

Performance
Evaluation Report

Sri Lanka: AES Kelanitissa Power Project



Performance Evaluation Report
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Project Number: 34912
Equity Investment/Loan Nos.: 7167 /1815(SF)
Independent Evaluation: PE-757



NOTES

- (i) The fiscal year of the Government of Sri Lanka ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

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Abbreviations

ADB	–	Asian Development Bank
AKL	–	AES Kelanitissa Limited
ANZ	–	Australia and New Zealand Banking Group
CEB	–	Ceylon Electricity Board
CPC	–	Ceylon Petroleum Corporation
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
IPP	–	independent power producer
kJ	–	kilojoule
kWh	–	kilowatt-hour
MW	–	megawatt
PPA	–	power purchase agreement
PRG	–	partial risk guarantee
RRP	–	report and recommendation of the President
WACC	–	weighted average cost of capital

Currency Equivalents

Currency Unit		– Sri Lanka rupee/s (SLRe/SLRs)		
		At Appraisal (30 October 2000)	At Completion (10 October 2003)	At Evaluation (20 November 2012)
SLRe1.00	=	\$0.0126	\$0.0106	\$0.0077
\$1.00	=	SLRs79.35	SLRs94.42	SLRs130.15

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IED retains full responsibility for this report.

Basic Data

AES Kelanitissa Power Project in Sri Lanka (Investment No. 7167-SRI, Loan No. 1815-SRI)

Key Project Data	As per ADB Loan Documents (\$ million)
Total project cost	104.0
ADB investment	
Loan	
Committed	26.0
Guarantee	52.0
Partial risk guarantee	31.0

Key Dates	Expected	Actual
Concept clearance approval		June 2000
Board approval		19 December 2000
Loan agreement	4 April 2001	15 June 2001
Loan effectiveness	4 April 2001	15 June 2001
First disbursement	10 April 2001	1 October 2001
Physical completion date		31 August 2003
Commercial operations date	January 2003	10 October 2003
Months (effectiveness to commercial operation)	21 months	28 months

Project Administration and Monitoring	No. of Missions	No. of Person-Days
Fact-finding	2	18
Appraisal	1	15
Project administration	3	10
Extended annual review mission	1	6
Others	2	9

ADB = Asian Development Bank, PPER = project performance evaluation report, SRI = Sri Lanka, XARR = extended annual review report.

Source: Asian Development Bank.

Executive Summary

The AES Kelanitissa Limited (AKL) project has contributed significantly to Sri Lanka's power sector by stabilizing and balancing the country's power supply portfolio and meeting the thermal generation needs of the country in its early years while the project was still a cost-effective supply option. As more cost-effective independent power producers (IPPs) were developed, the project was displaced to reserve shutdown mode in order to improve and stabilize the reliability of the Sri Lanka power system's supply and to continue the elimination of load shedding (as expected at appraisal, Sri Lanka learned to build more efficient power plants, and, due to its high operating costs, this project moved into reserve supply mode). The project was the major catalyst to bring the country's power supply shortage to a stable condition within a short period of time. This is a remarkable achievement.

The Project

On 19 December 2000, ADB's Board of Directors approved a direct loan of \$26.0 million with a tenor of 12 years including a grace period of 3 years from ADB's ordinary capital resources and a \$52.0 million partial risk guarantee (PRG). The Government of Sri Lanka agreed to indemnify and reimburse ADB for \$31.0 million. Australia and New Zealand Banking Group cofinanced the project with a loan of \$52.0 million. ADB's original PRG of \$52.0 million was revised to \$31.0 million. Political risk insurance of \$21.0 million was provided by the private insurer Sovereign.

The AKL project aimed to (i) ease Sri Lanka's critical power supply shortfall in a cost-effective manner and minimize the cost of load shedding by helping to balance Sri Lanka's generation supply dependence on hydropower; (ii) help stabilize Sri Lanka's power supply capability; (iii) make competitively priced power accessible to consumers within a short time; (iv) help Ceylon Electricity Board expand consumer access to reliable and affordably priced power and thus provide power to at least 80% of the population by 2005; (v) be consistent with the long-term generation expansion plan and ADB's strategy for the sector's development; (vi) improve the sector's governance through private participation; (vii) promote the best commercial practices in power plant operations and management and thus establish performance benchmarks for the sector's other power generation providers; (viii) strengthen government support for increased private participation through its expected positive demonstration effects; and (ix) mobilize \$52.0 million of long-term debt from commercial banks, which was critical to the project, through ADB's PRG facility with a government counter-indemnity.

The project entailed the construction and operation of a 163-megawatt (MW) auto diesel-fired combined cycle gas turbine power plant. AKL, the project borrower, is a private limited liability company incorporated in Sri Lanka. AKL is a joint venture between AES Corporation, an IPP based in the United States, and Hayleys Limited, a diversified Sri Lankan conglomerate established under a build-own-operate-transfer arrangement with the Government of Sri Lanka. Under that arrangement, the plant would be transferred to the government at the end of a 20-year concession period. The project was completed 10 months behind schedule but essentially within the budget.

Evaluation

The overall rating for development impact is *less than satisfactory*. Despite this, the project did bring about some positive outcomes. AKL succeeded in bringing Sri Lanka's previous situation of power supply shortage up to a stable condition in a short time, eliminating load shedding for a significant period, enhancing power supply reliability, increasing private sector market entrants, and introducing the latest in best practice thermal plant operations and maintenance.

ADB's investment profitability is rated *satisfactory*. Using another IPP project in the region as an interim proxy, the ADB loan reflected risks associated with the project comparable with recent market benchmarks. The interest rate margin charged on ADB's direct loan to the project was benchmarked against ADB's support to Bangladesh's Meghnaghat Power Project in 2000. Comparative analysis of the two projects, both of which are in South Asia, yielded a *satisfactory* minimum multiple for the ADB loan and PRG support to AKL.

The overall quality of ADB work is assessed *less than satisfactory* and is discussed under three categories: (i) screening, appraisal, and structuring; (ii) monitoring and supervision; and (iii) role and contribution to the project.

