The regulation also assigns the ANC to establish a universal access program that will prioritize the availability of voice telecommunications services, telecommunications services accessible by users with special needs, Internet access at appropriate speeds, and any other telecommunications services that are considered appropriate. The ANC is also tasked to establish a Universal Access Compensation Fund.

2022 LEGISLATIVE PRIORITIES IN THE ICT SECTOR

In 2021, the GoTL planned to move forward with the creation of a legal licensing regime for external telecommunications networks as documented in the 2021 legislative plan. However, due to the GoTL's inability to hold public stakeholder consultations in 2021, efforts in this pursuit were stalled and extended through 2022. Legislative interventions in the ICT sector include:

- Create a law on privacy and the protection of personal data
- Create a cybersecurity law
- Create a law on data exchange/electronic transactions
- Create a law on computer crimes
- Create a unique identifier system
- Create a basic law for electronic communications
- Approve the new statute for the Information and Communication Technologies Agency, created by Decree Law No. 29/2-017
- Create a legal licensing regime for external telecommunications networks

In a meeting of the Council of Ministers in March 2022, the council approved the government's legislative plan for the year. The plan is based on proposals submitted by members of the Council of Ministers and consists of a forecast of the government's legislative interventions and respective priorities by sector. No other details were available at the time this report was completed.

HERE AND NOW: FINDINGS

THE NEED FOR CAPACITY STRENGTHENING WITHIN EDTL'S WORKFORCE

As part of EDTL's corporatization process supported by ADB, human resources planning, and capacity building are areas that need attention and progress to respond to the needs of its utility improvement efforts and ensure long-term benefits for EDTL's business operations. The pipeline of domestically sourced technical talent is also limited, and sourcing offshore talent is costly.

CNI 22'S EXPIRING TRANSMISSION O&M CONTRACT IS AN OPPORTUNITY TO PROCURE O&M SERVICES THAT CAN PROPERLY MAINTAIN EDTL'S DARK FIBER CAPACITY

EDTL's transmission O&M contract with the Chinese firm CNI 22 expired in late 2021 but was temporarily extended through June 2022. Throughout its period of performance, there has been no known knowledge transfer and no information exchange due to a significant language barrier. Anecdotal information suggests that technical manuals are in Chinese and CNI 22 operators are predominantly Chinese. A 2013 public letter from La'o Hamutuk, a local non-governmental organization, to the then-President of the National Procurement Commission stated that the project was seriously flawed in concept, design, implementation, community relations, and quality of work. CNI 22 repeatedly failed to meet its commitments regarding the schedule, quality of materials, employing Timorese workers, worker safety, and environmental management. They refused to comply with directives from the supervising consultant and others.

As part of ADB's assistance to EDTL, ADB supported the preparation of a public tender to procure O&M services. However, there has been a delay in the public tender, resulting in a short-term extension of the contract through June 2022. The procurement process for the new vendor is ongoing, with up to nine organizations having expressed an interest in bidding, including CNI 22. The tender is expected to conclude in May 2022 and the new firm is expected to start in June 2022. The Timor-Leste procurement agency is selecting the preferred vendor. In the event of a contract extension with CNI 22, proper knowledge transfers to EDTL employees could be included in the terms of the extended contract. This will help maximize the asset value of EDTL's transmission lines in the long term.

EDTL'S CORPORATIZATION WILL RESULT IN GREATER AUTONOMY AND DECLINE IN DOMESTIC REVENUE

EDTL has taken an important step to separate from the Ministry of Public Works. Through Decree-Law No. 29/2020, EDTL became a public enterprise. Public enterprises are considered to be the most autonomous of all public sector entities. The move to make EDTL a public enterprise will allow it greater autonomy and the ability to make its own decisions regarding strategic policy decisions, including future planning. As a public enterprise, EDTL's revenues are no longer counted in the GoTL's Treasury account as they are not included as part of the general government. In the Ministry of Finance's 2021 mid-year report, EDTL's revenues comprise electricity fees and charges and EDTL receipts from new installations. In 2020, revenues from EDTL dominated total domestic revenues for the government from fees and charges. As a result of the separation from the General Government Account, domestic revenue will fall significantly.

