

**REPORT AND RECOMMENDATION
OF THE
PRESIDENT
TO THE
BOARD OF DIRECTORS
ON A
PROPOSED LOAN
TO
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
FOR THE
NORTHERN AREA RURAL POWER DISTRIBUTION PROJECT**

August 2003

CURRENCY EQUIVALENTS

(as of 31 July 2003)

Currency Unit	–	kip (KN)
KN1.00	=	\$0.000095
\$1.00	=	KN10,570

ABBREVIATIONS

ADB	–	Asian Development Bank
CFS	–	corporate and/or consolidated financial statements
CSP	–	country strategy and program
DPA	–	district protected areas
EdL	–	Electricité du Laos
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
FRP	–	financial recovery plan
IEE	–	initial environmental examination
IPP	–	independent power producer
Lao PDR	–	Lao People's Democratic Republic
LNCE	–	Lao National Committee on Energy
LRMC	–	long-run marginal cost
LRU	–	loss reduction unit
MIH	–	Ministry of Industry and Handicrafts
MOF	–	Ministry of Finance
MOU	–	memorandum of understanding
NDF	–	Nordic Development Fund
NPA	–	national protected area
O&M	–	operation and maintenance
PMU	–	project management unit
PPA	–	power purchase agreement
PPME	–	project performance monitoring and evaluation
PPTA	–	project preparatory technical assistance
PSSS	–	Power Sector Strategy Study
PTD	–	power transmission and distribution
STEA	–	Science, Technology, and Environment Agency
TA	–	technical assistance
THPC	–	Theun Hinboun Power Company
TOR	–	terms of reference
UNIDO	–	United Nations Industrial Development Organization
UXO	–	unexploded ordnance
WACC	–	weighted average cost of capital

WEIGHTS AND MEASURES

A (ampere)	–	unit of electric current
V (volt)	–	unit of voltage
kV (kilovolt)	–	1,000 volts
kVA (kilovolt-ampere)	–	1,000 volt-amperes
kWh (kilowatt-hour)	–	1,000 watt-hours
GWh (gigawatt-hour)	–	1,000 megawatt-hours
MW (megawatt)	–	1,000,000 watts
MVA (megavolt-ampere)	–	1,000,000 volt-amperes

NOTES

- (i) The fiscal year (FY) of the Government and its agencies ends on 30 September.
- (ii) In this report, "\$" refers to US dollars.

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LOAN AND PROJECT SUMMARY

Borrower	Lao People's Democratic Republic (Lao PDR)
Classification	Poverty intervention Thematic: Economic growth
Environment Assessment	Environmental category: B An initial environmental examination was undertaken (Appendix 13).
Project Description	The Northern Area Rural Power Distribution Project aims to strengthen and expand transmission and distribution facilities, and thus provide electricity efficiently and reliably to rural villages and towns that have no access to electricity or rely on expensive and limited off-grid power supply. Reinforcement and extension of the 115-kilovolt (kV) transmission line and substation facilities will also improve service to industrial and commercial consumers and reduce system losses.
Rationale	The Lao PDR is one of the least developed countries in Southeast Asia. As 80% of the country's population is rural, rural development is needed to reduce poverty. Bringing electricity to rural areas, especially poor villages, is key to promoting rural development. Despite the country's comparative advantage in producing power and the low cost of production, low population density makes initial capital investments in rural electrification expensive. The Lao PDR thus has one of the lowest electrification rates in the region, which hinders the country's ability to attract investments and to develop rural areas. The Project will electrify 342 villages and towns, and directly benefit poor households (about 43% of the total rural population). These households will substantially reduce their expenditure on energy, and improve their income and quality of life. The indirect benefits include improved health and education and other benefits from rural development. Access to reliable and good electricity services will improve the ability of the rural population to generate economic growth and better benefit from it.
Objectives and Scope	The project objectives are to (i) extend the transmission and distribution system in northern rural areas to provide electricity to rural low-income communities, and to improve their living standards and economic condition; and (ii) help the Government restructure the power sector, and strengthen Electricité du Laos (EdL) project management capacity and operational efficiency. The Project scope includes (i) reinforcement and extension of the high-voltage (115 kV) power grid; (ii) construction of associated medium- (34.5/22 kV) and low-voltage (400 volts [V]) distribution systems; and (iii) provision of consulting services to help EdL in detailed project design, implementation supervision, and other capacity building activities.

Cost Estimates

The Project is estimated to cost \$51.51 million, including \$35.90 million in foreign exchange costs and \$15.61 million equivalent in local currency costs.

Financing Plan

(\$ million)

Source	Foreign Exchange	Local Currency	Total	%
Asian Development Bank	26.60	3.40	30.00	58.2
Nordic Development Fund	9.30	0.70	10.00	19.5
Government/Electricité du Laos	0.0	11.51	11.51	22.3
Total	35.90	15.61	51.51	100.0

Loan Amount and Terms

A loan of \$30 million equivalent from the Asian Development Bank (ADB) Special Funds resources will be provided. The loan will have a 32-year term, including a grace period of 8 years, with an interest rate of 1.0% during the grace period and 1.5% during principal amortization, and such other terms and conditions set forth in the draft loan and project agreements.

Allocation and Relending Terms

The proceeds of the loan will be re-lent to EdL for 20 years maturity, including a 5-year grace period, at an interest rate of 3.0% from 2004 to 2005 and 6.0% in 2006 and thereafter. EdL will bear the foreign exchange risk of the loan.

Period of Utilization

1 January 2004 to 30 September 2008

Estimated Project Completion Date

31 March 2008

Executing Agency

Electricité du Laos

Implementation Arrangements

Engineering and construction work will be carried out under contracts to be administered by EdL.

Procurement

Procurement of goods and services financed by ADB will be carried out in accordance with ADB's *Guidelines for Procurement*, while procurement for components financed from the Nordic Development Fund (NDF) will be in accordance with the *Guidelines of Nordic Competitive Bidding*.

Consulting Services

Approximately 110 person-months of international consulting services for project implementation will help EdL in project engineering, procurement, supervision of installation and construction, and final system testing and commissioning. Consultant services for project implementation will be entirely financed from the NDF loan. Consultants will be recruited by EdL, in accordance with the *Guidelines of Nordic Competitive Bidding*, and in full consultation with ADB. Approximately 13 person-months of international consulting services will be financed by the ADB loan, in accordance with ADB's *Guidelines for the Use of Consultants*, to help strengthen the power sector.

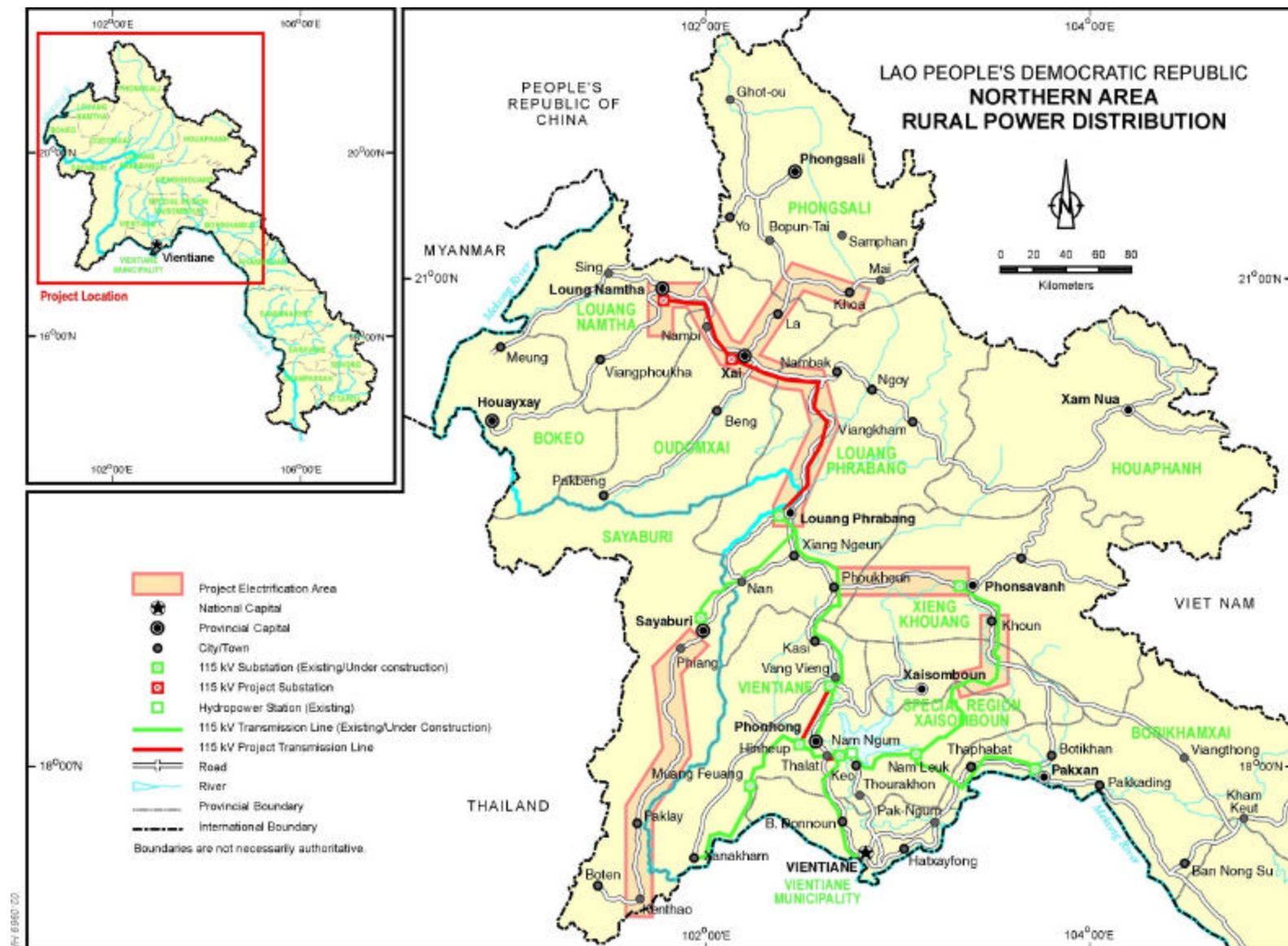
Project Benefits and Beneficiaries

The Project will benefit about 33,800 households in 342 rural villages and towns, improve the lives of the people, and reduce their expenditure on energy. Reinforcement and extension of transmission lines and substation facilities will make power supply more reliable and thus improve service to industrial and commercial consumers. New facilities will help reduce system losses. EdL's project management capacity will be strengthened. The Project will also help improve EdL's financial management and operational performance.

Risks and Assumptions

The major risks and assumptions of the Project are the following: (i) EdL's Financial Recovery Plan (FRP), including retail tariff increases, is successfully implemented; (ii) Poor households are able to pay connection charges; (iii) An approved resettlement plan is satisfactorily implemented before civil works start; and (iv) Consultant appointment and bid evaluation processing are not delayed.

The risks have been mitigated through associated covenants agreed upon, as well as through the Government's commitment.





I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to the Lao People's Democratic Republic (Lao PDR) for the Northern Area Rural Power Distribution Project.

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

2. In line with the power sector policy to expand affordable, reliable, and sustainable electricity supply to promote economic and social development, the Government has requested the Asian Development Bank (ADB) to help develop transmission and distribution facilities and rural electrification in the northern area. This report is based on the findings of the Loan Appraisal Mission and discussions with government agencies. The project framework is in Appendix 1.

A. Performance Indicators and Analysis

3. The power sector is organized under the Ministry of Industry and Handicrafts (MIH), whose main duties include preparing power sector development plans and regulations, recommending tariff levels to the Government, and administering and inspecting electricity enterprises. Under MIH is Electricité du Laos (EdL), a wholly state-owned public enterprise, which owns and operates the country's main generation, transmission, and distribution assets and manages electricity imports and exports. The organization structure of EdL is in Appendix 2.

4. The Lao PDR is one of the least developed countries in Southeast Asia. As 80% of the population lives in rural areas, these need to be developed to reduce poverty. Increasing access to electricity in rural areas, especially poor villages, is key to their development. Despite the country's comparative advantage in producing power and the low cost of production, low population density makes initial capital investments in rural electrification expensive. The Lao PDR thus has one of the lowest electrification rates in the region, which hinders the country's ability to attract investments and develop rural areas.

5. Only about 20% of all villages and 34% of households have electricity. The country has no fully integrated national grid. The power system covers four regions and serves about 250,000 customers. In the northern region, with 18% of the total population, only about 14% of villages have access to electricity. Rural households and communities with no access to the grid either have no electricity supply or rely on more expensive and limited off-grid power supply, which stunts the growth of agriculture, services, and industry.

6. Despite overall reduction of poverty due to significant economic growth during the 1990s, poverty was only marginally reduced in the northern region, the country's poorest, where over 52% of the population is poor.¹ With only basic infrastructure, the region has not benefited from economic growth as much as other regions.

B. Analysis of Key Problems and Opportunities

7. Continued economic growth is needed to reduce poverty and achieve social development. Although the country has development potential, particularly in land and water resources, it is constrained by (i) the land-locked nature of the country; (ii) shortage of skilled

¹ Lao National Expenditure and Consumption Survey 2 1997/98.

human resources; (iii) weak institutional capabilities; and (iv) limited transport, power, and communication infrastructure serving the small and widely dispersed population.