ADB additionality is rated *satisfactory*. Its support was necessary for timely realization of the AKL plant. Specifically, ADB financing provided comfort to an interested private financier..

Overall, the project is evaluated *less than successful* based on the above assessments of development impact, investment profitability, ADB work quality, and ADB additionality.

Lessons

It is prudent for ADB to consider alternative fuels when appraising the cost and benefits of oil-fired generation plants. Alternative fuels consist of renewable energy sources and thermal fuels, including clean coal options. Private sector support to the power sector is optimized with a comparative analysis of real fuel options

Risk of lost revenues due to delayed commissioning and unplanned shutdown associated with mechanical failures can be mitigated by requiring expert power plant developers sponsored by ADB to provide more oversight and guidance to construction contractors.

A close examination and assessment of real capacity is necessary in analyzing economic and financial benefits for private sector power plant projects supported by ADB. Nameplate capacity needs to be considered in the context of a plant's capacity factor. No power plant runs 100% of the time; and power plants, such as the one which AKL has, that run on auto diesel fuel will need to shut down routinely for scheduled maintenance. Routine maintenance, combined with unscheduled shutdowns, lower actual net capacity.

Experienced foreign investors in power generation have access to private sector technical insurance that sovereign entities may not otherwise have. This is important when technical problems surface that cause major shutdown of operations. Private sector insurance enables unforeseen technical problems to be fixed along with compensation to the insured for revenue loss due to the incident.

Recommended Follow-up Action

The requirements under Sri Lanka Electricity Act, No. 20, 2009, restricting license issuance to private sector power generation entities that are equal to or less than 25 MW or, if greater than 25 MW, at least 50% owned by the government most likely will negatively impact the country's power generation sector. The Ministry of Power and Energy has indicated that the country's legislature is considering revisions to the current Act that would be more conducive to private sector investment and a revision that is more friendly to private investment will soon be forthcoming. This revised legislative issue must be watched closely and, if necessary, followed up by ADB with further public sector capacity building support to encourage legislation that is more conducive to private sector investment in the sector.

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CHAPTER 1

The Project

A. Introduction

1. The Independent Evaluation Department of the Asian Development Bank (ADB) fielded an independent evaluation mission to Sri Lanka from 6 to 20 December 2011 to evaluate the project performance of the Kelanitissa Power Project.¹ The mission conducted interviews and discussion with key management staff of the project company, AES Kelanitissa Limited (AKL),² at its headquarters and plant, located 2 kilometers north of Colombo. The mission also had meetings with stakeholders of the project, including Ceylon Electricity Board (CEB); Ministry of Power and Energy; Ministry of Finance and Planning; Public Utilities Commission of Sri Lanka; Australia and New Zealand Banking Group (ANZ); and other relevant independent power producers (IPPs), including Asia Power (Private) Limited, and Lanka Transformers. The findings of the mission are recorded in this project performance evaluation report.

2. The evaluation criteria used for this project performance evaluation report are based upon relevant ADB guidelines.³ The findings of the mission and a survey of related documents are evaluated against the criteria of (i) development impacts and outcomes, (ii) ADB investment profitability, (iii) ADB work quality, and (iv) ADB additionality. An overall evaluation of project success is then presented.

B. Project Background

3. On 19 December 2000, ADB's Board of Directors approved a direct loan of \$26.0 million with a tenor of 12 years including a grace period of 3 years from ADB's ordinary capital resources and a \$52.0 million partial risk guarantee (PRG). The Government of Sri Lanka agreed to indemnify and reimburse ADB to \$31.0 million. ANZ cofinanced the project with a loan of \$52.0 million. ADB's original PRG of \$52.0 million was revised to \$31.0 million. Political risk insurance of \$21.0 million was provided by the private insurer Sovereign.

4. The project, located at an existing Kelanitissa power plant location in the lower reaches of the Kelani River, entailed the construction and operation of a 163-megawatt (MW), auto diesel-fired combined cycle gas turbine power plant. AES Kelanitissa Limited (AKL), the project borrower, is a private limited liability company incorporated in Sri Lanka. AKL is a joint venture between AES Corporation, an IPP based in the United States, and Hayleys Limited, a diversified Sri Lankan conglomerate established under a build-own-operate-transfer arrangement with the Government of Sri Lanka. Under that agreement, the plant would be transferred to the government at the end of a 20-year

¹ From 19 to 25 June 2008, ADB fielded its final mission to Sri Lanka for the extended annual review report for the AKL project. That report was published on 27 December 2011, some days after completion of the independent evaluation mission.

² AKL is a joint venture between AES Corporation, an independent power producer based in the United States, and Hayleys Limited, a diversified Sri Lankan conglomerate.

³ ADB. 2007. *Guidelines for Preparing Performance Evaluation Reports on Nonsovereign Operations*. Manila.

concession period. The project was completed 10 months behind schedule but essentially on budget.⁴

5. The project was the largest planned private sector IPP in Sri Lanka in 2000.⁵ At the time of project appraisal, Sri Lanka's electricity supply was neither sufficient nor reliable. In 1999, transmission and distribution losses were 21% and service interruptions were common. Tariffs were lower than the total system average incremental cost of supply. Sri Lanka experienced power shortages because of insufficient power facilities and variations in rainfall. Hydropower accounted for about 91% of the country's total generation, with 24 power stations providing 1,142 MW of the 1,691 MW total installed generation capacity in 1999. At project appraisal, the future development of hydro resources was increasingly difficult because 57% of the country's hydropower potential was already exhausted.