EDTL IS IN A TRANSITION PERIOD IN ITS CORPORATIZATION PROCESS

EDTL faces the reality that corporatization of a newly established standalone state-owned enterprise will not happen overnight. The public company is assigned a difficult task by the GoTL to plan and manage the electricity sector with greater agility, repair and upgrade existing infrastructure, expand the supply network, and apply best practices in its operations with a view to obtaining more revenue through the “user pays” principle. In a meeting with EDTL officials, it was reported that EDTL is establishing the enterprise’s organizational chart, operational procedures, staffing, and internal administration procedures. With support from ADB, EDTL is also in the process of establishing a legal unit, drafting an investment plan, and identifying human resources needs.

RAPID DEVELOPMENT IN THE ICT SECTOR REQUIRES A RELIABLE POWER SECTOR

Timor-Leste’s ICT sector has rapidly developed since its independence in 2002. Access to mobile-broadband service per 100 inhabitants has increased significantly from 0.4 percent in 2011 to 34 percent in 2017, and the percentage of the population covered by at least a 3G network is around 97 percent (UNESCAP, 2019). The power sector must be able to keep up with rapid development in the ICT sector, particularly in terms of reliability. All communications network operators are challenged by the inability of EDTL, the state-owned power agency, to provide reliable electricity on a 24/7 basis. This constraint will become greater as international cables are landed and as broadband satellite services come online, both of which will entail significant power requirements. EDTL’s electricity supply deficiencies will greatly hinder communications services as the ICT sector incorporates Internet of Things (IoT), 5G mobile broadband, and services based on blockchain technology, each of which entails greater power requirements than EDTL can currently meet.

LACK OF A DARK FIBER LEASING REGIME IS A MISSED EARNING OPPORTUNITY

The two island-wide fiber networks are under-utilized assets. The lack of international connectivity that limits the growth of Internet services also limits the ability of the market to optimize use of these broadband assets. However, even if the international connectivity constraint were relieved, two additional constraints regarding use of excess fiber capacity on these networks need to be addressed.

An appropriate regulatory framework is needed to set terms and conditions for leasing capacity on any broadband networks. Such a framework would enable licensed operators to obtain connectivity services through commercial leases, thereby speeding the availability of high-speed Internet services. Leasing of dark fiber on the two fiber networks would enable network operators to support increasing customer demand without investing in duplicative network facilities, thereby encouraging efficient use of network assets. Such arrangements could also enable non-facilities-based Internet Service Providers (ISPs) to obtain broadband connectivity for the provision of value-added services, particularly special-use or advanced services that cannot be adequately supported in the current environment (e.g., mobile financial services).

Based on a meeting with EDTL in 2021, dark fiber capacity is owned by EDTL but is under the management of ANC. ANC is also responsible for the O&M of the dark fiber, of which all maintenance costs are paid for through direct charges. It is unclear which charges carry these costs, and further investigation is needed to obtain a clear understanding of how this collaboration is functioning. EDTL reports that it does not receive compensation on utilization of its dark fiber capacity. Anecdotal information indicates that

EDTL does not understand how to price its dark fiber capacity, but it gains income from leasing poles to telecom companies. More information is needed to better understand this mechanism.

Capacity on the EDTL fiber network has been made available to Timor Telecom and to TIC Timor, the government's ICT agency. TIC is not charged for the capacity that it utilizes. Timor Telecom will not disclose what, if any, charges it may pay for the fiber that it utilizes, and EDTL has not responded to inquiries concerning the use and fee arrangements it has with Timor Telecom. Similarly, Telemor refuses to disclose information concerning any leasing of dark fiber on its fiber network.