8. The Government gives priority to power sector development to achieve macroeconomic, microeconomic, and social goals. The power sector policy² is to maintain and expand low-cost, reliable, and sustainable electricity, increase the national electrification ratio as quickly as possible, and bring electricity to all by expanding and improving the main grid. If more cost-effective than grid extension, off-grid electrification in remote and isolated areas will also be encouraged.³

9. EdL is extending the main grid, preferring projects that accelerate social and economic development and reduce rural poverty. To achieve the government target of raising the electrification ratio from 34% to 70% by 2010, EdL intends to supply electricity to 270,000 households with road access, mostly in rural areas. A detailed analysis of the power sector is in Appendix 3.

10. ADB has been the largest source of assistance to the power sector in Lao PDR, helping export hydropower and meet local electricity demand by providing over \$230 million in loans and technical assistance (TA) by the end of 2002 (Appendix 4). Of the eight completed power projects, six were rated successful and the other two, partly successful.⁴ The sector should be made sustainable and able to deal with social and environmental concerns and contract management. Low domestic retail tariffs and EdL's poor financial performance impede sustainable power expansion. The Government needs to set tariffs based on marginal-cost pricing, progressively remove heavy subsidies to domestic consumers, and discourage waste. Once electricity becomes available, the upper middle-class and wealthy households are the first to adopt it. If a project, however, also introduces reasonable and affordable up-front charges and lifeline tariffs, even poor households pay for electricity. The policy dialogue with the Government addressed these issues (paras. 21–32), taking into account experience gained.

11. The most recently completed project performance audit report for the Nam Ngum-Louang Phrabang Power Transmission highlights a number of lessons, which, along with follow-up actions, were incorporated into project design: (i) monthly tariff adjustment is suitable to raise tariffs to acceptable and viable levels without causing undue consumer resistance; (ii) transmission projects that carry electricity across populated rural areas should also distribute electricity to them to minimize objections from affected communities; and (iii) more rigorous checks are needed at commissioning so that faulty equipment does not impair technical operations.

12. ADB's Country Strategy and Program⁵ for the Lao PDR aims to promote sustainable economic growth and development through infrastructure investments. Specifically, ADB will continue to help the power sector, emphasizing rural electrification. As most of the poor live in rural areas and most people depend on agriculture to live, rural development is critical to sustainable economic growth and poverty reduction. Widespread rural electrification will improve productivity, consumer demand, and economic opportunities. Internationally, rural electrification alone has not triggered industrial development and economic growth: other

² Power Sector Policy Statement, Ministry of Industry and Handicrafts, March 2001 (Supplementary Appendix A).

³ In general, off-grid electrification is a viable alternative for communities too far from distribution networks to be economically served from the grid. A number of demonstration projects on off-grid electrification are ongoing with help from the World Bank, Japan International Cooperation Agency (JICA), and United Nations Development Programme/Global Environmental Facility (UNDP/GEF) funds.

⁴ The two partly successful projects are (i) Vientiane Power Distribution, which had cost overruns following civil unrest in the mid-1970s; and (ii) Nam Ngum-Louang Phrabang Power Transmission, which also had cost overruns due to high inflation and the deteriorating exchange rate.

⁵ ADB. 2002. *Lao People's Democratic Republic Country Strategy and Program Update (2003-2005)*. Manila.

infrastructure such as roads and improved irrigation must be available or developed simultaneously. The Government has thus agreed that ADB's assistance will focus on the poorest northern provinces.⁶ Such an integrated approach will reinforce projects, thereby maximizing efforts to reduce poverty and develop the economy. As ADB has approved a loan⁷ to finance the Northern Economic Corridor Project, which will link the Lao PDR to neighboring Thailand and People's Republic of China, which are rapidly growing economies, the northern region can expect an economic boom. The proposed Project will directly complement ADB's efforts, promote socioeconomic development, and reduce poverty.

III. THE PROPOSED PROJECT

A. Objectives

13. ADB is helping EdL build a backbone high-voltage transmission network through the Power Transmission and Distribution (PTD) Project.⁸ By project completion in September 2003, these backbone lines will permit further high-voltage extension of the northern grid while substations will enable expanded coverage at 22.0-kilovolt (kV) or 34.5 kV distribution levels.

14. The proposed Project is designed to maximize the benefit of previous investment in transmission and distribution facilities and further extend the distribution network. The feasibility study completed in September 2002 covers potential project areas in Xieng Khouang, Phongsali, Louang Namtha, Oudomxai, Louang Phrabang, and Sayaburi provinces, and Xaisomboun Special Region, which are due to receive special development assistance as they are the poorest parts of the country.

15. The distribution work should not be started all at the same time. During the Fact-Finding Mission the Government and ADB agreed to divide the northern area rural electrification into three phases. The proposed Project is phase one and will intensify electrification in areas near the backbone 115 kV transmission lines being constructed under the PTD Project to maximize financial and socioeconomic benefits. ADB has also committed to other infrastructure projects in areas with the highest poverty incidence and potential for economic development.⁹ Project areas include districts in Xieng Khouang, Sayaburi, Oudomxai, and Louang Namtha provinces, and Xaisomboun Special Region (see project map). Areas not covered under the Project will be electrified in the follow-on phases. This Project and the follow-on projects were included in EdL's updated Power Development Plan (2002-2011).

16. The Project's objectives are to (i) extend the transmission and distribution system in northern areas to provide electricity to rural low-income communities, and improve their living standards and local economic conditions; and (ii) help the Government restructure the power sector, and strengthen EdL's project management capacity and operational efficiency.

⁶ Including Phongsali, Louang Namtha, Oudomxai, Bokeo, Louang Phrabang, Houaphanh, Sayaburi, and Xieng Khouang provinces.

⁷ ADB. 2002. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Lao PDR for the Greater Mekong Subregion Northern Economic Corridor Project*. Manila.

⁸ ADB. 1997. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to Lao PDR for the Power Transmission and Distribution*. Manila. The network facilities consist of 115 kV lines from Nam Leuk to Xieng Khouang, Xieng Ngeun to Sayaburi, and Thalut to Muang Feuung, and 115/22 kV substations at the end of each line.

⁹ Including the Northern Economic Corridor, Rural Access Roads, Northern Community Managed Irrigation, and Northern and Central Water Supply and Sanitation projects.

17. The Project will reinforce and extend the existing high-voltage transmission lines (115 kV) and construct associated medium- (34.5/22 kV) and low-voltage (400-volt [V]) distribution systems in the northern area. Reinforcement and extension of the 115 kV transmission lines and substation facilities will improve service to industry and commerce. New transmission and distribution facilities will increase the capacity of transmission lines, substations, and shunt capacitors, and thus lessen system losses.

B. Components and Outputs

18. Grid extension and distribution facilities will be developed along main and branch roads. Road access ensures that grid extension is technically possible and economically beneficial. All villages along the main roads or up to 10 kilometers (km) from the transmission line are the principal candidates for electrification. The power demand forecast projected residential consumption based on an inventory of appliances by house size and the assumed intensity of their use. Projected nonresidential consumption in villages gave allowance for schools, hospitals, markets, rice milling, guest houses, community water supply systems, and some large industry users.¹⁰ Most targeted customers will be households in economically viable population centers and rural villages with road access. Total projected energy sales from the project areas are estimated at 8% of EdL's projected domestic turnover in 2010. Given the limited increase of power demand in rural areas and adequate power surplus in the Lao PDR, power generation sources will be sufficient for power supply in project areas.¹¹

19. The Project will electrify 342 villages and towns, directly benefiting 33,800 households. These households will substantially reduce their expenditure on energy, and improve their income and quality of life. The indirect benefits include improved health and education and other benefits from rural development. Access to reliable and good electricity services will improve the ability of the rural population to generate economic growth and better benefit from it. The Project will lift barriers to access and lay the foundation for future poverty targeting of electricity access beyond the project areas (paras. 26-28).

20. The project components were developed following technical, economic, and financial studies that consider environmental and social aspects. The feasibility study compared various ways of extending rural electrification, including on- and off-grid options, and concluded that grid extension was the most cost-effective and would generate acceptable economic returns.¹² The specific construction quantities will be revised after detailed design during implementation. Specifically, the Project will consist of the following components:

- (i) extension of high-voltage (115 kV) transmission lines totaling 303 km, including a 173 km line from Louang Phrabang to Oudomxai, and a 79 km line from Oudomxai to Louang Namtha, a 46 km line from Hin Heup to Vang Vieng, and a 5 km line from Nam Ngum to Thalut;
- (ii) construction of 115, 34.5, and 22 kV substations at Oudomxai, Louang Namtha, and Louang Phrabang (extension); "T" tap junction¹³ at Hin Heup substation;

¹⁰ Under the feasibility study as well as the Fact-Finding Mission's field survey, a number of large industrial users such as cement plants, a sawmill, and a garment factory were operating or would be developed.

¹¹ By completion, total increased demand on annual energy in the project areas is estimated at 46,000 MWh/year. Detailed power supply and demand balances for the country and regions show that the increased demand up to 2020 could be met by increasing power supply sources.

¹² As an optimal design, the conventional 22 kV, three-phase, three-wire distribution system is employed for high-density town centers or villages, while the 34.5 kV, three-phase, two-shield wire, earth return shield-wire system is the least-cost solution to electrify low-density service areas with small loads.

¹³ A "T"-shaped junction where a new transmission line is connected to an existing line to tap power supply.

“Interface” at Sayaburi and Phonsavan substations; and some minor extension work at Vang Vieng, Thalat, and Nam Ngum substations;

- (iii) erection of 796 km of medium-voltage (34.5/22 kV) distribution lines, 237 distribution transformers, and 609 km of low-voltage (380 V) distribution lines; and connection of 33,800 households in 342 villages;
- (iv) clearance of unexploded ordnance (UXO) in project areas;
- (v) miscellaneous works, including benefit monitoring, resettlement, and compensation programs;
- (vi) consulting services to help EdL in detailed project design, implementation supervision, and other capacity-building support; and
- (vii) consulting services to the Government to further study the separation of its existing shareholdings and future independent power producer (IPP) investments from EdL, and development of IPP project selection and implementation procedures.

C. Special Features

1. Financial Recovery Program

21. EdL’s financial performance since 1997 has been significantly affected by the depreciation of the kip. As EdL borrows almost all its debt in foreign currency, the depreciation of the kip has prevented it from meeting its financial ratios (Appendix 5). With the help of ADB and the World Bank, the Government and EdL have made great efforts to improve EdL’s financial performance. In late 1999 the Government approved a comprehensive financial recovery program (FRP) for EdL to restore its financial viability and improve its internal cash-generating capacity to meet future investment needs.

22. Specific financial recovery measures include the following: (i) increase retail electricity tariffs starting in May 2002 for all consumer classes by approximately 2.3% per month through April 2005; (ii) convert some EdL debt into government equity; (iii) retain dividends from EdL’s subsidiary companies; (iv) revalue EdL’s fixed assets in service; (v) temporarily relax repayment terms of subsidiary loan agreements; (vi) review EdL’s capital expenditure program to ensure EdL’s financial viability in meeting the Government’s electrification targets; and (vii) implement EdL’s performance contract with the Government, which includes eliminating payment arrears from government agencies. The Government agreed to offset its arrears and current consumption against EdL’s tax and other financial liabilities. In May 2003 the Government confirmed that the first offsetting payment had been made, and ADB and the Government agreed on a schedule of consecutive quarterly offsets in 2004 and 2005 to fully settle the arrears. Completion of the FRP and other beneficial transactions in 2002¹⁴ has helped EdL recover from its financial crisis and become more stable. EdL operations should be profitable and sustainable for the next several years. However, EdL faces some risks as it attempts to balance its capital expansion plans (including rural electrification projects on behalf of the Government) with its financial performance as a commercial organization. ADB will

¹⁴ The proceeds from refinancing of the Theun Hinboun Hydropower Project were applied to outstanding liabilities with the Government.

continue to monitor EdL's financial recovery and help in future planning to ensure that EdL remains properly capitalized.

2. Implementation of the Power Sector Strategy

23. In the last several years, ADB has focused its policy dialogue efforts on financial restructuring and revisions of EdL's tariff structure, which has allowed EdL to recover from the 1997 financial crisis and move to full loan covenant compliance. Recently, ADB has also engaged MIH and EdL in institutional and sector restructuring. Under an ADB TA,¹⁵ the Power Sector Strategy Study (PSSS) was completed in September 2002, reviewing overall sector development and policies. Key policy recommendations include (i) developing a more rigorous least-cost hydropower development plan and selection process and accordingly updating EdL's Power Development Plan; (ii) segregating non-core operations such as off-grid rural electrification and IPP investment functions, allowing EdL to concentrate on power grid operation and development; (iii) reevaluating the role of the Government in the power sector as an operator, investor, and regulator; and (iv) establishing a procedure for competitive tendering of future generation projects. These recommendations focus on long-term development strategies and will guide ADB's policy dialogue with the Government. Further work on coordination with the World Bank to jointly implement those strategies is ongoing.

24. Based on the findings of the PSSS and a workshop¹⁶ on options for power sector reform, the Government has approved a sector-strengthening strategy, including a time-bound implementation plan in June 2003, and began implementing it thereafter.