6. The country's long-term generation expansion plan, developed in May 2000, anticipated annual growth in peak demand to average 7.4% (from 1,371 MW in 2000 to 3,722 MW in 2014), and annual growth in overall electricity demand to average 7.8% over the same period.⁶ The power supply gap was expected to widen with retirement of old plants and likely delays in commissioning new plants. To meet the country's projected demand while minimizing reliance on hydropower, the long-term generation expansion plan called for new thermal capacity additions of 187 MW per annum through 2014. The AKL project was included into that plan.⁷

C. ADB Assistance to Strengthen the Enabling Environment

7. Faced with challenges to CEB that included weak financial performance, politicized and nontransparent tariff processes, generation supply constraints, a transmission system overloaded in several areas, and system losses as high as 21% on the transmission as well as distribution networks, the Government of Sri Lanka embarked upon power sector restructuring that culminated in its approval of the Electricity Reform Act, 2002, providing a legal framework for the restructuring program. The restructuring plan required sector unbundling and the formation of a generation company, one transmission company, and four distribution companies, along with the establishment of an independent regulatory commission to improve sector governance, enabling a transparent business environment.

8. In October 2002, ADB approved the Power Sector Development Program, involving, among other things, a program loan of \$60 million from its ordinary capital resources to further support incentives for restructuring in the form of program assistance.⁸ The government established the Public Utilities Commission in 2002 as a regulator for the energy and water sectors under the Public Utilities Commission Act, 2002. The unbundling of CEB did not materialize, however, due to opposition from within the ruling coalition and from labor unions.⁹ The government separated

⁴ Actual budgeted cost at time of appraisal was \$104.1 million.

⁵ Other IPPs operating in the country in 2000 included Asia Power with 51 MW, Lakdhanavi with 22.5 MW, and Colombo Power with 60 MW. All IPPs together comprised about 5% of total generating capacity.

⁶ Government of Sri Lanka. 1999. *Long-Term Generation Electricity Plan*. Colombo.

⁷ ADB. 2000. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to AES Kelanitissa (Private) Limited and Proposed Partial Risk Guarantee for the Kelanitissa Power Project in the Democratic Socialist Republic of Sri Lanka*. Manila.

⁸ ADB. 2002. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Sri Lanka for the Power Sector Development Program*. Manila (Loan 1929 [\$60 million] and 1930 [\$70 million from ADB Special Fund], approved on 31 October 2002).

⁹ ADB. 2011. *Country Partnership Strategy: Sri Lanka, 2012–2016*. Manila.

generation, transmission, and distribution into CEB functional units, but this restructuring fell short of the Power Sector Development Program requirements. Subsequently, in 2006, ADB terminated the second tranche of the program loan when it became apparent that important restructuring conditions would not be met.

9. Given the results of the 2002 restructuring endeavor, ADB encouraged the government to consult with stakeholders when preparing a fresh sector reform program. Consequently, the government introduced and negotiated regulatory reform that faced less political resistance. In May 2008, the government formulated a national energy policy that aimed to create greater efficiencies in CEB operations, further empower the Public Utilities Commission, and advance an enabling environment for additional private sector participation. Parliament approved the Sri Lanka Electricity Act in March 2009 (the Act), empowering the Commission to regulate the electricity supply industry from April 2009, including CEB's six functional business units, which encompass generation, transmission, and four separate distribution operations.¹⁰ The Act empowered the Public Utilities Commission to regulate and set tariffs for each of CEB's functional units, as well as to issue licenses for all energy sector suppliers, including IPPs. The Act fell short, however, in providing sector-related legislation that further enabled private sector investment. In particular, the Act authorized the Commission to grant licenses to IPPs of only 25 MW or less. For licensing IPPs with capacity greater than 25 MW, the Act required at least 50% government ownership unless the Secretary to the Treasury was to determine otherwise.¹¹

D. Key Project Features

10. AKL agreed to build, own, operate, and transfer the power plant in accordance with an implementation agreement with the government and a power purchase agreement (PPA) with CEB. CEB was to purchase the capacity and energy output of the plant under the 20-year PPA. Ceylon Petroleum Corporation (CPC) was to guarantee the availability of fuel for the project under a fuel supply agreement. The government agreed to guarantee the payment obligations of CEB under the PPA and the supply obligations of CPC under the fuel supply agreement in accordance with the implementation agreement. The project was expected to commence operation in January 2003 with implementation under a performance-based, fixed-price, turnkey engineering, procurement, and construction contract. AES awarded the engineering, procurement, and construction contract to Larsen & Turbo, an Indian construction firm, through an international competitive bidding process.

11. A land lease agreement was to provide AKL with all necessary leasehold interests and other rights-of-way and easements. At the time of its processing, the project's levelized tariff was estimated at \$0.0607 per kilowatt-hour (kWh). That estimated tariff was expected to be competitive with CEB's earlier thermal IPP contracts having tariffs averaging \$0.072/kWh in 2000 and significantly less than the emergency (temporary) power tariff averaging \$0.1160/kWh in 2000. Thus, the project was expected to help reduce overall power supply costs.

E. Project Highlights

12. The capital cost recovery rate in the PPA allows AKL to recover all investment costs plus return on equity in the first 10 years of the contract. CEB agreed to purchase

¹⁰ Government of Sri Lanka. 2009. *Sri Lanka Electricity Act*, No. 20 (Act No. 20). Colombo.

¹¹ Footnote 10, Chapter III, Part I, Clause 9.

the capacity and energy output of AKL under a two-part capacity and energy charge tariff for a period of 20 years. The capacity charge was designed to cover debt service, return on equity, plus fixed operation and maintenance costs, and it is subject to an average guaranteed minimum availability of 92%. The energy charge consists of fuel costs and variable operation and maintenance expenses and is subject to a maximum heat rate. The fuel component of the energy charge is adjusted based on changes in fuel prices (which are passed on directly to the consumer) and is subject to a guaranteed heat rate. Incentive payments are payable when availability targets are exceeded and liquidated damages are payable for failure to meet targeted availability.