While a dark fiber leasing regime would enable maximization of asset value in the existing fiber networks, realization of the potential value of the EDTL fiber network requires more than regulatory changes. Under current conditions, a two-fiber pair is utilized by Timor Telecom and four pairs are utilized by TIC. These pairs may be the only fiber on this network that are fully operative. If so, then a proper operations and maintenance regime for the network must be adopted if the potential value of this national asset is to be realized.

EFFORTS TO UPGRADE TIMOR-LESTE'S ICT INFRASTRUCTURE ARE SLOWLY UNDERWAY

In 2018, the GoTL signed a letter of intent to connect the country to a submarine fiber-optic cable by Telkomcel, with landing stations in Indonesia, including in Larantuka, Atambua, and Kalabahi, and one landing station in Dili, Timor-Leste. The \$20 million project is believed to have been scrapped due to heavy opposition. There is little information detailing the reasons behind this failed attempt. (TeleGeography, 2019). In 2019, Timor Telecom completed a project to build a national terrestrial fiber network as part of an effort to boost e-government services.

The GoTL's most recent attempt to upgrade its ICT infrastructure was its approval in November 2020 of a project to connect Australia's North Western Cable System (NWCS) and Timor-Leste through an underwater fiber-optic cable system. In Timor-Leste's country statement at UNESCAP's Committee on Information and Communications Technology, Science, and Innovation in 2020, the GoTL expressed its commitment to focus its attention on speeding up the subsea fiber-optic cable to be physically implemented in 2021. The GoTL believes that the subsea fiber-optic telecommunication cable and a point of presence will provide Timor-Leste with much-needed high-speed Internet bandwidth that will also benefit other sectors, such as education, health, and the economy at large.

As of January 2022, the subsea optical fiber cable project from Darwin, Australia to Timor-Leste is under the authority of the National Procurement Commission. The GoTL forecasted \$41.6 million of the 2021 General State Budget to finance the infrastructure development of the subsea optical fiber cable. The public procurement for the purchase and installation of the equipment attracted bids from more than 20 international companies. The project is supported by DFAT, which helped prepare the front-end-engineering design with funding from AIFFP.

In mid-2023, a subsea telecommunications cable will be constructed from various cities in Indonesia and Dili in Timor-Leste, to Darwin, as part of the Inligo Networks Asia Connect Cable System Mega Project, a project by Indonesia's second-largest cellular telecommunications company, Indosat Ooredoo Hutchison, and Inligo Networks to connect Southeast Asia and North America. It is unclear how Timor-Leste will benefit from this project.

GEOPOLITICS AND PRIVATE INVESTMENT: CONFRONTING CHINA’S ROLE IN THE PACIFIC’S ICT DEVELOPMENT

Like other Pacific Island countries, Timor-Leste’s eagerness to advance its connectivity is highly dependent on subsea cables. In 2020, a bidding process for a project to connect Micronesia, Kiribati, and Nauru disqualified three Chinese companies over security concerns raised by the United States, Australia, and Japan. A similar move to shut out Chinese companies was seen in the Solomon Islands, a country that reportedly made plans for a Chinese company to lay a subsea cable. That project was halted after an intervention from the Australian government to fund the project. Awarding the project to a Chinese company raises a risk of spying and increased vulnerability to cybersecurity attacks. Timor-Leste’s direct involvement with CNI 22 running critical transmission infrastructure should serve as a cautionary tale in the telecom sector.

THE LACK OF COMPETITIVELY PRICED INTERNATIONAL BROADBAND CONNECTIVITY FUELS ILLEGAL PRACTICES

The liberalization of the ICT sector in 2012 resulted in expanded service coverage, increased access to ICT, and rapid development of network connectivity. Active mobile-broadband subscriptions per 100 inhabitants in Timor-Leste increased from 0.4 in 2011 to 29.7 in 2014, according to the International Telecommunications Union (ITU). Timor-Leste’s 2015 Population and Housing Census reported that 81 percent of households had a mobile phone. Despite these improvements, affordability remains a challenge. Both mobile-broadband and fixed-broadband services in Timor-Leste cost well above the United Nations Broadband Commission’s affordability target of 2 percent or less of the country’s average monthly income.