25. The Government prioritizes power generation for export to raise revenue. The Electricity Law gives EdL the mandate to ensure domestic power supply through development and operation of domestic generation, transmission, and distribution. However, EdL has been distracted from financially managing its core operations as it is the Government's shareholder for IPP projects. EdL uses dividends from IPP investments to cross-subsidize core operations and meet loan covenants. EdL has also unintentionally reduced the direct financial benefits that the Government receives from IPP. Although the Government's Power Sector Policy Statement and studies support the establishment of a wholly government-owned IPP shareholding company to assume ownership of shares held by EdL, a detailed implementation framework to establish and operate this company needs further study and stakeholder consultation. The Government and ADB have agreed to study IPP project selection criteria and introduce clear IPP project implementation procedures (para. 41).

3. Connections for the Poor

26. The Project addresses two key barriers that prevent the poor from accessing electricity services from the grid. The first is the policy of cost sharing, where the village contributes 30% of low-voltage distribution costs, and thus disproportionately burdens the poorer and more remote villages and may deter villages from connecting entirely. MIH recognized the inequity and, to provide affordable electricity services to the poor, has abolished the policy of cost sharing.

27. The second barrier was the up-front connection charges paid by individual households. Poor households may find the charges too steep to pay in one lump sum. The Fact-Finding

¹⁵ ADB. 1999. *Technical Assistance to Lao PDR for the Power Sector Strategy Study*. Manila.

¹⁶ Vientiane, November 2002.

Mission's findings confirm that poor households in electrified villages are either not connected or connect through shared (illegal) connections, which are paid for at a flat rate and thus substantially more expensive per kWh than direct connections. This also implies that electricity subsidies are not reaching the poor but, in effect, benefiting the nonpoor.

28. EdL has agreed to allow residential consumers connecting to 3/9-ampere meter connections, and all new residential consumers, and not just those under ADB projects, to amortize the initial up-front costs over up to 12 months. Charges for wiring from the pole and works on inside house wiring will be left entirely to the private sector to promote small-scale rural enterprise. The private sector is expected to provide credit on the work to secure customers. However, EdL will carefully monitor connections under the Project as part of benefit monitoring and evaluation, and require revision of credit provision if needed. The number of connected poor, compared to the anticipated number, will be reported in quarterly reports to ADB as part of project performance monitoring.

4. Loss Reduction on Distribution System

29. EdL's distribution losses were relatively high during the past 5 years at around 20%. The loss reduction program under the PTD Project identified a number of factors contributing to EdL's technical and nontechnical distribution losses, and recommended ways to reduce them. EdL established a loss reduction unit (LRU) to record and analyze distribution losses. Staff in all main field branches are trained regularly in loss reduction. Through consultant services, the Project will help EdL implement recommendations for loss reduction.

30. EdL will implement these recommendations under its own budget, including improvement of its billing system, upgrading low- and medium-voltage distribution conductors, calibrating and replacing inaccurate meters in substations, and installing new capacitors. EdL is committed to reduce total domestic distribution loss¹⁷ to less than 17% by the end of 2003, 16% by 2004, and 15% by 2005, and maintain these levels thereafter. The Project will help EdL reduce losses, and the consultant engaged will provide technical supervision and training for EdL staff, particularly at EdL branch offices, to continually improve EdL's operational performance. EdL will submit to ADB annual progress reports on LRU operations and management, and statistics of total system losses.

5. Capacity Building

31. EdL has successfully implemented seven ADB-assisted projects. Its overall performance, including that for projects financed by other lending agencies, is satisfactory. EdL's institutional capacity has been strengthened substantially. However, capacity weaknesses still exist, particularly in the design and operation of high-voltage transmission and distribution facilities, financial management, social and environmental management, contract management, and benefit and evaluation monitoring. The Project will complement ADB's previous efforts and further strengthen EdL's capacity in these areas through consultant services in coordination with other funding agencies support. The consultants will (i) train EdL staff in bid evaluation, contract awarding, supervision of construction work, and system testing and commissioning; (ii) strengthen the capacity of staff in main field offices through regular training seminars, dissemination of technical standards, and implementation of the computerized management

¹⁷ Domestic distribution losses are defined as the difference between (i) gross energy (gigawatt-hours [GWh]) sent out from the 115 kV substation, and (ii) electricity (GWh) billed to all consumers and expressed as a percentage of gross energy.

information system; and (iii) help improve social and environmental assessment, management, and monitoring of projects.

32. The Project will also provide capacity building in consumer services through a consumer awareness program, which will include information on safe use of electricity, connection cost policy, tariffs, billing statements and timing of bills, and due payment and disconnection policy. The program design will take into account the difficulties of language barriers. The Project will help build sustainable benefit monitoring and evaluation to feed into project design and evaluation (para. 46).

D. Cost Estimates

33. The total project cost is estimated at \$51.51 million equivalent, comprising \$35.90 million equivalent (70%) in foreign exchange cost, and \$15.61 million equivalent (30%) in local currency cost. The cost estimates are based on 2003 price levels for base costs, and include physical contingencies, price contingencies, taxes and duties, and interest charges during construction. Physical contingencies have been estimated at 10% of base costs, and price contingencies were calculated using ADB's current rates of inflation. The cost estimates are summarized in Table 1 and details in Appendix 6.

Table 1: Summary of Project Cost Estimates
(\$ million)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base Cost			
1. Civil Works ^a	17.60	5.44	23.04
2. Materials and Equipment	7.90	2.90	10.80
3. Miscellaneous Works (land acquisition, compensation, and benefit monitoring program)	0.00	0.26	0.26
4. Consulting Services for Project Implementation	2.80	0.30	3.10
5. Other Consulting Services	0.36	0.04	0.40
Subtotal (A)	28.66	8.94	37.60
B. Contingencies			
1. Physical	2.63	0.84	3.47
2. Price contingencies	3.94	1.45	5.39
Subtotal (B)	6.57	2.29	8.86
C. Interest during Construction	0.68	3.39	4.07
D. Taxes and Duties	0.00	0.98	0.98
Total	35.90	15.61	51.51
%	70	30	100

^a Civil works include turnkey contracts and installation contracts.

E. Financing Plan

34. ADB will provide a \$30-million loan from its Special Funds resources to finance 58.2% of the total project cost. The loan will finance \$26.6 million of the Project's foreign exchange cost, including interest during construction on the loan to the Government. The loan will also finance \$3.4 million equivalent of the Project's local costs. The proportion of local currency funding

proposed under this loan is justified by the nature of the Project, particularly its focus on poverty reduction, electrification of rural areas, and fiscal condition of the Government. The Nordic Development Fund (NDF) will provide parallel cofinancing of €10 million (approximately \$10 million equivalent) for the substation package and project implementation consulting services, representing 19.5% of total project cost.¹⁸ EdL will fund \$11.5 million of local costs (representing 22.3% of total project cost) from its internally generated funds. The proposed financing plan is in Table 2.

35. The ADB loan will have a maturity of 32 years, including an 8-year grace period, with an interest rate of 1.0% during the grace period and 1.5% during principal amortization and on other terms and conditions set forth in the loan and project agreements. The borrower will be the Lao PDR, and the proceeds of the loan will be re-lent to EdL pursuant to a subsidiary loan agreement with terms and conditions acceptable to ADB. The borrower will re-lend the ADB loan to EdL for 20 years maturity, including a 5-year grace period, at interest rates consistent with the re-lending terms included in the government-approved FRP (3.0% interest in 2004-2005, 6.0% interest in 2006 and thereafter). The Government will re-lend NDF's loan to EdL on the same terms. EdL agreed to bear the Government's foreign exchange risk of the proposed loans, as EdL's foreign currency earnings from export sales of electricity should mitigate this risk.

Table 2: Proposed Financing Plan
(\$ million)

Source	Foreign Currency	Share of Total (%)	Local Currency	Share of Total (%)	Total	Share of Total (%)
Asian Development Bank Loan	26.60	51.6	3.40	6.6	30.00	58.2
Nordic Development Fund Loan	9.30	18.1	0.70	1.4	10.00	19.5
Government/Electricité du Lao Counterpart Funding	0.00	0.0	11.51	22.3	11.51	22.3
Total	35.90	69.7	15.61	30.3	51.51	100.0

F. Implementation Arrangements

1. Project Management

36. EdL will be the Project's executing agency. The EdL general manager will be responsible for overall project management. The project management unit (PMU) headed by the project manager was established at EdL on 18 March 2003.¹⁹ Supervised by the Development Department deputy general manager, the PMU will be responsible for all aspects of project implementation: (i) overall project implementation planning, budgeting, finance planning, and accounting; (ii) recruitment of consultants; (iii) supervision and coordination of detailed project design; (iv) procurement of goods and services; (v) implementation, supervision, and

¹⁸ The NDF board had approved the loan proposal on the cofinancing arrangement for the Project in May 2003. The NDF loan will be denominated in euros and have a maturity of 40 years, with a 10-year grace period, 0.75% service charge, and 0.50% commitment fee. NDF will administer its own loan portion, including the relevant procurement and disbursement.

¹⁹ The PMU consists of the project manager, project accountant, procurement specialist, and project engineer.

commissioning of all project components; (vi) organization of the project performance monitoring system; and (vii) preparation of periodic progress reports and the project completion report. A team of international consultants will help the PMU in its day-to-day operations. Consultant services and construction work will be carried out under contracts administered by EdL. It will establish a permanent socioeconomic cell by the end of 2003 under the Environmental and Social Management Office.

2. Implementation Period

37. The Project will be implemented over 4.5 years beginning in the fourth quarter of 2003. Physical works are expected to be completed by the first quarter of 2008, with loan closing in September 2008 (6 months following completion of works). The 4.5-year implementation period is considered appropriate, given the large number of project components, distances of the project sites, and the difficult terrain. The implementation schedule is in Appendix 7.

3. Procurement

38. Procurement of goods and services to be financed from the proposed ADB loan will be carried out in accordance with ADB's *Guidelines for Procurement*. International competitive bidding procedures will be used for major civil works contracts estimated to cost over \$1 million, and supply contracts valued over \$500,000. For civil works contracts not exceeding \$1 million, local competitive bidding procedures will be used. The Government's procurement guidelines (Implementing Rules and Regulations on Government Procurement of Goods, Construction, Repairs and Services, December 1988), prepared under an ADB TA, are considered satisfactory for this. For supply contracts valued at \$500,000 or below, international shopping procedures will be followed. Indicative procurement packages are in Appendix 8.

4. Consulting Services

39. Considering EdL's limited project management capacity and technical expertise, approximately 110 person-months of international and 20 person-months of domestic consulting services will be required to support project implementation and capacity building. Consultants will focus on supervising and guiding project implementation and EdL staff training, while the PMU will be responsible for project implementation. The consultant team, including experts on transmission, substation, distribution, environmental and socioeconomic survey, assessment and monitoring, will help EdL (i) conduct detailed project design; (ii) procure goods and services; (iii) supervise installation and construction; (iv) final system test and commission; (v) oversee quality assurance on UXO detection and clearance; (vi) provide technical support for distribution management and loss reduction; (vii) conduct social and environmental assessment, management, and monitoring; (viii) build capacity for social and environmental assessment, management, and monitoring; (ix) undertake project performance monitoring and evaluation; and (x) conduct a consumer awareness campaign.

40. Project implementation consultant services will be entirely financed from the proposed NDF loan. EdL will recruit consultants in accordance with NDF's *General Procurement Guidelines* (to be attached to NDF's credit agreement) based on Nordic competitive bidding, and in full consultation with ADB. The general procurement principles and documents will follow and be based on ADB's practice and guidelines. The terms of reference (TOR) for project implementation consulting services are in Appendix 9.

41. Around 13 person-months of separate consulting services will be required to help the Government strengthen the power sector. EdL will closely coordinate with the Committee for Planning and Cooperation, MIH, and other agencies. These consulting services will be financed from the ADB loan and recruited in accordance with ADB's *Guidelines on the Use of Consultants*.²⁰ The major tasks include (i) develop transparent IPP project selection criteria and introduce clear IPP project implementation procedures, and (ii) identify and structure an appropriate government agency to assume ownership of the Government's existing IPP shareholdings and future IPP equity investments. The TOR for these consulting services are in Appendix 10.

5. Disbursement Arrangements

42. For ADB loan funds, all standard disbursement procedures in accordance with ADB's *Loan Disbursement Handbook* (January 2001) will be used. Disbursements will be for supply and installation of power distribution and transmission equipment and accessories. Considering EdL's adequate cash-flow capacity, the Government and EdL agreed that an imprest account would not be required. However, to facilitate disbursement processing, statement of expenditure will be used, with a ceiling of \$50,000.

6. Accounting, Auditing, and Reporting

43. EdL will maintain separate accounts for the proposed Project and submit to ADB within 9 months after the end of the fiscal year audited annual project accounts describing in detail fund sources and expenditures. EdL will also submit within 9 months after the end of the fiscal year audited annual financial statements.

44. Unless otherwise agreed in advance by ADB, EdL will continue to hire external auditors for its annual financial statements and annual project accounts, and the audit report together with the memorandum on issues identified during the audit will be attached to these reports. For future contracts and revisions, ADB will approve the auditors' TOR before work starts. While the accounts will be prepared using Lao accounting standards, the audit will be done using international standards of auditing. The auditors will provide detailed comments on any divergence from such standards, provide opinions on compliance with ADB's financial covenants, and indicate the details of the actual calculation for all ratios, in conformity with the definitions contained in the loan and project agreements.

45. Regular progress reports for the proposed Project will be prepared by the PMU and submitted quarterly to ADB and NDF. The reports will describe the physical progress, procurement and contractual status, highlights of implementation issues, total number of consumers connected, and a summary of project components, with details of the latest project disbursements of incremental expenditures and contract amounts. A project completion report will be submitted to ADB and NDF within 3 months after project completion. Aside from assessing project execution and operation, the report will indicate compliance with the loan covenants.