CHAPTER 2

Evaluation

A. Project Rationale and Objectives

13. The AKL project aimed to (i) ease Sri Lanka's critical power supply shortfall in a cost-effective fashion and minimize the cost of load shedding by helping to balance Sri Lanka's generation supply dependence on hydropower; (ii) make competitively priced power accessible to consumers within a short time;¹² (iii) serve as the first step toward greater dependence on market forces and private sector involvement in the sector; (iv) be consistent with the long-term generation expansion plan and ADB's strategy for the sector's development, which sought to boost private sector participation in new power generation projects and thereby enhance the financial resources available for the sector's expansion and improved operational and management efficiencies; (v) improve the sector's governance through private participation; (vi) generate power at a tariff that would have been competitive with that of similar plants in Sri Lanka while costing much less than emergency (temporary) power; and (vii) release scarce government funds to support the development needs of Sri Lanka's social sector.¹³ The project achieved each of the objectives established at the time of project appraisal.

14. The main risks identified during project processing were: (i) the project's competitiveness could diminish should the power sector become deregulated and market driven; (ii) the project's impact on the country's foreign exchange reserve situation, particularly that exposure to IPPs, such as AKL, could strain the country's overall foreign exchange position by eroding Sri Lanka's foreign exchange reserves; (iii) there could be a mismatch between the project's foreign exchange debt service requirements and the local currency tariffs; (iv) the impact of the sector's restructuring on the obligation of the government, CEB, CPC, and other key agencies with performance undertakings under the project agreements, and particularly that for restructuring could cause any project agreements to become null and void; (v) CEB's weak financial position might render it incapable of fulfilling its obligations under the PPA on a sustainable basis; (vi) the viability of the project could diminish in the event of surplus power in the medium term; and (vii) there might be project completion delays and cost overruns.¹⁴

15. Generally, project risks were well mitigated, with the exception of AKL's negative impact on Sri Lanka's foreign exchange reserves. While the fuel requirement of AKL alone had minimum impact on Sri Lanka's foreign exchange situation, in combination with the fuel requirements of other oil-fueled IPPs it does indeed strain the country's foreign exchange position.¹⁵

The project aimed to ease Sri Lanka's critical power supply shortfall in a cost-effective fashion by helping to balance Sri Lanka's generation supply dependence on hydropower

¹² Generation projects have no direct effect on consumer prices, but by diversifying generation they can indirectly impact consumer prices and reliability. As discussed in para. 20, AKL accomplished this objective.

¹³ Footnote 7, pp. 22–23.

¹⁴ Footnote 7, p. 23.

¹⁵ Independent Evaluation Department. 2007. *Country Assistance Program Evaluation: Sri Lanka (Supplementary Appendix C—Power Sector Assistance Evaluation)*. Manila: Asian Development Bank.

The plant was intended to be a bridge until additional power generation supplies could be further developed and brought on line

16. The design of the project was relevant to ADB's country assistance plan at the time of project appraisal.¹⁶ That plan called for ADB support to projects in Sri Lanka that would accelerate economic growth and increase employment opportunities. It was also relevant to Sri Lanka's government sector policy and plans to reduce prices to the consumer, ensure high levels of service and supply reliability, and sustain an adequate level of investment in the sector by harnessing private investment in power generation.¹⁷ The plant, included in the government's long-term generation expansion plan (footnote 6), was intended to be a bridge until additional power generation supplies could be further developed and brought on line.¹⁸

17. As articulated in the updated country partnership strategy,¹⁹ and given the country's current need for base load generation capacity with low-cost fuels, the project's rationale and objectives remain relevant today. However, the actual high cost of petroleum-based fuel emphasizes the important need for ADB to select for funding power sector generation projects in the context of a real comparative fuel price analysis.²⁰

B. Development Impact

18. Development impacts and outcomes are evaluated in consideration of AKL's effects on Sri Lanka's economic and social environment. The overall development impact rating is *less than satisfactory* and is based on a complete and up-to-date²¹ assessment of the impact of the project outcomes under the following criteria: (i) private sector development; (ii) business success; (iii) economic development; and (iv) environmental, social, health, and safety performance.

1. Private Sector Development

19. Overall private sector development is rated *satisfactory*. Private sector development is evaluated while including impacts beyond AKL and then under direct company outcomes (paras. 20–24). Further details on private sector development are presented in Appendix 1.

a. Beyond Company Impacts

20. The AKL project's primary role was to ease Sri Lanka's critical power supply shortfall in a cost-effective fashion while minimizing the cost of load shedding by helping to offset the country's generation supply dependence on hydropower. The project accomplished this goal. After AKL's commissioning in 2003, hydropower's share in Sri Lanka's generation capacity mix declined from approximately 70% to less than 40% by year end 2005. As a direct result of AKL's commissioning, load shedding was eliminated, power supply reliability was enhanced, and private sector entrants

¹⁶ ADB. 1999. *Sri Lanka: Country Assistance Plan, 2000–2002*. Manila.

¹⁷ Government of Sri Lanka, Ministry of Power and Energy. 1997. *Power Sector Policy Directions* (as amended in October 1998). Colombo.

¹⁸ At project appraisal, with government plans for fuel diversification into coal and other non-oil-based plants, it was expected that as oil-based plants approached the ends of their useful lives, they were explicitly expected to serve as "peaking service and for base-load power generation depending on merit dispatch." See also RRP, p. 33 and Appendix 1, p. 6.

¹⁹ ADB. 2011. *Country Partnership Strategy: Sri Lanka, 2012–2015*. Manila.

²⁰ This is further discussed in Chapter 3, paras. 51–53 under "Issues" and para. 55 under "Lessons."

²¹ During 19–25 June 2008, ADB fielded its final mission to Sri Lanka for the extended annual review of the AKL project. The independent evaluation mission carried out for this report was conducted from 6 to 21 December 2011.

increased in the power generation market. The project supported Sri Lanka's economic growth, which depends heavily on the availability of electricity (footnote 16).

b. Direct Company Outcomes

21. The project was a catalyst to private investment in medium-sized power generation and one of the first attempts to induce commercial lending in Sri Lanka's medium-sized power generation sector. AKL demonstrated to potential private sector investors that public-private partnerships in the power generation sector were possible and financially viable.²² The project risk guarantee provided by ADB to the commercial bank ANZ on behalf of AKL enabled the additional financial resources necessary for plant development, construction, and operations.