Almost all Internet traffic transits over geostationary satellite connections that are very expensive and of comparatively poor quality. Telkomcel circumvents that constraint by transiting traffic over “short haul” submarine cables to cable landing facilities in West Timor that are owned by the company’s parent, Indonesia Telekom, and by Moratelindo, the operator of the eastern segment of the Palapa Ring. Police took action against Telemor and a local ISP for unauthorized microwave connections to Indonesia/West Timor that were used to reach Telekom’s international facilities there. The case was under investigation as of January 2021 and its current status is unknown at the time of writing this report.

TIMOR-LESTE’S EMERGING ICT INDUSTRY HINDERS DEVELOPMENT IN OTHER SECTORS

Given the foregoing, the ICT industry is still relatively nascent in Timor-Leste as entrepreneurial activity in the sector suffers from a significant lack of appropriately trained workers, combined with international broadband connectivity constraints. Because of the broadband constraints, banks have not introduced mobile banking services into the market. Innovations in other financial services, as well as financial inclusion of the underbanked or non-banked through mobile banking, is also impeded. E-commerce capabilities and activity on the part of local commercial firms is limited, in part because of the connectivity constraints, but also due to the absence of a modern commercial law regime, particularly one that supports e-commerce.

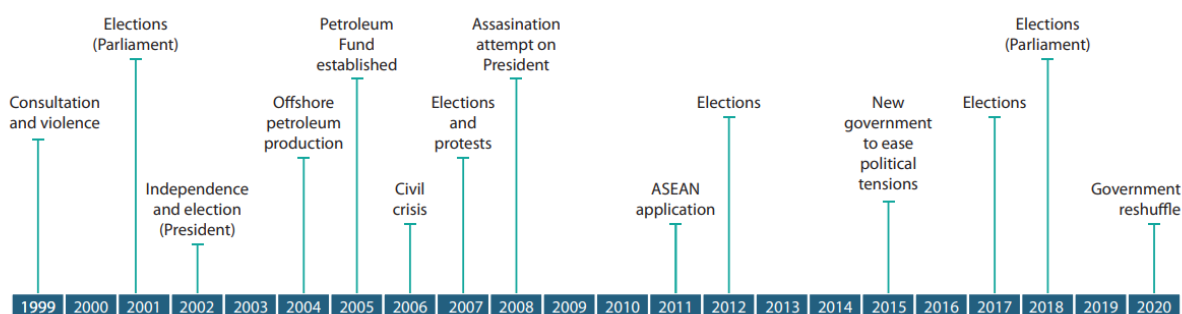
An initiative to promote digital technology to access financial services is the Central Bank of Timor-Leste’s program called “The National Program of Digital Village,” which has been implemented through a pilot project in the Administrative Post of Maubise, in Ainaro Municipality. The pilot aimed to facilitate the usage of digital technology for financial services among public officials, teachers, police officers, veterans, entrepreneurs, companies, and students. In the medium and long term, the pilot project aims to provide

community members opportunities to access integrated and interconnected digital financial services. As of November 2021, since the implementation of the project in Maubise, more than 700 clients had accessed digital financial services via e-wallets and more than 3,500 transactions had been carried out by these clients. E-wallets were provided by Telemor Fintech² and Tele Digital Solution.

POLITICAL UNCERTAINTY PRESENTS A SERIOUS RISK TO PROGRESS

Timor-Leste is known for its fluid, unpredictable, and uncertain political situation. Figure 3 presents a timeline of events in Timor-Leste that shows the intermittent periods of political uncertainty. Since 2017, there have been three governing coalitions in Timor-Leste. Although the changes were non-violent and occurred legally, they presented disruptions to normal governance. Timor-Leste’s complex and ambiguous governance is known to contain multi-layered interactions between formal and informal governance authorities.