7. Project Performance Monitoring and Evaluation

46. EdL will ensure that a comprehensive program for project performance monitoring and evaluation (PPME) acceptable to ADB will be carried out during implementation and subsequent

²⁰ The selection of consultants will employ the quality- and cost-based selection method, involving the simultaneous submission of technical and financial proposals and the use of price as an evaluation criterion.

operation to assess the achievement of the Project's objectives. The PPME will be based on the project framework in Appendix 2, including monitoring and evaluation of the project physical progress, operations, and project benefits and impacts. With help from the consultants and in consultation with local communities, the PMU will develop a set of PPME indicators at the start of the Project. The PMU will carry out the PPME, including initial baseline physical and socioeconomic surveys, data collection, and analysis. To set a benchmark to monitor and evaluate social and economic benefits, a baseline socioeconomic survey will be carried out before connections are made in project areas. A second socioeconomic survey will be carried out 3 years after the first connections to evaluate project effectiveness in targeting the poor and enhancing the welfare of households and communities. The surveys will cover electrified and unelectrified areas. The new connection policy will be assessed continuously throughout the Project. EdL will submit a detailed PPME implementation plan for ADB's review and concurrence within 6 months of loan effectiveness, as well as annual PPME reports.

8. Project Review

47. A project inception mission will be fielded soon after approval of the proposed loan. ADB will also conduct regular reviews (at least twice annually) throughout project implementation. The Government and ADB will agree on measures to remove any hurdles to project implementation and to meet project objectives. The Government, ADB, and NDF will jointly undertake a detailed midterm review of the Project after 2 years of implementation, or earlier if major difficulties threaten the project objectives. The midterm review will appraise the project scope, cost estimates, implementation arrangements, number of connections, and compliance with loan covenants; and identify issues to be resolved to improve project impact and sustainability. The Government, ADB, and NDF will jointly decide on any changes needed in project design and implementation.

IV. PROJECT BENEFITS, IMPACTS, AND RISKS

A. Project Benefits

1. Economic Analysis

48. Most households have no access to grid electricity. However, province-sponsored systems and privately operated diesel-run generators or small hydro systems and imports from Thailand provide limited amounts of electricity to homes, industry, and commerce, albeit at substantially higher prices than those paid by EdL customers.

49. The economic benefits of extending grid supply to unserved areas are estimated for incremental and nonincremental consumption. Benefits for existing consumption levels are based on the cost of alternative energy sources when grid electricity is absent, and on consumers' willingness to pay when it is available. Benefits were estimated separately for poor and nonpoor residential consumers, and for industrial, commercial, and irrigation customers.

50. Derivations for the willingness-to-pay demand curve were made for poor and nonpoor households, with the nonpoor divided into established and first-time consumers. The initial consumption point of each demand curve is set and valued individually based on the load profile of each category, reflecting its ability to pay.

51. Estimated costs of private power supply for commercial customers are based on the use of a 40 kW gas oil generator, and for industrial customers, on a 200 kW gas oil generator. The cost of alternative energy sources for irrigation is based on the estimated cost for diesel pumps

with an 8-horsepower motor. As for domestic customers, benefits were estimated for incremental and nonincremental consumption levels based on load forecasts for the three consumer segments.

52. The economic analysis is carried out at border price level using 2003 prices. Financial project costs were converted into economic cost by deducting taxes and duties. No price contingencies are included in the base capital cost, but the economic capital costs include physical contingencies. Costs were separated into foreign exchange and local costs, and a standard conversion factor of 0.9 has been applied to local costs. Annual operation and maintenance costs were also calculated in economic prices as a percentage of the total capital investment cost. The economic cost also includes provision for residential wiring, which is excluded from financial cost. Energy costs have been valued based on the actual export price of electricity as the foregone economic benefit. System losses were calculated separately for each new feeder based on estimated peak demand and on load and loss factors, and included in estimating energy costs. On the basis of a comparison of economic costs and benefits over a 35-year project lifetime, including the construction period and excluding any residual value, the economic internal rate of return was estimated at 23.3%, with a net present value of KN356 billion. Sensitivity testing and risk analysis show that the Project will be robust in all scenarios. A distribution analysis showed that electricity consumers and local labor will benefit from the Project, while the Government return on the Project will be negative as a result of the highly subsidized tariff structure. The poverty impact ratio was estimated to be 10%. Details of the economic, distribution, and risk analysis and the sensitivity tests are in Appendix 11.

2. Financial Analysis

53. The Project's financial internal rate of return (FIRR) is based on the Project's capital and operating and maintenance costs, and revenue generated from new connections and incremental energy sales. The project FIRR is 2.71% (Appendix 12). The pro forma net annual revenues are generally positive and cover project operating expenses. However, with a weighted average cost of capital at 4.77%, the financial returns of the investment do not exceed total project financing cost. Although the financial performance of the Project is marginal, its impact on EdL's operation is minimal compared to EdL's total domestic sales. Total projected energy sales from the project areas are only 8% of EdL's projected domestic turnover in 2010. A more meaningful measure of project performance in this case is the average cost recovery ratio (i.e., financial benefit-cost ratio). Based on the projected real tariffs in 2005, the Project's cost recovery ratio is 95%, indicating that 95% of total project capital and operating costs are recovered directly from sales revenue, and is considered satisfactory given the nature of rural electrification programs.

54. A low FIRR raises the important question of how the Project can be sustained so that economic benefits will continue to materialize and accrue to the targeted beneficiaries. Rural electrification alone is rarely financially viable in developing member countries and often requires cross-subsidization from other consumer groups. While retail tariff for almost all Lao consumer groups will be below the long-run marginal cost when connections begin, the cross-subsidy needs to come from another source within EdL or directly from the Government. The current Lao PDR's fiscal problems prevent an explicit subsidy transfer from the Government. EdL earns additional revenue (in dollars and baht) from exporting surplus energy to Thailand. Even as more energy is required domestically, exports to Thailand will remain a significant portion of EdL's turnover as new generation is commissioned and connected to EdL's supply system. This export revenue boosts EdL's financial performance, hedges a portion of EdL's foreign exchange risks, and helps EdL meet its financial obligations to lenders and the

Government. Export revenue is, in effect, a government subsidy to EdL for carrying out rural electrification and will ensure that the Project will be sustainable despite its marginal financial performance.

B. Project Impacts

1. Environment

55. An initial environmental examination (IEE) was undertaken for the Project. A summary IEE is in Appendix 13. The IEE concluded that only minor potential impacts would be expected because of the following:

- (i) The transmission lines will pass through areas where people engage in hunting, logging, and shifting cultivation.
- (ii) The route was selected to avoid environmentally sensitive areas and areas with social, historical, and culture value.
- (iii) Potential for resettlement is minimal.
- (iv) Measures are available to mitigate potential impacts.

56. Wherever possible, the 115 kV lines will be parallel and close to existing roads to minimize environmental impacts. Mature forests and other environmentally sensitive areas will be avoided. Construction will have other minor and temporary impacts, but measures are proposed to mitigate them.

2. Land Acquisition and Resettlement

57. The social assessment carried out in the feasibility study identified the need to prepare a resettlement plan. In accordance with ADB's policy on involuntary resettlement, only a short resettlement plan has been prepared because the Project will have insignificant²¹ involuntary resettlement impacts. The plan incorporates the Government's national policy on resettlement and compensation, decree on resettlement and compensation, and implementation regulations for project-related resettlement and compensation.²² The plan is summarized in Appendix 14 and will be updated after the detailed design and measurement survey and approval by ADB.

58. EdL has made every effort to minimize land acquisition impacts by avoiding wherever possible villages and other settlement areas, agricultural land, and trees. Sites that will be acquired for the three substations and one "T" tap junction will affect only scrubland. Only two houses that may be affected by a 115 kV line will have to relocate nearby. A minimum amount of mainly nonagricultural land will be required for 115 kV towers. Farmers will still be able to cultivate under the transmission lines and towers. Electric poles and lines will be adjacent to existing roads between villages, and along roads and pathways in villages. The construction of low- and medium-voltage distribution systems will entail height restrictions to 3 meters for trees and structures, requiring some trees to be cut. Actual impacts of transmission and distribution

²¹ Resettlement is "significant" where 200 or more persons are displaced from their houses and/or lose more than 10% of their productive income-generating assets.

²² Draft documents prepared under ADB Loan 1867: Environment and Social Program, for \$20 million, approved November 2001; and TA 3746-LAO. Final documents were approved and issued by Government in May 2003.

lines will be determined only during detailed design. The short resettlement plan provides for full compensation for all losses and relocation. All compensation and resettlement for a subcomponent will have to be completed, rehabilitation measures in place, and the contract area free of all encumbrances before award of the civil works contract for that component.

59. EdL has a well-established land acquisition, compensation, and resettlement procedure, which is not always implemented well because of limited staff and capacity. EdL has also developed a comprehensive public involvement program for people affected by projects, but requires adequate staff to implement the program well. EdL has established the Environment and Social Management Office, with an experienced environmental specialist manager, three environment specialists, and one social development specialist. The Project will strengthen this office's capacity by helping EdL recruit and train another social development specialist and another rural development specialist.

3. Poverty Impacts

60. More than 43% of the project beneficiaries are poor. Many more live just above the poverty line and are in danger of falling below it. They live mainly by engaging in subsistence agriculture and providing manual labor, and are thus vulnerable to external shocks such as natural disasters and poor economic growth. While energy is a major input into the livelihood of the poor, they rely on high-cost sources such as diesel for lighting and batteries for radios, and manual energy. Fuel poverty is a major burden, especially for women, who supply the manual energy to process food. Fuel poverty also constrains the livelihoods of the poor, restricts commerce, and reduces the ability of the poor to diversify their income sources. Most rural villages have rice mills that run on diesel. The high cost of diesel is transferred to consumers, which results to high costs of using rice mills and thus deter the poorest from using more modern and cheaper ways to process food.

61. The most immediate and direct project impact on the poor includes reducing cash expenditure on energy. Unelectrified poor households spend from \$1.00 to \$1.25 per month on diesel for lighting, or from 14% to 18% of total cash household income. Connecting poor households will immediately reduce cash expenditure to about \$0.03, or less than 0.25% of cash income, so that scarce and fungible cash income can be diverted to other more beneficial expenditure items. As poor households' electricity consumption is likely to increase as appliances become more affordable, expenditure on electricity will increase to around from 2 to 3% of household income, normally within the first 2 years of electrification.

62. Other benefits of village electrification include reduced reliance on manual energy to process food, which gives women more time and significantly reduces their workload, whether the household is electrified or not. National data show that women living in villages with no electricity spend approximately 14 hours a week processing food. Much time is spent manually processing rice, which could be done by rice mills. In villages with electricity, food processing takes only 5 hours. Access to electricity may also improve social services, including education and health services, as children can study at night, and vaccines and other medications can be stored safely even in remote villages. Electric lighting at night will also keep households safe from wild animals and robbers. More people will enjoy social interaction and leisure when they can stay out longer in the evenings. Villagers mentioned that they would receive more information from the outside world through television. While the social benefits are difficult to quantify, they reflect improved quality of life and save money. Many social benefits have a "public good" character and are not limited to connected households. The detailed results of the poverty impact assessment are in Appendix 15.

C. Project Risks

63. The major risks facing the Project are the following: (i) incomplete implementation of EdL's FRP, including retail tariff increases; (ii) poor households' inability to pay connection charges; (iii) delayed consultant appointment and bid evaluation processing; and (iv) unsatisfactory implementation of an approved resettlement plan before civil works start. To mitigate these risks, a number of measures, including associated loan covenants, have been devised, involving the following: (i) financial covenants binding the Government and EdL to implement the FRP; (ii) government commitment to amortize up-front charges for poor households and officially approve the new connection policy; and (iii) advance recruitment of consultants and advance procurement actions.

D. Overall Assessment

64. The project scope and estimated costs were established by a detailed feasibility study and found to be technically sound and appropriate. The Project's physical components form part of EdL's least-cost development plan, and technologies applied are reliable. Actions have been proposed to minimize and mitigate potential project risks or minor social and environmental impacts. The Project will fulfill the criteria for poverty intervention. Economic analysis has also shown that the Project will have robust economic returns. The Project will, therefore, be technically and economically sustainable.

V. ASSURANCES

D. Specific Assurances

65. In addition to the standard assurances, the Government and EdL have given the following assurances, which will be incorporated into the legal documents:

1. Financial Matters

- (i) The Government will ensure or cause EdL to ensure the following:
 - (a) continue to implement EdL's FRP and revise EdL's capital expenditure program annually;
 - (b) maintain a debt service coverage ratio of at least 1.5 for FY2003 and thereafter;
 - (c) generate internal cash of at least 30% of the three-year average of planned capital expenditures in FY2003 and thereafter;
 - (d) maintain a debt-equity ratio of 1.5 or below;
 - (e) reduce EdL's accounts receivable for domestic electricity sales equivalent to 2 months' average sales by FY2003 and maintain this level thereafter;
 - (f) maintain levels of electricity tariffs for EdL to meet its financial loan covenants in FY2005 and thereafter;
 - (g) maintain the lifeline tariff block for residential consumers at no more than 50 kWh/month; and
 - (h) offset government, provincial, and municipal receivables (including arrears as of 31 December 2002) above 2 months' average sales against EdL's tax and other financial liabilities with the Government every quarter in 2004 and 2005, and submit quarterly statements to ADB concerning these settlements.