22. The plant introduced the latest in best practice thermal plant operations and maintenance. Subsequent power plants competed to perform as well as or better than AKL. Important best practice power plant operational knowledge was transferred from AKL to Sri Lanka via training and support directly provided by AES Corporation. This knowledge transfer buttressed individual worker skills as well as produced cutting-edge power generation sector expertise for retention in the country and for export by Sri Lankans to other countries. Power plant efficiency levels were raised and proper security protocols implemented.

23. Sri Lanka's power sector statistics show (footnote 16), and primary stakeholder CEB has asserted, that AKL helped to eliminate load shedding in the country.²³ Further, CEB has shown that when the AKL plant operates, it ensures a high level of service and supply reliability. However, rising fuel oil pricing have yielded higher priced power and not the lower priced generation that the government had anticipated.

24. The successful performance of AKL includes catalyzing private sector investment in the medium-sized power generation sector, introducing best practice thermal power plant operations, helping to eliminate load shedding, and successfully serving as a base load power generation bridge until additional power generation resources could become available. On balance, the overall private sector development rating is *satisfactory*.

2. Economic Development

25. The project's impact on economic development is rated *satisfactory*. This rating is based solely on recalculation of the economic internal rate of return (EIRR).²⁴

26. AKL is part of a proliferation of thermal generating IPPs operating with expensive petroleum fuel that negatively impact Sri Lanka's fiscal and foreign reserve situation (footnote 16). Nevertheless, the aforesaid macroeconomic woes of the country are not attributable solely to the AKL project. Hence, given ADB guidelines (footnote 3), it is clear that a project's contribution to economic development is

²² IPP Lanka Transformers (LT) was able to secure private capital of \$300 million in 2007 to build a two-stage 300 MW power plant (online respectively in 2008 and 2010) involving HSBC, Coface, Hermes, Atradius and US EXIM. Like AKL, LT is a heavy fuel oil-based power plant, built as a private sector endeavor to meet Sri Lanka's increased power demand (resulting from economic growth) and to bridge the anticipated supply gap until more low-cost generation—such as coal—could be brought online. Prior to LT and after AKL, Helandanavi (Pvt.) Ltd and ACE, Power Embilipitiya Ltd were medium-sized IPPs of 100 MWs each that came online, respectively, in October 2004 and March 2005.

²³ CEB Statistical Reports 2005 through 2011 also validate this information.

²⁴ Included in EIRR calculation is actual cost of fuel to Sri Lanka's economy.

measured primarily by its EIRR. Therefore, with its recalculated EIRR, which is greater than the 10% opportunity cost benchmark, AKL's economic development contribution is rated *satisfactory* (Appendix 2).

3. Environmental, Social, Health, and Safety Performance

27. The project adhered to ADB's policies on environmental, social, health, and safety issues and is therefore rated *satisfactory* in this area. Because the AKL power plant was established on an existing Kelanitissa power plant location, new land acquisition was not required. At the time of project appraisal, the plant was classified as environment category A and thus required a full environmental impact assessment. The AKL plant is required to comply with the environmental requirements of ADB and the Government of Sri Lanka. The Environmental Division of the National Building Research Organization of Sri Lanka has been contracted by AKL to conduct quarterly environmental testing.

28. The lenders' independent technical advisor, Sargent & Lundy, continuously appraises AKL's environmental performance. Upon review of Sargent & Lundy records,²⁵ the mission found that environmental monitoring is conducted at AKL for nitrogen oxide emission, ambient air quality, noise, and discharge water quality. While there is evidence showing incidents of the plant's exceeding some limits,²⁶ overall, it complies with the requirements of the environmental impact assessment and those ADB and government guidelines that were in effect at the time the project agreements were signed in 2000.

29. In addition to providing needed capacity to the power sector, AKL has assisted the government to train its navy in utility generation practices. It has created a young professional internship program providing internships to at least six graduates per year. Seventy-five percent of the internship participants are absorbed into AKL as permanent hires. AKL employs approximately 50 persons, including four women. It provides temporary employment to local contractors for operations, maintenance, and other works related to the plant.

30. The independent evaluation mission observed AKL's health and safety practices. All visitors, contractors, and employees are required to have a safety orientation course prior to visiting or performing any work at the power plant. AKL had created a safety video discussing its safety and health practices. The video explains the plant's use of fire alarms, log books, policies against alcohol and drug use, and main control room safety permit exercises, as well as its safety permit issuances. In addition, AKL conducts monthly safety meetings for its staff.

31. The AKL power plant materially complies with most standards in Sri Lanka and those established by ADB at approval. The plant has contributed measurably to employment and professional best practice power plant training. Its safety measures and performance demonstrate good standards that have been replicated at other power plants in the country. The project's environmental, social, health, and safety

*AKL power plant
materially
complies with
relevant
environmental
standards*

²⁵ Sargent & Lundy. 2011. *Technical Due Diligence Review for the AKL Power Plant*. Chicago. Reports from 2003 through 2011.

²⁶ Nitrogen dioxide level exceeded the World Bank limit for the 3rd quarter of 2010, but was within Sri Lanka standards. Suspended particulate matter levels were higher than World Bank limits in the first three quarters of 2010 but were within Sri Lankan limits. Sri Lankan nighttime and daytime noise limits were exceeded several times in 2010, but measurements indicated these levels to be from traffic alone, without the plant's major noise-making machines.

impacts are positive and sustainable. Overall environmental, social, health, and safety performance is rated *satisfactory*.

4. Overall Development Impact

32. The overall rating for development impact is *less than satisfactory*. Despite this shortcoming, the project has brought about some positive outcomes. AKL succeeded in bringing Sri Lanka's previous situation of power supply shortage up to a stable condition in a short period of time, eliminating load shedding for a significant period, enhancing power supply reliability, increasing private sector market entrants, and introducing the latest in best practice thermal plant operations and maintenance.