Figure 7: Timeline of major events in Timor-Leste's political landscape (World Bank, 2020)



With presidential and parliamentary elections scheduled for 2022 and 2023, there is a possibility of reemerging political uncertainty, in addition to ongoing challenges related to the COVID-19 pandemic. Fitch Solutions assigns Timor-Leste’s Short-Term Political Risk Index score at 55.0³, reflecting balanced stability risks as the country prepares for its fifth presidential race in March 2022. There were 16 presidential candidates who contended the March 2022 presidential elections, four of whom were women.

On March 19, 2022, Timor-Leste’s first round of the presidential election resulted in José Ramos Horta, Timor-Leste’s former president from 2007 to 2012, in the lead with 46.5%, followed by the incumbent Francisco Guterres of Fretilin with 22.1%. The two candidates will contest in the second round on April 19, 2022, and the winner will take office on May 20, 2022.

The two biggest political parties in Timor-Leste are the National Congress for Timorese Reconstruction (CNTR) and Fretilin (Revolutionary Front for an Independent East Timor). The parties hold a majority in Parliament, with 57 out of 65 seats, based on the 2018 parliamentary election following President Guterres’s move to dissolve Parliament. Other parties in Parliament include the Democratic Party and the Democratic Development Forum, a coalition of the Party for Unity and Democratic Development

² Telemor Fintech is a subsidiary of Telemor, a subsidiary of Viettel Global Investment JSC.

³ Fitch Solutions’ Short-Term Political Risk Index is a measure of pertinent political risks to investment climate stability over a time frame up to 24 months forward. The score ranges from 0 to 100, in which a higher score means a lower risk. (Source: <https://www.fitchsolutions.com/sites/default/files/2021-04/FS-Country-Risk-Index-Methodology.pdf>).

(PUDD), the Timorese Democratic Union (UDT), the Frente Mudança (FM), and Partido Desenvolvimento Nacional.

A media release issued by Fretilin in 2011 suggests that the party has interest in how EDTL runs its operations, indicated by its push for a detailed audit on the utility. The release criticized the government, then ruled by Xanana Gusmão of CNRT. According to the release, the government obstructed a cross-party parliamentary resolution for an independent and detailed audit of the management and operations of EDTL and instead provided an inadequate advisory report from Deloitte.

Political uncertainty can impact the approval of the state budget and may have implications on EDTL's operations. There were multiple past instances in which budget approval delays were due to political reasons. The state budgets for 2017, 2018, and 2020 were enacted many months late and resulted in a curtailment of the government spending on which much of the country's economy depends. This resulted in sharp declines in public investments in 2019 and 2020.

Timor-Leste has a dual budgeting system, whereby the recurrent budget is mostly under the responsibility of the Ministry of Finance, while the capital budget is under the mandate of the Administrative Council of the Infrastructure Fund (known as CAFI). As a state-owned enterprise, EDTL must follow a budget application and approval process, which is prone to disruptions or delays by political dynamics.

PROCUREMENT TRANSPARENCY IS AN AREA OF IMPROVEMENT.

In an attempt to increase transparency, Timor-Leste issues procurement information on its eProcurement Portal. The portal provides information on signed contracts awarded since 2010 and currently open tenders. Despite this effort, procurement processes remain largely opaque. Anecdotal information provided by La'O Hamutuk indicates there was no public consultation process, cost/benefit analysis, or legally required environmental impact analysis by the GoTL or the companies implementing the Hera and Betano heavy fuel oil power plants. The tendering process, contract changes, design changes, the opacity of the budget, and significant cost overruns raise doubts about transparency.