- (ii) The Government will arrange additional financing as required for EdL to meet assurances set out in (b), (c), and (d) of (i) for FY 2003 and thereafter.
- (iii) The Government and EdL will ensure that sufficient counterpart funds are available on time to meet all local-cost components of the Project.
- (iv) Unless it complies with covenants contained in (a), (b), (c), and (h) of (i) for fiscal 2003 and thereafter, EdL will not declare any dividend to the Government. Compliance with (a), (b), and (c) will be certified by audited financial statements for the fiscal year. Compliance with (h) will be monitored by EdL and ADB quarterly.

2. Social, Environmental, and Resettlement Matters

- (i) EdL will ensure that the Project will fully comply with ADB's *Environmental Assessment Guidelines* and the Government's environmental regulations throughout project implementation, and meet the mitigation and monitoring requirements described in the IEE. Project budget will be set aside to implement the mitigation measures identified in the IEE to the satisfaction of ADB.
- (ii) Full census and inventory of lost assets of people affected by the Project will be undertaken following detailed design during project implementation. An updated resettlement plan will be prepared and submitted to ADB for approval before land acquisition for those components.
- (iii) The updated resettlement plan approved by ADB will be implemented to its satisfaction. Before the award of civil works contract for each component, all people it affects will be satisfactorily compensated and resettled, and rehabilitation measures will be in place in accordance with the updated resettlement plan, government procedures, and ADB's policy on involuntary resettlement.
- (iv) Contractors will not pay men and women unequal wages for equal work. Child labor will not be permitted under the Project.
- (v) EdL will submit a detailed implementation plan of the PPME for ADB's review and concurrence within 6 months of loan effectiveness, and annual PPME reports within 1 month after the end of each calendar year.
- (vi) EdL will assign at least one staff at each provincial branch office by the end of 2003 to be responsible for social and environmental management.

3. Operational Matters

- (i) EdL will use its own funds to continually carry out the loss reduction program and ensure that the total domestic distribution loss will be less than 17% by the end of 2003, 16% by 2004, and 15% by 2005, and maintain those levels thereafter. EdL will annually submit to ADB the progress report on the LRU's operations and management and the statistics of total system losses.
- (ii) EdL will annually prepare and provide to ADB for its review and comment a draft power development plan for all capital expenditures planned for the subsequent 10 years, including EdL's load forecast, investment requirements for generation, transmission, and distribution; indicative financing assumptions; and its financial projections over the same period.
- (iii) EdL will continue to implement the MIH policy under which EdL will fund 100% of the low-voltage distribution costs for villages.
- (iv) EdL will issue information on the amortization option for residential consumers with 3/9 ampere meter connections to all branch offices and consumers at least 2 months before connections are made. Amortization will apply to all EdL

- residential consumers with 3/9 ampere meter connections, including consumers in areas not supported by ADB, by the end of 2003.
- (v) At least 2 months before connections are made, EdL will implement a consumer awareness campaign on the safe use of electricity, billing practices, and connection policy.
 - (vi) EdL will establish a socioeconomic cell and assign appropriate counterpart staff to train in systematic data collection, benefit monitoring, and economic modeling.
 - (vii) EdL will strengthen its Environmental and Social Management Office by engaging at least one social development specialist and one rural development specialist by the end of 2003.

VI. RECOMMENDATION

65. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB and acting in the absence of the President, under the provisions of Article 35.1 of the Articles of Agreement of ADB, I recommend that the Board approve the loan in various currencies equivalent to SDR21,491,357 (\$30,000,000 equivalent) to the Lao People's Democratic Republic for the Northern Area Rural Power Distribution Project from ADB's Special Funds resources, with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan and Project Agreements presented to the Board.

JOHN LINTJER
Vice-President

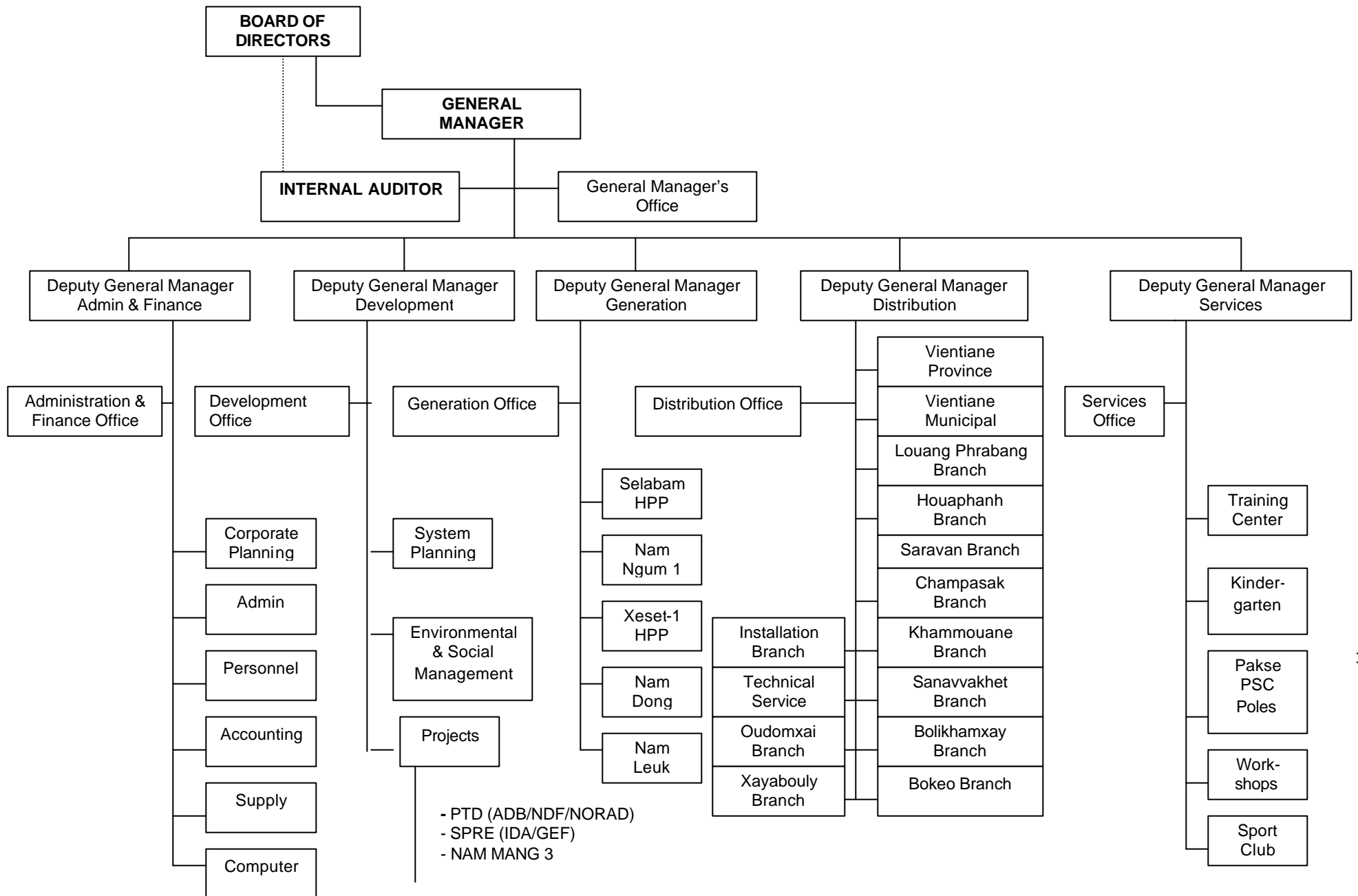
21 August 2003

PROJECT FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Goals <ul style="list-style-type: none"> Extend electricity to poor rural areas that have potential for socioeconomic development to improve rural living standards and economic conditions Strengthen Electricité du Laos (EdL) institutional capacity and improve its operation efficiency on a commercial basis 	<ul style="list-style-type: none"> Improved quality of rural electricity supply Improved quality of rural life and reduced cost of energy consumption Improved EdL financial performance, operation efficiency, and project implementation capability 	<ul style="list-style-type: none"> Socioeconomic surveys at project inception and completion EdL annual reports Benefit monitoring and evaluation program Project completion report (PCR) 	<ul style="list-style-type: none"> The macroeconomic and political environment is stable. The Government is committed to poverty reduction. The Government will implement other committed infrastructure projects or cross-sector interventions in the northern region. EdL's financial recovery plan, including the increase of retail tariffs, will be implemented as envisaged.
Purpose <ul style="list-style-type: none"> Strengthen and expand the power grid and supply electricity to the selected northern rural areas Improve EdL's technical and financial performance 	<ul style="list-style-type: none"> Power grid extended to Xieng Khouang, Sayaburi, Oudomxai, Louang, and Namtha provinces; and Xaisomboun Special Region Electrification ratio by population in the northern region increased from 18% to 30% by project completion EdL's compliance with technical and financial targets as set in the loan covenants 	<ul style="list-style-type: none"> Project review missions EdL's annual reports Project progress report and PCR EdL financial statements Project accounts and records for electricity supply and operation 	<ul style="list-style-type: none"> Consumers can pay for new connections and energy consumption. Consumers with 3-ampere meter connections are allowed to amortize payments.
Outputs <ul style="list-style-type: none"> Extension of 115-kilovolt (kV) transmission lines and construction of 115 kV substations Erection of medium- and low-voltage distribution facilities and household connections 	<ul style="list-style-type: none"> 303 kilometers (km) of 115 kV lines and 3 units of 115 kV substations 796 km of 34.5 kV and 22 kV distribution lines and 237 sets of distribution 	<ul style="list-style-type: none"> Quarterly project progress reports Project review missions Project accounts and records for electricity supply and operation 	<ul style="list-style-type: none"> No delay in procurement of civil works On-time implementation of mitigation measures Counterpart funds will be available on time

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<ul style="list-style-type: none"> Unexploded ordnance clearances, miscellaneous works, and consulting services 	transformers <ul style="list-style-type: none"> 608 km of 380 V distribution lines Electrification of 33,800 households in 342 villages 	<ul style="list-style-type: none"> PCR 	<ul style="list-style-type: none"> Unexploded ordnance are adequately cleared.
Activities <ul style="list-style-type: none"> Engagement of consultants Conduct of detailed project design and survey Update, approval, and implementation of resettlement plan Procurement of equipment and materials Physical construction Conduct of consulting services Project performance monitoring and evaluation Capacity building for socioeconomic assessment Consumer awareness program Implementation of EdL's financial recovery program and sector reform 	<ul style="list-style-type: none"> Consultants engaged by January 2004 Detailed project design completed by June 2004 Bid evaluation and contract awards completed by August 2005 Physical works completed by March 2008 	<ul style="list-style-type: none"> Quarterly project progress reports Review missions PCR 	<ul style="list-style-type: none"> Consultants and contractors are competent. Appointment of consultants and contractors is not delayed. Construction supervision and quality control are effective. Procurement is timely. Resettlement planning and implementation are effective.
Inputs			
<ul style="list-style-type: none"> Civil works Equipment and materials Land acquisition, resettlement, and benefit monitoring program Consulting services 	<ul style="list-style-type: none"> \$23.0 million \$10.8 million \$300,000 \$3.5 million 	<ul style="list-style-type: none"> Quarterly project progress reports Review missions Project accounts and records for electricity supply and operation PCR 	<ul style="list-style-type: none"> Consultants and contractors perform well. Construction supervision and quality control are effective. Government counterpart resources and other funding agency's contribution are committed and allocated.

ORGANIZATIONAL CHART OF ELECTRICITÉ DU LAO



POWER SECTOR ANALYSIS

A. Background

1. The power sector in the Lao People's Democratic Republic (Lao PDR) is still in its infancy, with only 34% of households having access to electricity, according to the Hydropower Office, Ministry of Industry and Handicraft (MIH). The sector has the potential to be pivotal in achieving the Government's social and economic development objectives by expanding the availability of low-cost, reliable electricity within the country and earning foreign exchange from sales to the region. The power sector policy encourages optimal use of the country's natural resources, promoting efficiency in power sector institutions and creating a conducive environment for responsible infrastructure investment, public and private.

B. Power System Facilities and Operations

2. The power system facilities cover the Northern, Central 1, Central 2, and Southern regions, serving about 250,000 customers. The largest two regions, Northern and Central 1, which cover Vientiane Prefecture and Vientiane and Louang Phrabang provinces, as well as other surrounding areas, are supplied from the Nam Ngum hydropower station (150 megawatts [MW]) and partly from the recently completed Nam Leuk hydropower station (60 MW). The southern region covers Saravan and Champassak provinces and is supplied from the Xeset (45 MW) and Selabam (5 MW) hydropower stations. Existing power grids for these areas are interconnected with the power grid in Thailand to export electricity generated in excess of domestic demand. Central 2, which covers Khammouane and Savannakhet provinces, is supplied from Thailand through 22-kilovolt (kV) submarine cables across the Mekong River. Scattered small generating sets (hydro and diesel) with a total installed capacity approximately of 10 MW also provide limited supply serving small communities. The Lao PDR power stations are listed in Table A3.1.