C. ADB Investment Profitability

33. ADB's investment profitability is rated *satisfactory*. ADB expects a reasonable financial return but absolute parameters have not been defined for evaluating the minimum targeted risk adjusted return on capital employed for guarantees and loan investments.²⁷ The norm has been to compare against a similar project in the region. Using a similar IPP project in the region as an interim proxy, it can be seen that the ADB loan reflects risks associated with the project comparable with recent market benchmarks. The interest rate margin charged on ADB's direct loan to the project was benchmarked against ADB's support to Bangladesh's Meghnaghat Power Project.²⁸ Comparative analysis of the two projects, both of which are in South Asia, yielded a *satisfactory* minimum multiple for the ADB loan and PRG support to AKL.

D. ADB Work Quality

34. The overall quality of ADB work is assessed *less than satisfactory* and is discussed under three categories: (i) screening, appraisal, and structuring; (ii) monitoring and supervision; and (iii) role and contribution to the project.

E. ADB Additionality

35. ADB support was necessary for timely realization of the AKL plant. ADB financing was an essential condition for timely implementation of the project, as it provided comfort to the interested private financier. The project had substantial development impact, enabling the elimination of load shedding. The PRG mitigated the risk for commercial lenders. During the independent evaluation mission, private financier ANZ shared that without ADB's support, ANZ would not have been keen to provide financing. ADB additionality is rated *satisfactory*.

ADB support was necessary for timely realization of the AKL plant

F. Overall Assessment

36. The project's overall rating is *less than successful*. The table summarizes the evaluation.

²⁷ Footnote 3, Appendix 3, p. 23.

²⁸ Bangladesh: Meghnaghat Power Project (Loan 1793, GU 1793, and CF 39) is a private sector power generation project in South Asia. Like AKL, it was supported by ADB in 2000.

Overall Assessment of the Project

Indicator/Rating	Unsatisfactory	Less than Satisfactory	Satisfactory	Excellent
Development Impact		x		
ADB Investment Profitability			x	
ADB Work Quality		x		
ADB Additionality			x	

ADB = Asian Development Bank.

Source: Independent Evaluation Department.

37. The AKL project has contributed significantly to Sri Lanka's power sector by stabilizing and balancing the country's power supply portfolio and meeting the thermal generation needs of the country in its early years while the project was still a cost-effective supply option. As more cost-effective independent power producers were developed, the project was displaced to reserve shutdown mode to improve and stabilize supply reliability of Sri Lanka's power system and to continue the elimination of load shedding. The project was the major catalyst to bring the country's power supply from shortfall into a stable condition within a short time. This is a remarkable achievement.

Issues, Lessons, and Recommended Follow-Up Action

A. Issues

38. Oil-based generation in a country like Sri Lanka, where there is a single, state-owned generation power purchaser and provider, results in high cost to the country's treasury. Consequently, the government has fewer resources available for important services, including services to improve the power sector and provide an enabling environment for private sector investment.

39. In addition to a comparative analysis of fuel options, consideration of fuel conversion plants is equally necessary. If found to be cost-effective given hypothetical fuel price increases, dual-fuel power plants should be included among viable alternative least-cost generation plant design options.

40. As was the case of ADB's support to Sri Lanka, in formulating requests for proposals, finalizing relevant shortlists, evaluating bidding documents, and awarding contracts, requiring a comparative analysis of fuel and dual-fuel options can mitigate risks associated with high-cost fuel in the power generation sector.

41. When the Sri Lankan Electricity Act of 2009 altered the conditions for power generation licenses, making AKL ineligible, risk of a material shutdown of the plant was minimal because AKL's capacity was, and continues to be, a vital component to Sri Lanka's power supply. The passage of new legislation that changes the requirements for issuing and retaining power generation licenses can cause adverse effects on private sector projects. To reduce risks of possible de-licensing, preliminary and subsequent power generation licenses should be wholly incorporated into relevant concessionary and power purchase agreements. As is the case with contract-provided tariffs, subsequent legislative or regulatory determinations outside of the contract should not affect a contract-provided license to operate. Hence, where a loss of license would cause material harm, a contract-provided license mitigates that risk.

B. Lessons

42. It is prudent for ADB to consider alternative fuels when appraising the cost and benefits of oil-fired generation plants. Alternative fuels consist of renewable energy sources and thermal fuels, including clean coal options. Private sector support to the power sector is optimized with a comparative analysis of real fuel options.

It is prudent for ADB to consider alternative fuels when appraising oil-fired generation plants

43. Risk of lost revenues due to delayed commissioning and unplanned shutdown associated with mechanical failures can be mitigated by requiring expert power plant developers sponsored by ADB to provide more oversight and guidance to construction contractors.

44. Close examination and assessment of real capacity is necessary in analyzing economic and financial benefits for private sector power plant projects supported by ADB. Nameplate capacity needs to be considered in the context of a plant's capacity factor.²⁹ No power plant runs 100% of the time, and power plants, like that of AKL, that run on auto diesel fuel will need to shut down routinely for scheduled maintenance. Routine maintenance combined with unscheduled shutdowns lower actual net capacity. Hence, to mitigate the risk of providing support to nonviable private sector power generation projects, it is necessary that ADB include scheduled shutdowns and the possibility of unscheduled shutdowns when calculating initial economic and financial rates of return.

45. Experienced foreign investors in power generation have access to private sector technical insurance that sovereign entities may not otherwise have. This is important when technical problems arise that cause major shutdown of operations, as was the case of AKL due to a 2004 fire. Private sector insurance enables unforeseen technical problems to be fixed along with compensation to the insured for revenue loss due to the incident. Foreign investors can leverage important insurance that is often difficult for sovereign entities to acquire.

C. Recommended Follow-up Action

The issue of revision of the law must be monitored by ADB

46. The requirements under the 2009 Act restricting license issuance to private sector power generation entities with capacities less than or equal to 25 MW, or, if greater than 25 MW, that are at least 50% owned by the government, has had little effect on AKL's current operations. Absent a material revision of the law, however, future private investment in the power generation sector may be thwarted. The Ministry of Power and Energy has indicated that revisions to the current Act that would be more conducive to private sector investment are under consideration by the country's legislature and that a revision more friendly to private investment will soon be forthcoming. This issue of legislative revision must be monitored by ADB.