Table 4: Select electricity sector procurement details obtained from GoTL's eProcurement Portal (not inclusive of procurement of fuel supply to EDTL power plants)

Date Signed	Vendor	Contract and Link to the eProcurement Portal	Contract Value (US\$)
September 15, 2010	Puri Akraya Engineering	<u>Engineering, Procurement and Construction of 119.5 MW Hera Power Plant & 136.6 MW Betano Power plant. Original Contract Amount: \$ 330,420,600. Amendment for addition of 150kV high voltage outdoor. Amended Amount: \$ 406,171,322. (Contract No. RDTL 10004115)</u>	\$406,171,322.00
December 21, 2009	CNI22	<u>Construction of Nationwide Electrical Power Grid and Power Plant and its facilities. Original Contract Awarded Amt \$ 367,131,224. Current Contract Amt after amendments \$ 298,496,192 (Contract No.: RDTL-812931)</u>	\$298,496,192.00
December 23, 2010	CSI Company LDA	<u>Contract RDTL-100053. Engineering Design, Supply and Installation of the</u>	\$30,900,000.00

Date Signed	Vendor	Contract and Link to the eProcurement Portal	Contract Value (US\$)
		Extension of the Comoro Diesel Generating Power Station	
June 29, 2007	Manitoba Hydro Int'l	Contract RDTL-96343. Provision of management Services for EDTL	\$11,003,071.00
July 16, 2009	Bonifica S.P.A.	Contract RDTL-92896. Construction Supervision Services for the Building of a national Electrical Power system for the Timor-Leste	\$8,595,400

With regards to corruption, Transparency International ranked Timor-Leste 93rd out of 180 countries on its Corruption Perceptions Index in 2019, and the GoTL is continuing to take steps to combat corruption. The World Bank estimates that Timor-Leste loses 1.5 to 2 percent of gross domestic product annually to corruption. Anecdotal information in an annual report by the Freedom House indicates that anti-corruption bodies lack funding to operate effectively. The independent Anti-Corruption Commission was established in 2009 and has no powers of arrest or prosecution, relying on the prosecutor general, with input from police and the courts, to follow up on corruption investigations. Anecdotal information suggests challenges in engaging public sector entities, which indicates a lack of openness and transparency in governance.

WAY FORWARD

To accurately represent Timor-Leste's political economy in the power and ICT sectors in the interest of operationalizing EDTL's dark fiber capacity for improved connectivity, the following are recommended:

- **Engage government and private sector entities from both the ICT and power sectors:** Obtaining perspectives from regulators and companies in both sectors is paramount to accurately paint the political economy landscape. There is little public evidence on the dark fiber capacity utilization in EDTL's transmission network. In the preparation of this report, multiple stakeholders were consulted, including the ADB, ANC, ANE, EDTL, TIC, MPW, and MTC. However, more in-depth discussions are needed.
- **Identify capacity building needed to operationalize dark fiber capacity:** Improvement of capital is a complex issue that requires careful planning and execution. As EDTL is undergoing a corporatization process, more work needs to be done to assess capabilities, key roles, and organizational units required to manage dark fiber operationalization. This is also an opportunity to collaborate with ADB in work on EDTL's corporatization process, such as the formulation of an investment plan and an assessment of human resource needs.

CHALLENGES ENCOUNTERED

During the writing of this report, there were challenges associated with engaging local stakeholders and obtaining timely responses, hindering significant progress in acquiring accurate information and deep insights on the ground. The upcoming presidential election and ongoing COVID-19 pandemic, including travel restrictions that prevented visits to the country, presented challenges in stakeholder engagement.

APPENDIX A

STAKEHOLDERS CONTACTS

- Ministry of Public Works (MPW)
- Information and Communication Technology Agency (TIC)
- Electricidade de Timor-Leste (EDTL)
- Autoridade Nacional Para A Electricidade, Instituto Publico (ANE, IP.)
- Ministry of Transportation and Communications (MTC)
- Autoridade Nacional De Comunicacoes De Timor-Leste (ANC)
- Timor Telecom
- Diresaun Nasional Infraestrutura Komunikaun (DNIC)
- Asian Development Bank (ADB)

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