Table A3.1: Power Stations in the Lao People's Democratic Republic

No.	Power Station	Regions	Owners	Installed Capacity (MW)	Average Generation (GWh/year)	Commissioning Year
1	Nam Ngum 1	Central 1	EdL	150.0	998	1971/78/84
2	Selabam	Southern	EdL	5.0	24	1970/93
3	Xeset 1	Southern	EdL	45.0	180	1991
4	Nam Dong	Central 1	EdL	1.0	5	1970
5	Nam Phao	Central 1	Provincial	1.6	-	1995
6	Nam Ko	Northern	Provincial	1.5	-	1997
7	Theun Hinboun	Central 1	IPP	210.0	1620	1998
8	Houay Ho	Southern	IPP	150.0	617	1999
9	Nam Leuk	Central 1	EdL	60.0	230	2000
Total				624.1	3674	

EdL = Electricité du Laos, GWh = gigawatt-hour, IPP = independent power producer, MW = megawatt.

Source: Electricité du Laos.

3. The standard of transmission system voltage is divided into three levels: 230 kV for independent power producer (IPP) projects producing for export, and 115 kV for domestic high-voltage transmission lines; 22/34.5 kV for the medium-voltage distribution network; and 0.4 kV

for the low-voltage distribution system. Table A3.2 shows the transmission and distribution facilities.

Table A3.2: Electricité du Laos Transmission and Distribution Facilities

Regions	230 kV Transmission Lines (km)	115 kV Transmission Lines (km)	22/34.5 kV Transmission Lines (km)	0.4 kV Transmission Lines (km)	Installed Capacity of Distribution Transformers (MVA)
Central 1	-	645.0	1695.0	2420.0	455.0
Central 2	172.0	1.7	1831.5	1068.8	154.4
Northern	-	-	183.8	135.4	8.2
Southern	322.0	114.5	1126.6	1049.1	90.6
Total	494.0	761.2	4837.2	4673.5	708.2

km = kilometer, kV = kilovolt, MVA = kilovolt ampere

Source: Electricité du Laos.

4. The growth of electricity demand during the past 5 years is a strong indicator of consumer's willingness and ability to pay for electricity. As shown in Table A3.3, demand increased significantly in electrified areas.

Table A3.3: Electricity Consumption, 1996–2000
(million kWh)

Category	1996	1997	1998	1999	2000	Growth Rate (%)
Residential	193	218	252	285	324	13.8
Commercial/Services	40	40	50	58	68	14.2
Entertainment	-	9	11	11	12	10.1
Government Offices	45	50	54	54	60	7.5
Agriculture/Irrigation	13	17	30	34	33	26.2
Industries	80	91	108	115	115	9.5
International Organizations	8	8	8	8	7	
Total	379	433	513	565	639	14.0

kWh = kilowatt hour,

Source: Electricité du Laos.

5. The Lao PDR is endowed with significant hydropower resources. Export of hydropower is the largest single foreign exchange earner for the country. The Government thus emphasizes development of export-oriented hydropower projects and mobilizing private sector investment. With external assistance, two IPP hydropower projects with substantial generating capacities were completed recently, and demand for electricity for domestic use and export is growing rapidly. Table A3.4 shows Electricité du Laos (EdL) statistics on generation, and electricity sales from 1996 to 2000.

Table A3.4: Electricity Generation and Sales, 1996–2000
(million kWh)

Category	1996	1997	1998	1999	2000	Growth Rate (%)
Generation	1248	1219	948	1169	1579	6.1
Imports	87	102	142	172	160	16.4
Export	792	710	405	598	863	2.2
Domestic Consumption	379	433	513	565	639	14.0

Source: Electricité du Laos.

C. Power Sector Development

6. Electricity is supplied through main grids and off grid. Three sources provide generation for EdL main grids: (i) small or medium-sized power generation projects, generally up to about 100 MW, developed by EdL primarily to supply the national market; (ii) domestic off-take entitlements from IPPs; and (iii) imports from neighboring countries (Thailand and Viet Nam). Generation for export is provided from two sources: (i) surplus electricity from EdL's domestic hydropower projects and (ii) IPP hydropower projects.

7. Unserved areas are targeted by grid extension projects, off-grid development, and domestic off-take entitlements from IPP projects. Grid extension is used to supply the main centers and densely populated areas on the floodplains of the Mekong and its tributaries. Off-grid electrification through isolated grids—from provincial and town to multi- and single-village grids—is more advantageous than a high-cost grid extension thinly distributed over difficult terrain.

8. Less than 20% of villages have electricity, which limits commercialization and diversification of the economy. Poverty incidence strongly correlates with the lack of electricity. The Government thus gives electrification high priority, particularly in rural areas, and expects that by 2010 70% of the population will have electricity.

9. The financial and technical resources needed to expand export capacity and extend rural electrification are far beyond the Government's means and requires partnership between public and private investors. This partnership, however, will depend on reforms and measures to strengthen the energy sector and to ensure that the people share equitably in the benefits of hydropower development.

10. Given the pivotal economic role of the power sector, the Government has focused on harnessing private sector resources to accelerate power development. As part of the market-oriented economic restructuring, foreign capital is encouraged and regulated.

11. The Government has restructured and commercialized power sector institutions to enhance their operating efficiency. EdL, the state-owned national power utility, is being commercialized through the following measures: (i) EdL was incorporated as a public company under a charter approved by MIH on 29 December 1997; (ii) EdL average retail tariffs were increased by 3.0% per month from 1999 to 2001 and again by 2.3% per month starting in May 2002 through April 2005; (iii) EdL signed a performance contract plan for 2001-2003 with the

Ministry of Finance and MH in February 2001, which establishes targets for EdL's technical, commercial, and financial performance; commits the Government to improve EdL's financial viability (including through tariff increases); and provides for monitoring of compliance by MIH; (iv) Reorganized into profit centers, EdL introduced formal cost accounting and internal transfer pricing for each profit center; (v) Formal auditing practices have been adopted and an external auditing firm engaged beginning in 1998; and (vi) A loss reduction unit has been established and investments are being made to reduce losses.

D. Key Development Challenges

12. Power potential should be harnessed to best serve the people's interests, especially to reduce poverty by promoting sustainable economic growth. Large-scale projects can and should be supported if community groups displaced by such projects are fully compensated, if the environmental effects are carefully assessed and mitigated, and if the net benefits are shared equitably between investors and the people as owners of the resources. The revenues generated from increased export earnings will be vital to improving basic government services, including education, health, and infrastructure services in poor areas.

13. The development strategy should distinguish between the appropriate roles for the public and private sectors, taking account of the Lao PDR's continuing transition to a market-based economy. The private sector should be encouraged to invest in electricity generation and distribution, leaving the Government to focus on the regulatory framework and overall transmission system.

14. Other management issues also demand public attention and resolution. Electricity use is highly subsidized and, despite monthly increases in domestic tariffs since early 1999, full cost recovery is still distant. EdL thus has a serious debt burden, which also reflects EdL's history of borrowing unprotected for exchange rate risk. The sharp devaluation of the kip following the Asian financial crisis has greatly deepened EdL's problems. EdL must be strengthened financially and made more efficient.

15. The Government is an investor in power development and the regulator of the sector, which leads to conflicting interests. The Government's encouragement of social and economic development through electrification at highly subsidized tariffs, for example, is counter to sound power management and EdL's commercial viability. If the Government wishes to be a regulator and an investor, then it should establish an institutional framework that ensures that the two roles do not conflict.

16. International best practices should help determine the right course of action. The Government has drawn from these practices, notably adjusting the pricing system to harmonize with cost recovery principles. The Government is also restructuring EdL's debt obligations and initiating other institutional and regulatory matters central to sound management of the power sector. EdL has successfully engaged the private sector as a partner in power development. However, the Government should consider consolidating this experience, drawing benefits from power projects through concession fees, royalties, and taxation. Seeking a large ownership position through equity participation can be risky, and may not conform to EdL's or the Government's financial interests.

PREVIOUS ASIAN DEVELOPMENT BANK ASSISTANCE TO THE POWER SECTOR

Loan	Project	Amount (\$)	Date of Approval
65-LAO	Vientiane Power Distribution	3,370,000	06 May 1971
128-LAO(SF)	Vientiane Power Distribution (supplementary)	1,350,100	03 May 1971
501-LAO(SF)	Vientiane Plain Rural Electrification	4,300,000	19 Dec 1980
642-LAO(SF)	Vientiane Plain Rural Electrification (phase II)	6,300,000	11 Oct 1983
698-LAO(SF)	Xeset Hydropower (TA loan)	1,000,000	23 Oct 1984
846-LAO(SF)	Xeset Hydropower	15,500,000	27 Oct 1987
928-LAO(SF)	Nam Ngum-Louang Phrabang Power Transmission	11,000,000	06 Dec 1988
1063-LAO(SF)	Xeset Hydropower (supplementary)	3,000,000	11 Dec 1990
1214-LAO(SF)	Nam Song Hydropower Development	31,500,000	21 Dec 1992
1308-LAO(SF)	Nam Ngum-Louang Phrabang Power Transmission (supplementary)	4,000,000	30 Aug 1994
1329-LAO(SF)	Theun-Hinboun Hydropower Project	60,000,000	08 Nov 1994
1456-LAO(SF)	Nam Leuk Hydropower Project	52,000,000	10 Sept 1996
1558-LAO(SF)	Power Transmission and Distribution	30,000,000	30 Sept 1997
Total		223,320,000	
Technical Assistance			
275-LAO	Vientiane Plain Rural Electrification	140,000	22 Dec 1978
374-LAO	Xeset Hydropower	246,000	14 Nov 1980
909-LAO ^a	Xeset Hydropower (implementation)	1,760,000	27 Oct 1987
1080-LAO	Xieng Khouang and Sayaburi Power Transmission Study	85,000	03 Jan 1989
1081-LAO	Nam Ngum Hydropower Station Operational Study	192,000	03 Jan 1989
1082-LAO	Institutional Improvement to EdL Louang Phrabang	198,000	03 Jan 1989
1221-LAO	Nam Song-Nam Leuk Hydropower Development Feasibility Study	500,000	10 Nov 1989
1301-LAO ^b	Nam Ngum-Louang Phrabang Power Transmission	960,000	29 Mar 1989
909-LAO ^c	Xeset Hydropower (supplementary)	1,000,000	14 Dec 1990
1532-LAO ^d	Nam Song-Nam Leuk Hydropower Development Feasibility Study	1,300,000	08 Jul 1991
1548-LAO	Nam Mang 3 Prefeasibility Study	50,000	07 Aug 1991
1301-LAO ^b	Nam Ngum-Louang Phrabang Power Transmission Supplementary	1,034,000	14 Oct 1992
2054-LAO	Theun-Hinboun Power Legal Power	100,000	04 Jan 1994
2479-LAO ^d	Power Transmission and Distribution	250,000	18 Dec 1995
2569-LAO ^d	Corporate and Financial Development of EdL	340,000	15 May 1996
2583-LAO ^d	Power System Planning in the Ministry of Industry and Handicraft	600,000	07 Jun 1996
2728-LAO ^d	Study for Establishing Lao National Grid Company	600,000	23 Dec 1996
3087-LAO ^d	Northern Area Rural Power Distribution Project	580,000	28 Nov 1997
2926-LAO ^d	Nam Ngum 500 kV Transmission Project Power Distribution	510,000	14 Oct 1998
3374-LAO ^d	Power Sector Strategy Study	800,000	23 Dec 1999
Total		11,245,000	

EdL = Electricité du Laos, kV = kilovolt, TA = technical assistance.

^a United Nations Development Programme (UNDP) funds.^b Swiss funds.^c Norwegian funds.^d Japan special funds.

FINANCIAL PERFORMANCE AND PROJECTIONS OF ELECTRICITÉ DU LAOS

A. Introduction

1. The financial performance of Electricité du Laos (EdL) since 1998 has been significantly affected by the depreciation of the kip during the Asian financial crisis. EdL's past financial performance is indicated in Table A5.1, compiled from audited financial statements:

Table A5.1: Electricité du Laos Financial Performance (1998-2001)

Audited Financial Results	ADB Covenants	1998	1999	2000	2001
Average Kip per Dollar Exchange Rate		4,300	7,650	8,245	9,540
Average Retail Tariff (KN/kWh)		50	133	169	251
Average Retail Tariff (cents per kWh)		1.16	1.74	2.05	2.63
Electricity Sales (GWh)		918	1,200	1,503	1,506
Turnover (KN million)		95,165	268,508	340,744	399,197
Cost of Sales (KN million)		58,884	116,709	135,063	167,478
Gross Profit (KN million)		36,281	151,799	205,681	231,719
Interest Expense (KN million)		36,493	99,437	90,683	43,073
Foreign Exchange Loss (KN million)		14,335	38,876	120,642	78,122
THPC Dividend Income (KN million)		24,051	105,123	144,763	135,566
Net Profit Before Tax (KN million)		(3,841)	80,871	75,864	196,232
Operating Margin (%)		24	43	42	45
Accounts Receivable (no. of months)	2.0	3.9	2.5	3.8	3.3
Self-Financing Ratio (%)	min of 30%	(34)	(9)	(33)	(18)
Debt Service Coverage Ratio	min of 1.3	0.5	0.9	0.9	1.3
Debt-Equity Ratio	max of 1.5	7.3	10.1	6.1	3.2

ADB = Asian Development Bank, GWh = gigawatt-hour, kWh = kilowatt-hour.

Source: Electricité du Laos Financial Statements.