²⁹ The ratio between the average capacity of a plant and its nameplate capacity is referred to as the plant's capacity factor.

Appendixes

APPENDIX 1: PRIVATE SECTOR DEVELOPMENT INDICATORS AND RATINGS: INFRASTRUCTURE

Impact of the Project	Ratings ^a				Justification and/or Annotations
	Impact to Date	Potential Impact (Sustainability) and Risk to its Realization		Combined Rating ^a	
		Impact	Risk		
1. Beyond Intermediary and Investee Company Impacts					
1.1 Private Sector Expansion. Contribution by a pioneering or high-profile project that facilitates or paves the way for more private participation in the sector and economy	Satisfactory	Satisfactory	Low	Satisfactory	The project was a catalyst for private investment in medium to large power generation. It marked one of the first attempts to induce commercial lending to Sri Lanka's medium to large power generation sector. The evaluation mission found evidence demonstrating positive impacts in eliminating load shedding, enhancing power supply reliability, and increasing private sector market entrants. Evidence shows that the project helped to facilitate subsequent public-private partnerships in the generation sector.
1.2. Competition. Contribution of new competition pressure on public and/or other sector players to raise efficiency and improve access and service levels in the industry	Satisfactory	Satisfactory	Low	Satisfactory	The project introduced the latest in best practice thermal plant operations and maintenance. Additional competition entered the power generation market, and subsequent power plants competed to perform as well or better. Important best practice knowledge was transferred from AKL to Sri Lanka, buttressing individual professional skills and producing cutting-edge expertise for retention in the country and for further export by Sri Lankans to other countries. Power plant efficiency levels were raised while proper security protocols were introduced and implemented.
1.3. Innovation. Demonstration of efficient new products and services, including in areas such as marketing, distribution, tariffs, production, and technology; as well as in ways to cover or contain cost and manage demand	Satisfactory	Satisfactory	Low	Satisfactory	Foreign sponsor AES Corporation was innovative in, among other things, securing relevant property damage insurance from reputable private sector insurer AIG. AIG was able to mobilize sufficiently early to enable proper plant replacement and claim payment when needed. While the plant was out of operation for approximately 18 months to enable proper equipment renovation, absent a private sector foreign sponsor such property damage insurance most likely could not have been mobilized. For Sri Lanka, this represents an innovation in

Impact of the Project	Ratings ^a				Justification and/or Annotations
	Impact to Date	Potential Impact (Sustainability) and Risk to its Realization		Combined Rating ^a	
		Impact	Risk		
					cost containment for power plant operations.
1.4. Linkages. Relative to investments, contribution of notable upstream or downstream links to business clients, consumers, suppliers, key industries, and others in support of growth	Satisfactory	Satisfactory	Low	Satisfactory	The project received training, operations, and management support from AES Corporation. As a result, when problems arose, handling, insurance claim processing, and efficient overhauls were facilitated, thus enabling the plant to return to efficient operations and allowing Ceylon Electricity Board to provide sufficient and reliable power downstream via its transmission and distribution facilities to domestic and business customers.
1.5. Catalytic Element. Contribution by pioneering and/or catalytic finance, mobilizing or inducing more local or foreign market financing and/or foreign direct investment in the sector	Satisfactory	Satisfactory	Low	Satisfactory	ADB's role in private sector development in Sri Lanka had been well established prior to the AKL project. The project is ADB's 11th private sector investment in Sri Lanka, but its first private sector power project in the country and its second partial risk guarantee. The project enabled ADB to demonstrate its support for private power projects, particularly in new power generation. The partial risk guarantee enabled additional private financial resources to become available for plant construction and operations, as well as for the sector's general expansion.
1.6. Affected Laws, Frameworks, Regulation. Contribution to better laws and sector regulation for public-private partnerships, concessions, joint ventures, and build-own-operate-transfer projects; and to liberalization of markets as applicable for better sector efficiency	Less than satisfactory	Less than satisfactory	Medium	Less than satisfactory	At the time of project appraisal, the government had a new policy framework for the sector. It aimed to reduce prices while ensuring a high level of service and supply reliability. Evaluation mission findings show the project helped to ensure a high level of service and supply reliability, but rising fuel oil prices, among other things, caused the government to take more cautious measures toward privatization and led to more conservative law and regulation that could hinder future private investment in the sector.
2. Company Impact With Wider Potential					
2.1. Skills Contribution. Contribution to new strategic, managerial, and operational skills with actual or potential wider	Satisfactory	Satisfactory	Low	Satisfactory	Important best practice knowledge was transferred from AKL to Sri Lanka, buttressing individual professional skills and producing cutting-edge expertise for retention in country and for further export by Sri Lankans to other

Impact of the Project	Ratings ^a				Justification and/or Annotations
	Impact to Date	Potential Impact (Sustainability) and Risk to its Realization		Combined Rating ^a	
		Impact	Risk		
replication in the sector and industry					countries. Power plant efficiency levels were raised while proper security protocols were introduced and implemented.
3. Overall Private Sector Development Rating. The rating (excellent, satisfactory, partly satisfactory, or unsatisfactory) is not an arithmetic mean of the individual indicator ratings, and does not have fixed weights. Actual impact (positive or negative), potential future impact, and the risk to its realization need to be considered.	Satisfactory	Satisfactory	Medium	Satisfactory	AKL increased Sri Lanka’s power supply reliability, helped to reduce load shedding, and aided the country in diversifying its power generation fuel mix. The project also provided some catalytic effects for future private sector participation in the power sector. AKL enabled important knowledge transfer of best practice power generation plant operations and maintenance. Such knowledge appears sustainable and vital to assisting other countries in the region. AKL’s effect on laws, frameworks, and regulation were not as anticipated. Rising fuel oil prices, among other things, caused the government to take more cautious measures toward privatization and have led to more conservative law and regulation that could hinder future private investment in the sector.

ADB = Asian Development Bank, AKL = AES Kelanitissa Limited,

^a The combined rating should weigh impacts and risk to its sustainable realization.

