A. Sector Performance, Problems and Opportunities

1. Timor-Leste has made tremendous progress in the power sector since independence in 2002. Since 2008, the government, through its electric utility, Electricidade de Timor-Leste (EDTL), has invested nearly $1 billion to replace old, inefficient diesel generation and create a single transmission and distribution system from a collection of isolated systems. As a result of the investment, network-supplied electricity coverage increased from 21% of households in 2003 to roughly 70% in 2014, and installed generating capacity more than tripled, giving EDTL enough capacity to connect all households and easily meet peak demand until at least 2027 under the highest load-growth scenario.

2. However, the following challenges remain: (i) roughly 60% of generated electricity is not billed to customers; (ii) technical losses are high (12% of generation) and the installation of meters has not kept pace with new connections; (iii) generation remains dependent on imported diesel, with the operating cost estimated at $0.42/kilowatt-hour (kWh); and (iv) there are substantial investment needs, especially at the distribution level (voltages of 20 kilovolts and below) (footnote 1). The government’s Strategic Development Plan, 2011–2030 targeted 100% electrification by 2015, but this was not achieved and would require a continuation of investment in new distribution.² The existing network also needs investment in modernization and replacement of ageing assets, especially in Dili, where the network is several decades old. Service interruptions in Dili are a frequent, almost daily, occurrence.

3. The government recognizes that, in order to sustain its successes in the sector, EDTL must begin to operate on a more commercial basis. The government currently subsidizes roughly 85% of operating costs in the sector (over $100 million in 2015).³ The amount of subsidy required will grow unless technical and nontechnical losses decline and generation costs can be reduced. The government also recognizes that changes to the institutional, legal, and regulatory arrangements are needed to achieve financial sustainability for the sector. EDTL remains a department within the Ministry of Public Works, Transport and Communications and has never operated on a fully commercial basis. It lacks the human capacity and business systems to operate efficiently and address the operational and developmental challenges that it faces.

4. The Strategic Development Plan, 2011–2030 has set ambitious targets for the power sector, including achieving 100% electrification, increasing renewable energy generation, and attracting natural gas processing facilities to the country. The Law Establishing the Bases for the National Electricity System states the government’s commitment to reliability and quality of power supply and makes provisions for universal service and good quality, reliable power supply.⁴

5. Two newly constructed power plants supply most of Timor-Leste’s electricity: (i) the 119-megawatt (MW) Hera plant, located near Dili, became operational in 2011; and (ii) the 136 MW Betano plant, located in the Manufahi district on Timor-Leste’s south coast, became

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These capacities were added to the existing 27.5-MW Comoro power plant in Dili. The Hera and Betano plants can run on diesel or heavy fuel oil, and can be modified to run on natural gas. However, no heavy fuel oil handling and storage facilities exist, so they would need to be built. Conversion of the plants to run on natural gas is a lengthy and capital-intensive undertaking, although it would be cost-effective if natural gas were available on-shore.

There is currently more than enough capacity to serve consumption and meet daily and seasonal peaks. Forecasts indicate that even under the highest demand scenarios, Timor-Leste will have ample diesel-generating capacity through at least 2027, albeit at high cost. Reductions in existing excessive technical and nontechnical losses will extend this horizon by several years. In 2013, the government commissioned a new and modern 603-kilometer transmission ring around the country consisting of 150 kV high-voltage lines, nine substations to serve major load centers, and a control center in Dili that connects to existing distribution networks.

The principal weaknesses in the power sector are the high cost of generation, the need for investment in distribution, the ongoing need for substantial fiscal subsidies, and excessive technical and nontechnical network losses. These problems are, to some extent, the result of weaknesses in the institutional, legal, and regulatory environment: the absence of proper commercial practices within EDTL, and poor implementation of the legal and regulatory frameworks for the sector. The power sector in Timor-Leste runs almost entirely on imported diesel. Roughly 90% of the sector’s operating costs are fuel costs associated with power generation. In 2013, the government spent $100.8 million on fuel for power generation out of the $114.6 million it had allocated to the sector.

The government has invested in new generation and transmission capacity, but has not yet invested as much in rehabilitating the distribution system (20 kV and below), which is in poor condition. Outages persist, despite an abundance of new generation capacity and a new transmission system, largely because of maintenance needs at the low voltage level. Investment is also needed to extend the low voltage network. Roughly 30% of households in Timor-Leste, many of them in rural areas, still have no network-supplied electricity. Most communities in remote and mountainous areas do not have any access to electricity.

The level of revenue collected by EDTL is well below its actual cost of service. This gap is a result of the following factors:

(i) **Technical losses.** Estimated to be roughly 12% of gross generation, technical losses take the form of electricity lost as heat on transmission and distribution lines between the generator and end-use customer.

(ii) **Nontechnical losses.** These losses include unmetered consumption, some of which is the result of theft (especially in Dili), and most of which is the result of the government’s policy of providing electricity connections without meters (and therefore without tariffs) in the districts outside of Dili. In 2012, the government expanded connections to 57,000 new, unmetered customers. The system had 108 gigawatt-hours of nontechnical losses in 2012 compared to 33 gigawatt-hours of nontechnical losses in 2011.

(iii) **Under-collection of invoices.** Prepaid meters have been installed in much of Dili, and payment discipline is gradually improving. Most customers outside the capital still do not have meters or access to a local payment office, and collection in those areas remains very low.