B. Profitability and Cash Flow

2. As EdL borrows almost all of its funds in foreign currency (typically dollars), the depreciation of the kip has dramatically affected EdL's ability to remain profitable and meet its financial ratios from internal operations. The depreciation of the kip has resulted in large foreign exchange losses on loans, which must be serviced from EdL's kip-denominated cash flow. EdL's profitability in the last several years is attributed to nonoperating income (dividends from the Theun-Hinboun Power Company, of which EdL owns 60%), which covers the foreign exchange losses on existing debt. EdL's operating efficiency and tariff levels should, therefore, be assessed.

3. While it has remained positive, EdL's cash flow from internal sources has been decreasing in recent years. This trend can be partly attributed to the declining share of export revenue, denominated in dollars and baht, which has helped mitigate some of EdL's foreign exchange losses. As the share of electricity exported declines relative to domestic sales, cash flow decreases as domestic tariffs do not cover the full cost of service. Technical losses, low tariffs, and low collection of accounts receivable need to be addressed. Accounts receivable have remained significantly above the Asian Development Bank (ADB) covenant level of 2

months' worth of sales, mostly attributable to unpaid government sales (11.0 months in 2001) and domestic sales (4.5 months).

C. Tariffs

4. Low average retail tariffs contributed to the poor performance of EdL as it expanded its electrification rate. While revenues from export sales cross-subsidized these domestic sales over the past several years, declining export revenue will expose EdL's weak financial position and the need for significant retail tariff restructuring.

5. EdL carried out a detailed tariff study¹ in late 2001, which justified applying for a new tariff increase with the Government. This tariff report indicated that the long-run marginal cost for EdL was approximately KN741 per kilowatt-hour (kWh) in 2002. The tariff study also analyzed the appropriate lifeline tariff (now set at 50 kWh) and revenue analysis as required for EdL to meet its loan covenants in the next couple of years. Table A5.2 indicates EdL's projected tariff rates in 2002–2010:

Table A5.2: Projected Annual Average Tariff Schedule, 2002–2010
(KN/kWh, unless otherwise noted)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
% of Tariff Increase	17.3	31.4	31.4	12.0	0.0	0.0	0.0	0.0	0.0
Residential Tariffs:									
0–50 kWh	65	87	115	137	137	137	137	137	137
51–150 kWh	153	205	269	322	322	322	322	322	322
> 150 kWh	420	590	776	928	928	928	928	928	928
Embassies Tariff (\$)	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
Embassies Tariff	941	1,006	1,077	1,152	1,233	1,319	1,411	1,510	1,616
Commercial Tariff	488	638	838	1,003	1,003	1,003	1,003	1,003	1,003
Entertainment Tariff	636	845	1,111	1,329	1,329	1,329	1,329	1,329	1,329
Industry Tariff	400	491	645	771	771	771	771	771	771
Government Office Tariff	422	546	716	857	857	857	857	857	857
Agriculture/Irrigation	176	228	299	358	358	358	358	358	358
Tariff for Others (22 kW)	374	491	645	723	723	723	723	723	723
Weighted Average Tariff	291	395	513	612	612	613	614	615	616
Weighted Average Tariff (\$)	0.0306	0.0389	0.0472	0.0526	0.0492	0.0460	0.0431	0.0403	0.0378

Note: For conservatism, no tariff increases are estimated in the long-term forecasts beyond the approved increases ending in 2005.

Source: Electricité du Laos, 2003.

D. Financial Restructuring

6. In late 1999 the Government approved a comprehensive financial recovery program (FRP) for EdL to restore its financial viability and improve its ability to meet future investment needs through self-financing. The plan was developed with assistance from the World Bank and ADB, EdL's key creditors. The FRP underscores the Government's commitment to EdL and the power sector, provides financial terms to encourage further rural electrification and expansion of the national grid, and puts EdL on commercial footing. The FRP includes the following provisions:

¹ Power Supply Tariff Study – Final Report, February 2002, EdL.

7. **Conversion of Electricité du Laos Debt to Equity.** The Government converted \$69 million of EdL debt into government equity in 2001, including the re-lent proceeds of Loan 1329.² This conversion was equivalent to the Government injecting additional equity capital into EdL, which was needed to reduce its debt leverage.

8. **Variable Remittance to the Government as Taxes and Dividends.** The Government agrees that EdL can retain dividends from its subsidiary investments, notably Theun Hinboun Power Company (THPC), to ensure that EdL complies with the financial loan covenants of the World Bank and ADB. Should EdL comply, it pays 29% of total net income as dividends to the Government, giving EdL more flexibility in managing its finances and the ability to reinvest dividends in capital expansion. ADB supports this agreement but EdL needs to discuss a longer-term solution with the Ministry of Finance (MOF) on the dividends to ensure proper equity capitalization.

9. **Revaluation of Fixed Assets.** The Government agreed to revalue 100% of fixed assets directly related to power generation, transmission, and distribution. ADB deemed the revaluation study acceptable as it was incorporated into a comprehensive financial restructuring plan, and asset revaluation will be permitted for all Lao businesses in the future. The final study report was completed in November 2002, and the results are being translated in the 2002 financial statements. Asset revaluation will substantially increase the depreciation expense of EdL, thereby reducing its net income and tax liability with the Government.

10. **Relaxation of Repayment Terms of Subsidiary Loan Agreements.** In 2001 MOF and EdL amended most of its subsidiary loan agreements with World Bank and ADB. These steps include reducing interest rates and extending repayment terms by five years on existing loans. The amendments are reasonable, considering the extended terms are only a temporary relaxation. EdL's debt service burden is reduced until other financial measures can be implemented, improving EdL's operational cash flow. ADB formally approved the amended agreements in January 2003. EdL agreed to involve ADB in any future plans for debt restructuring.

11. **Maintenance of Electricity Tariffs to Meet Electricité du Laos's Financial Objectives.** After conducting a tariff study in 2002, the Government agreed to a schedule of retail electricity tariff increases starting in May 2002. Tariffs will increase for all consumer classes at 2.3% per month (a compounded annualized rate of 31.0%) through April 2005. This schedule will increase tariffs to approximately KN612/kWh (\$.053/kWh) in 2005 (Table A5.2). While still below full cost recovery, this decision clearly indicates the Government's support for EdL to become a more commercial entity. The Government agreed to fully implement the tariff schedule as planned, and EdL will inform ADB of any deviation from the plan, as it would significantly affect long-term financial performance.

12. **Review of Electricité du Laos's Capital Expenditure Program.** EdL has agreed to regularly review its capital expenditure program (officially, EdL's Power Development Plan) and its ability to finance the expansion program through new debt and internal cash generation. ADB supported this planning effort through TA 3374-LAO: Power Sector Strategy Study. The World Bank is also funding a study to update the recommendations and analysis based on recent changes. EdL will annually update a more robust and analytical power development plan by considering short- and long-term strategy, combined planning of domestic and export

² ADB. 1994. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to Lao PDR for the Theun-Hinboun Hydropower Project*. Manila.

generation on a least-cost basis, and integration of technical planning with the subregional grid system. These developments will reduce technical, commercial, and financial risks to EdL as it expands its service.

13. **Limitation on the period of debt-servicing relief to Electricité du Laos.** While it strongly supports EdL, the Government also stipulates its intent to consider a phased withdrawal of financial support as EdL's operations become more commercial and self-sustaining. ADB appreciates the Government's limitation to provide assistance due to fiscal constraints, but with an electrification target rate of 90% by 2020, it is unlikely that EdL can finance this expansion without additional government financing assistance. EdL may require government equity injections (direct or through conversions to equity) to prevent it becoming too leveraged. This issue will be addressed when future power development plans are submitted to ADB for review and comment.

14. Most of the FRP has already been implemented, and tariff increases began in May 2002. This is the Government's strongest signal of intent to support EdL and transform it into a commercially viable organization. Other aspects (e.g. asset revaluation) are being translated in the 2002 financial statements. EdL agreed to ensure full implementation of the FRP; comply with ongoing provisions on tariff levels, dividend remittances, and capital expenditure review; and keep ADB informed of its completion.

E. Future Financial Performance

15. EdL's projected financial statements are in Table A5.3. EdL has greatly improved its financial and operational performance as a result of the FRP in FY2002 (based on unaudited estimated results) and also because the Government applied the \$33 million THPC proceeds³ to outstanding liabilities with MOF. Asset revaluation results were much greater than initially estimated during the drafting of the FRP, so future financial performance appears to be stronger than anticipated.

16. EdL's financial performance depends on full and timely retail tariff increases and rationalization of the Power Development Plan. Tariffs will continue to increase until they reach an estimated equivalent level of KN612/kWh in 2005. Tariffs will, at minimum, need to be maintained at this level in real terms, meaning that further increases will be required after 2005 to keep pace with exchange rate movements. EdL is planning a more detailed tariff review in 2003 to see how the tariff structure and rates can be changed to eventually move toward full cost recovery.

17. Projections for some of EdL's financial ratios (specifically, debt service coverage and debt-equity ratio) are declining from 2003 to 2010. While these ratios have been complied with for several years, their deterioration is related to the ambitious capital expenditure program to reach a nationwide electrification ratio of 90% in 2020. This plan assumes that debt will be used to finance expansion, even though lenders or donors do not appear committed to finance it. Even if this new debt is concessional, EdL's projected operations and growth may not sustain the required debt service. EdL agrees to review and update its capital expansion plan and develop financing plans (including future government contributions to EdL equity), which indicates EdL's intent to remain financially viable.

³ THPC refinanced its original financing package in May 2002 to take advantage of lower costs of debt than required for financial close in 1996. THPC then returned 50% of the share capital to the owners, including EdL. Therefore, \$33 million was returned to EdL in May 2002.

18. EdL agrees to financial loan covenants consistent with previous loans and to maintain operational and financial performance so that these covenants are met annually. ADB will assess covenants based on audited financial statements submitted within nine months after the close of EdL's fiscal year (31 December). The following indicates financial loan covenant levels and steps required to ensure such levels are met during project implementation and principal repayment. The Government also agrees that EdL will not remit any dividends until the audited financial statements certify compliance with the debt service coverage, debt-equity, self-financing, and government receivables settlement plan.

19. **Self-Financing Ratio.** EdL agrees to maintain a self-financing ratio of no less than 30%. The revaluation of assets will increase allowable depreciation expense and reduce EdL's tax liabilities. This should enhance EdL's ability to meet its self-financing ratio covenant, but the capital expenditure plan should still be reviewed regularly to ensure that it does not strain financial performance.

20. **Debt Service Coverage Ratio.** EdL agrees to maintain net revenues of no less than 1.5 times annual debt service payments. This is an small increase from Loan 1558 covenants (1.3 times) to harmonize financial covenants with those of the World Bank. ADB recommends that EdL review its capital expenditure program to ensure that future projects are not financed with high levels of debt, which will jeopardize financial performance once the grace periods on principal repayment end.

21. **Debt-to-Equity Ratio:** EdL agrees to maintain the ratio of its long-term debt to no more than 1.5 times its equity. ADB believes this covenant warrants significant attention. EdL's financial projections and capital expenditure plan indicate that EdL will be unable to meet this covenant after FY2004 due to the large amount of long-term debt assumed to finance capital expansion. ADB requested MOF to ensure that the Government maintains significant equity in EdL to ensure compliance. As long as EdL maintains the Government's shareholding in independent power producer projects, ADB will support EdL retaining Theun Hinboun dividends in the future. EdL's retention of these dividends is equivalent to future Government injections of equity, which will be required to sustain EdL's growth.

22. **Accounts Receivable:** ADB is concerned about the growing accounts receivable, mostly with central government, provincial, and municipal offices. The Government has not complied with the relevant covenant for several years. While ADB is cognizant of the Government's fiscal difficulties, EdL cannot function as a true commercial enterprise under the conditions of nonpayment without permission to terminate electricity service. EdL agrees to reduce its overall accounts receivable to no more than two months' average electricity sales. The Government also agreed to offset EdL's arrears (calculated as of 31 December 2002) and current government consumption above two months' average from EdL's tax and other financial liabilities with the Government. In May 2003 the Government confirmed that the first offsetting payment was made, and ADB and the Government have agreed on a schedule of consecutive quarterly offsets in 2004 and 2005 to fully settle the arrears. Receivables with domestic customers also require improvement. EdL is introducing a new billing system that will permit EdL to carry out more detailed analysis and aging of the receivables, and increase timely bill collection from delinquent customers.

F. Conclusion

23. The completion of the FRP and other financially attractive beneficial transactions in 2002 (proceeds from THPC refinancing applied to outstanding liabilities with the Government) have

helped EdL recover from its financial crisis and become more stable. This position should allow EdL operations to be profitable and sustainable for the next several years, and financial projections indicate that EdL will meet its loan covenants from FY2002 to 2008, based on the capital expenditure plan approved in 2001.

24. Compliance with financial covenants could become a problem, however, as EdL attempts to balance ambitious capital expansions plans (including rural electrification projects on behalf of the Government) with financial performance as a commercial organization. ADB continues to pursue financial improvements with EdL on operating efficiency and tariff increases and with MIH and MOF on sector structure and capitalization of EdL. ADB will ensure that the capital expansion plans are reviewed and rationalized, which will reduce the pressures for additional and excessive foreign debt borrowings. In this case, the risk of noncompliance with loan covenants will be mitigated through the above assurances and covenant to ensure direct government financing (equity injections of cash) when and as required to ensure a financially sustainable EdL.