Source: Independent Evaluation Department.

APPENDIX 2: EVALUATION OF THE ECONOMIC INTERNAL RATE OF RETURN

1. The project involves the construction and operation of an auto diesel-fired combined cycle generation facility with a nameplate capacity of 168 megawatts (MW) and a net dependable capacity of 163.15 MW under a build-own-operate-transfer scheme. AES Kelanitissa Limited (AKL) has a 20-year power purchase agreement with the Ceylon Electricity Board (CEB) and a 20-year fuel supply agreement with Ceylon Petroleum Corporation (CPC) until 2023. The government guarantees the obligations of CEB and CPC.

2. The economic analysis for the project was conducted in accordance with Asian Development Bank (ADB) guidelines.¹ This analysis covers the period from the start of construction in 2001 with the commissioning date of 2003 and up to the end of the concession in 2023. All values are adjusted to reflect 2003 prices, since 2003 is the year of the commercial operation date. United States inflation data from 2001 up to 2010 is available from public sources.² Forecast data from 2011 to 2023 were adjusted to real terms using the 2.40% United States inflation forecast utilized in the 2011 financial model.³

3. The electricity generated by the AKL project is sold to CEB under the power purchase agreement, while firm availability of fuel for the project is ensured by CPC under the fuel supply agreement. The land lease agreement is provided to AKL with all the necessary leasehold interests and other rights-of-way and easements. The government guarantees payment obligation of CEB under the power purchase agreement and CPC under the fuel supply agreement pursuant to the implementation agreement between the government and AKL.

4. The project's estimated levelized tariff of \$0.0607 per kilowatt hour (kWh) at the time of the original report and recommendation of the President (footnote 3) and appraisal was expected to be competitive with CEB's earlier thermal independent power producer contracts with average tariff of \$0.0721/kWh in 2000 and was significantly less than the average tariff of emergency (temporary) power of \$0.1160/kWh. Thus, the project was expected to help to diversify CEB's generation resource portfolio, reduce power supply shortages, and lower the overall cost of the power within CEB's system.⁴

A. Valuation of Economic Benefits

5. This analysis assumes in addition to all output from the project being incremental that the AKL project has significantly improved the reliability of CEB's system by eliminating load shedding in Sri Lanka.⁵ The total economic benefit from the project is calculated from the total electricity it generates to meet CEB's system demand and avoid outages. In electric utility practice, interruption cost has a dollar per interruption component as well as a cost component that varies with interruption duration.⁶

¹ ADB. 1997. *Guidelines for the Economic Analysis of Projects*. Manila; ADB. 2007. *Guidelines for Preparing Performance Evaluation Reports on Nonsovereign Operations*. Manila.

² Inflation data was taken from the US Bureau of Labor Statistics. www.bls.org

³ The United States inflation rate for future years is assumed at 2.4% in both the AKL Financial Model and in ADB. 2000. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to AES Kelanitissa (Private) Limited and Proposed Partial Risk Guarantee for the Kelanitissa Power Project in the Democratic Socialist Republic of Sri Lanka*. Manila.

⁴ It was expected at appraisal that upon commencement of the project's operation CEB would retire 40 MW of its existing capacity and cease dispatching 16 MW of small diesel generators owned by industry at SLRs 7/kWh. Also assumed was about 31 MW of electricity consumption benefits from cost savings by displacing kerosene lamps at an economic price of \$0.250/kWh.

⁵ According to the power purchase agreement, CEB has ceased to operate 50 MW, consisting of the two conventional boilers and two steam turbines (with rated capacity of 25 MW each) at the Kelanitissa Power Station, and has restricted the operation of the six 20 MW Frame 5 gas turbines for peaking purposes with an average annual load plant load factor of 5.2%.

⁶ Wood and Wollenberg. 1996. *Power Generation, Operation, and Control*. New York. See p. 285, Economic Scheduling with the Unserved Load Method.

The cost of interruption for reliability analysis is priced at a cost per unserved energy or energy not served (ENS) in dollar/kWh.

6. For this analysis, the project's generation is valued at a levelized unserved energy cost of \$0.21/kWh. From a system reliability point of view, this is half of that at which CEB's Base Case plan is optimized with a 300 MW coal-fired power plant.⁷ This is a conservative assumption, given that the range of ENS cost within CEB's optimized plan is \$0.42–\$0.83/kWh.⁸ The analysis accounts for capital investments, fuel, operation and maintenance, and the cost associated with transmission and distribution losses in order to determine the net amount of electricity that is being made available to the consumers.

B. Valuation of Economic Costs

7. Capital expenditures exclude interest during construction and contingencies. There is no need to adjust for taxes as the project is tax exempt.

8. The economic cost of fuel is the price of auto diesel without the value-added tax. The operation and maintenance costs are actual figures between 2003 and 2010 and extracted from the latest financial model for the period 2011–2023.

9. The valuation of costs also covers the incremental costs of the transmission and distribution networks needed to deliver electricity to the final consumer. Transmission and distribution losses are based on CEB's actual reported losses for 2003–2010 (18.4%–14%), then adjusted for 2011–2023 initially at 13% with gradual improvement to 12% toward the outer years (Public Utilities Commission of Sri Lanka, July 2011).⁹

10. The estimated minimal cost of land at appraisal is included, even though land was given to the project at no cost. Residual value of the project is based on the combined cycle plant's useful life of 30 years, assuming it will continue for 10 more years after it is transferred to CEB.

⁷ The 300 MW coal-fired power plant was in CEB's Long-Term Generation Plan with in-service date of 2004, but this was delayed and the plant became operational in 2011.

⁸ CEB's 2008 Generation Expansion Plan, pp. 7–11, Effect of Cost of Energy Not Served (ENS). The Base Case plan which included the 300 MW coal plan was re-optimized with \$0.83 and \$0.42 per unit of ENS.

⁹ Government of Sri Lanka, Sri Lanka Public Utilities Commission. 2011. *Decision on Electricity Tariff*. Colombo.