(iv) **Low tariffs.** EDTL’s operating cost is estimated at $0.42/kWh, but tariffs in Timor-Leste are well below this. Residential tariffs are structured as increasing blocks, with a tariff of $0.05/kWh for the first 20 kWh of consumption and $0.12/kWh for consumption above 20 kWh. As a result, all residential consumers receive the subsidy, regardless of income.
10. Much of the revenue shortfall described in para. 9 is funded through direct fiscal subsidy, but there is also a quasi-fiscal component. The quasi-fiscal component is a noncash deficit that accrues to infrastructure through deferred maintenance (the infrastructure depreciates more quickly because funds are not available to maintain it properly), or accrues as accounts payable (and possibly bad debt) to vendors or employees. Quasi-fiscal, in other words, refers to the portion of the deficit not covered by subsidies from the government.

11. The government and EDTL would save substantially by reducing technical and nontechnical losses and gradually increasing tariffs to cost-recovery levels. Savings from an effective loss-reduction program would deliver $260 million (present value of savings from 2012 through 2030). Coupled with a gradual increase in tariffs to cost-recovery levels, the present value of savings would be $650 million.5

12. Conversion of the Hera and Betano diesel power plants to run on natural gas would reduce the fuel costs for operating these plants by approximately 50%. As the development of the Tasi Mane onshore gas processing facilities progresses, or as other options for bringing gas to Timor-Leste’s shores become viable, contingency plans to convert the Hera and Betano plants should be prepared for implementation.

13. Timor-Leste has substantial renewable energy potential. Prefeasibility studies have identified about 450 MW of renewable energy generation potential. However, only 1.09 MW of renewable energy generation capacity has been developed, consisting of mostly solar and some small hydropower generators. Renewable options include the following:
   (i) **Wind power.** Prefeasibility studies have been conducted in Timor-Leste to determine the most suitable sites for wind-powered generation. These include the mountainous areas east of Maliana, and southwest and east of Venilale and Quelicai. The Program of the Vth Constitutional Government (2012-2017) prescribed development of a wind farm at Lariguto by 2017 but the Program of the VIth Constitutional Government (2015-2017) contemplates delaying this investment.
   (ii) **Solar power.** The government has identified solar power as the most suitable method to expand electricity to remote outlying regions. The average daily global horizontal irradiance in Timor-Leste ranges from 14.85 MJ/m² (megajoules per square meter) to 22.33 MJ/m². The government plans to introduce a program to provide 100,000 households with lighting from solar power generation.
   (iii) **Hydropower.** The government has identified about 40 sites for small hydropower projects that can be used during the monsoon season, which typically occurs from December to May. Each of these sites can generate 1.2 MW–50.0 MW, and do not require dams.

14. Hydroelectric potential appears particularly attractive. A 2012 study identified 14 projects that were economically viable when compared to the operating costs of the Hera and Betano plants.6 The study found that hydropower is feasible even with Hera and Betano as required capacity is not available from the hydro power plants during dry season but would be beneficial in reducing the pollution and financial cost of using imported fuels. Half of the hydropower plant sites identified in the study are financially viable even if the Hera and Betano plants are converted to use heavy fuel oil. Full feasibility studies have been completed for four of the sites that were identified in the study. By building these plants, the government could save roughly $35 million per year from avoided fuel costs. Assuming the plants were built in 2018, the

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5 Footnote 1 pp 25.
government would save $188 million in present value terms from 2018 to 2030.7

15. The power sector is vitally important to the achievement of inclusive growth and economic diversification. Delivery of universal service to the population supports important human development and poverty alleviation goals, while reduced cost of service is crucial for attracting capital- and energy-intensive industries (e.g., cement, food processing, etc.).

B. Government's Sector Strategy

16. The government views the power sector as pivotal to economic development and poverty reduction and has set ambitious targets for the provision of universal service and increased generation from renewable sources. Legislation passed in 2003 established the basis for Timor-Leste’s national electricity system, including principles of investment planning, ownership structure, involvement of the private sector, and sector regulation (including tariffs) (footnote 4). Subsequent legislation refined tariff policy and established nonpayment penalties, procedures for service termination and reconnection, and criminal sanction for theft of power.8 A subsequent government resolution established the current multtier power tariff structure, but also mandated that tariffs should reflect the true cost of service.9 However, EDTL has yet to fully implement these cost recovery provisions due to political sensitivities and limited technical capacity.

C. Asian Development Bank Sector Experience and Assistance Program

17. Energy was included in the country partnership strategy, 2011–2015 for Timor-Leste, but the Asian Development Bank (ADB) has had limited engagement in the sector.10 The government’s investments in the Hera and Betano diesel plants, and the national transmission and dispatch system, precluded ADB support and involvement (these investments were already at an advanced stage of development before substantive ADB support could be arranged). However, in early 2014, the government requested that ADB (i) assess options for addressing the structural and institutional shortcomings of the sector (including EDTL), and (ii) offer recommendations for how to attract private sector expertise to introduce commercial operating principles at EDTL and improve its overall performance. ADB mobilized technical assistance in mid-2014 and produced a report on sector reform and private sector participation in electricity (footnote 1).

18. In July 2015, the government and ADB signed a memorandum of understanding on a program of ADB support centered on reforms and investments to increase efficiency, strengthen service quality, and lower recurrent costs. ADB will help the government to develop a public–private partnership in the form of a lease or concession contract, and support conclusion of operation & maintenance contracts for the Hera, Betano, and Comoro power plants and the national transmission and dispatch system. ADB is also providing technical assistance to identify investments in EDTL’s distribution networks that are needed to improve physical and financial performance and extend network service to currently unserved populations. This engagement is expected to last through the period covered by the country partnership strategy, 2016–2020, and beyond.

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7 Footnote 1 pp25.
Problem Tree for Energy

National Impact

Constrained economic growth

Core problem

Inefficient sector investments and operations

Causes

Insufficient trained and competent EDTL technical personnel
EDTL not operating as a commercial enterprise
Poor financial performance, including revenue collection
Tariffs far below cost of service
Sector policy inadequate or unenforced

EDTL = Electricidade de Timor-Leste