Table A5.3: Income Statement
(KN millions)

Years	Actual		Estimated	Projected							
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Domestic turnover	108,046	177,952	230,345	391,410	575,460	769,125	854,575	930,614	1,011,337	1,111,176	1,209,867
Installation Fees and other Misc. Revenue	24,716	24,537	45,166	42,886	46,388	50,177	54,277	58,715	63,517	68,715	74,339
Total domestic turnover	134,073	206,346	284,090	445,800	638,218	839,157	930,355	1,012,614	1,100,070	1,207,197	1,313,778
Export turnover	208,470	202,801	229,863	155,762	106,458	50,485	120,876	176,737	301,153	298,495	264,355
Total Turnover and Revenue	342,543	409,147	513,953	601,563	744,676	889,642	1,051,231	1,189,351	1,401,223	1,505,693	1,578,133
Operating costs											
Raw materials & consumables	11,493	8,618	30,156	36,094	44,681	53,379	63,074	71,361	84,073	90,342	94,688
Purchase of energy	45,044	58,651	68,556	147,129	124,483	52,205	67,793	87,848	113,117	145,842	193,640
Purchase of external services	51,463	51,638	80,809	48,125	59,574	71,171	84,098	95,148	112,098	120,455	126,251
Import duties and taxes on energy	2,355	4,677	5,347	9,148	7,966	4,284	4,976	5,868	6,990	8,446	8,604
Taxes on domestic sales	6,704	10,317	14,204	22,290	31,911	41,958	46,518	50,631	55,004	60,360	65,689
Taxes on export sales	41,694	40,560	45,973	31,152	21,292	10,097	24,175	35,347	60,231	59,699	52,871
Wages and welfare charges	13,324	25,673	23,841	32,765	34,790	36,943	39,232	41,664	44,250	46,999	49,921
Losses on domestic bad debts	351	246	1,420	2,229	3,191	4,196	4,652	5,063	5,500	6,036	6,569
Depreciation	19,533	32,494	154,268	155,402	178,213	220,696	270,439	331,795	376,563	417,849	521,349
Other operating charges	14,804	15,833	17,161	24,063	29,787	35,586	42,049	47,574	56,049	60,228	63,125
Total Operating Costs	200,122	238,391	427,532	486,107	503,976	488,556	600,488	721,669	858,871	955,895	1,117,018
Other Operating income											
OPERATING INCOME	144,221	170,756	86,421	115,456	240,700	401,086	450,743	467,682	542,351	549,797	461,115
Foreign Exchange Gain(Loss)	(120,643)	(89,501)	(55,507)	(32,854)	(70,243)	(128,674)	(164,438)	(131,664)	(39,568)	(3,555)	(38,953)
Financial income	-	-	-	-	-	-	-	-	-	-	-
+ Financial revenues	-	-	-	-	-	-	-	-	-	-	-
- Current financial charges	-	-	-	-	-	-	-	-	-	-	-
Interests on LT loans	90,683	43,888	41,328	4,123	3,894	19,364	38,429	63,489	107,816	176,830	238,173
Interest on Long-Term Loans	(90,683)	(43,888)	(41,328)	(4,123)	(3,894)	(19,364)	(38,429)	(63,489)	(107,816)	(176,830)	(238,173)
OPERATING INCOME	(67,105)	37,366	(10,414)	78,479	166,562	253,049	247,876	272,528	394,967	369,412	183,989
Non-Operating Income	144,763	135,590	111,331	176,200	168,075	170,833	176,067	208,418	226,985	255,505	317,462
+ operating subsidy	-	-	-	-	-	-	-	-	-	-	-
NET INCOME BEFORE TAX	77,658	172,957	100,917	254,679	334,638	423,882	423,943	480,946	621,952	624,917	501,450
Profit Tax	(35,962)	(60,535)	(5,140)	(27,467)	(58,297)	(88,567)	(86,757)	(95,385)	(138,239)	(129,294)	(64,396)
NET INCOME	41,696	112,422	95,778	227,211	276,341	335,315	337,186	385,561	483,713	495,623	437,054

Table A5.4: Cash Flow Statement
(KN millions)

Cash Flow Statement (Kip Millions)		Actual		Projected								
Years		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CASH FLOW FROM OPERATIONS												
Reconcile EBT to Op. Profit before WC		163,814	203,250	240,689	270,858	418,913	621,782	721,182	799,477	918,914	967,646	982,464
Increase/Decrease of working capital		69,166	26,270	(27,436)	39,890	45,627	70,061	6,243	24,585	66,424	2,297	(59,634)
Taxes Paid		(35,962)	(60,535)	(5,140)	(27,467)	(58,297)	(88,567)	(86,757)	(95,385)	(138,239)	(129,294)	(64,396)
Net Cash Flows from Operations		58,686	116,445	262,986	203,501	314,990	463,154	628,182	679,507	714,251	836,055	977,702
CASH FLOW FROM INVESTMENTS												
Capital Expenditures		(205,101)	(225,297)	(428,894)	(777,971)	(1,225,833)	(1,187,083)	(980,642)	(1,320,835)	(2,052,728)	(2,007,307)	(1,023,715)
Dividends Received from THPC		144,763	135,590	111,331	176,200	168,075	170,833	176,067	208,418	226,985	255,505	317,462
Investment in Subsidiaries		-	-	(46,281)	-	-	-	-	-	-	-	-
Net Cash Flow from Investments		(60,337)	(89,707)	(271,282)	(601,771)	(1,057,758)	(1,016,250)	(804,576)	(1,112,417)	(1,825,743)	(1,751,802)	(706,254)
CASH FLOW FROM FINANCING												
State capital contribution to equity		-	-	-	-	-	-	-	-	-	-	-
Customer's contributions/deposits		13,306	8,765	20,605	14,527	20,672	25,072	27,152	29,403	31,841	34,482	37,341
Increase in capital by loans conversion		-	725,968	-	-	-	-	-	-	-	-	-
- loans converted in capital		-	(725,968)	-	-	-	-	-	-	-	-	-
Grants & subsidies		24,267	11,265	-	45,743	48,944	54,698	62,263	66,621	-	-	-
Proceeds from new loans		129,399	157,708	300,226	544,580	858,083	830,958	686,450	924,584	1,436,909	1,405,115	716,601
Repayment of Principal on Long-Term Debt		(63,864)	(17,179)	(43,138)	(9,686)	(9,460)	(24,335)	(38,731)	(65,742)	(115,483)	(196,526)	(272,425)
Dividends paid to Government		-	-	-	27,775	65,891	80,139	97,241	97,784	111,813	140,277	143,731
Net Cash Flow from Financing		89,802	151,794	257,087	608,412	963,459	941,460	807,223	1,023,248	1,433,239	1,348,865	587,906
NET CASH FLOW		88,151	178,532	248,791	210,142	220,690	388,363	630,829	590,338	321,747	433,118	859,354
CHANGE IN CASH												
Beginning Cash Balance		59,207	147,358	325,890	574,681	784,823	1,005,513	1,393,877	2,024,706	2,615,044	2,936,791	3,369,909
Annual Net Cash Flow		88,151	178,532	248,791	210,142	220,690	388,363	630,829	590,338	321,747	433,118	859,354
Ending Cash Balance		147,358	325,890	574,681	784,823	1,005,513	1,393,877	2,024,706	2,615,044	2,936,791	3,369,909	4,229,263

Balance Sheet (Kip Millions)

	Actual		Projected								
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NON-CURRENT ASSETS											
Gross fixed assets (excl. WIP & CIDC)	841,932	846,609	875,912	881,584	1,319,099	2,504,955	3,371,127	5,091,053	5,864,360	6,624,271	9,381,146
Add Revalued assets	-		5,856,875	5,856,875	5,856,875	5,856,875	5,856,875	5,856,875	5,856,875	5,856,875	5,856,875
Less Accumulated depreciation	111,525	144,019	298,288	453,690	631,903	852,599	1,123,038	1,454,833	1,831,396	2,249,245	2,770,594
Less Acc. Depreciation on revalued assets			2,061,474	2,061,474	2,061,474	2,061,474	2,061,474	2,061,474	2,061,474	2,061,474	2,061,474
Net Revalued Fixed Assets	730,407	702,589	4,373,025	4,223,295	4,482,597	5,447,757	6,043,490	7,431,621	7,828,365	8,170,427	10,405,953
Work in progress	66,211	286,831	686,421	1,458,721	2,247,038	2,248,265	2,362,736	1,963,645	3,243,066	4,490,461	2,757,302
Capitalized Interest During Construction	44,965	56,299	78,620	121,907	203,405	345,976	536,299	769,566	1,051,358	1,396,367	1,778,717
Work in progress + C.I.D.C.	111,176	343,129	765,041	1,580,628	2,450,444	2,594,242	2,899,035	2,733,211	4,294,424	5,886,828	4,536,018
Investments in Joint Ventures	102,942	102,942	56,121	56,121	56,121	56,121	56,121	56,121	56,121	56,121	56,121
Total Non-Current Assets	944,525	1,148,661	5,194,188	5,860,044	6,989,162	8,098,120	8,998,646	10,220,953	12,178,910	14,113,376	14,998,092
CURRENT ASSETS											
Inventories	74,363	11,805	33,048	29,666	24,483	29,249	20,737	23,461	27,641	29,701	31,130
Domestic Accounts Receivable	55,751	36,747	50,591	79,389	104,913	137,944	152,935	166,457	180,833	198,443	215,963
Export Accounts Receivable	52,953	25,003	28,339	19,204	13,125	6,224	14,903	21,790	37,128	36,801	32,592
Cash, Securities (banks & in-hand)	147,358	325,890	574,681	784,823	1,005,513	1,393,877	2,024,706	2,615,044	2,936,791	3,369,909	4,229,263
Total Current Assets	330,425	399,444	686,660	913,082	1,148,034	1,567,293	2,213,280	2,826,751	3,182,393	3,634,854	4,508,948
TOTAL ASSETS	1,274,949	1,548,105	5,880,848	6,773,125	8,137,195	9,665,413	11,211,926	13,047,705	15,361,303	17,748,231	19,507,040
EQUITY											
Share Capital	121,412	847,380	847,380	847,380	847,380	847,380	847,380	847,380	847,380	847,380	847,380
Revaluation Reserve			3,795,401	3,795,401	3,795,401	3,795,401	3,795,401	3,795,401	3,795,401	3,795,401	3,795,401
Grants & investments subsidies	26,104	37,369	37,369	83,111	132,056	186,754	249,017	315,638	315,638	315,638	315,638
Customer's contributions	21,085	29,850	50,455	64,983	85,655	110,727	137,879	167,282	199,123	233,604	270,945
Reserve amount carried forward	(1,472,572)	(1,430,876)	(1,318,454)	(1,222,676)	(1,023,241)	(812,791)	(557,615)	(317,670)	(29,893)	342,008	697,353
Other Reserves	(50,352)	148,961	109,253	135,029	265,867	453,641	665,824	803,340	850,803	841,321	790,195
Retained Earnings	41,696	112,422	95,778	199,436	210,450	255,176	239,945	287,777	371,901	355,346	293,324
Total Equity	(1,312,626)	(254,894)	3,617,182	3,902,663	4,313,568	4,836,287	5,377,830	5,899,147	6,350,352	6,730,698	7,010,236
LIABILITIES											
Total LT loans (principal)	794,620	243,539	586,904	1,141,169	2,008,713	2,864,006	3,589,187	4,579,513	6,131,905	7,733,546	8,722,572
+ Capitalized interests	44,965	56,299	78,620	121,907	203,405	345,976	536,299	769,566	1,051,358	1,396,367	1,778,717
Total LT loans (Principal + Cap. Interest)	839,585	299,838	665,524	1,263,076	2,212,118	3,209,982	4,125,485	5,349,079	7,183,263	9,129,913	10,501,289
Provision for potential forex loss on LT loans	1,640,947	1,531,901	1,561,022	1,593,876	1,629,365	1,676,164	1,756,716	1,849,036	1,909,774	1,952,660	1,986,182
Trade creditors & other debts	47,972	29,320	39,347	38,030	37,601	29,056	35,337	41,812	50,842	58,626	68,150
Import duties and sales taxes due	35,976	2,475	2,913	2,948	2,841	2,491	3,314	4,016	5,310	5,628	5,580
Profit tax Due	23,095	(60,535)	(5,140)	(27,467)	(58,297)	(88,567)	(86,757)	(95,385)	(138,239)	(129,294)	(64,396)
Total Liabilities	2,587,576	1,803,000	2,263,666	2,870,462	3,823,628	4,829,126	5,834,096	7,148,558	9,010,951	11,017,533	12,496,804
TOTAL LIABILITIES AND OWNER'S EQUITY	1,274,949	1,548,105	5,880,848	6,773,125	8,137,195	9,665,413	11,211,926	13,047,705	15,361,303	17,748,231	19,507,040
PERFORMANCE RATIOS / LOAN COVENANTS											
3-yr Average Self Financing Ratio (min of 30%)	-33%	-29%	58%	51%	46%	53%	59%	56%	51%	56%	98%
Debt/Equity Ratio (max of 1.5)	5.94	1.87	0.62	0.73	0.89	1.01	1.09	1.22	1.43	1.65	1.78
Debt Service Coverage Ratio (min of 1.5)	0.9	1.13	2.75	3.48	4.58	5.73	2.76	2.44	2.09	1.46	1.04

DETAILED COST ESTIMATES
(\$'000)

Item	Unit	Foreign Exchange	Local Currency	Total Cost
A. 115 kV Transmission Lines				
1. Louang Phrabang to Oudomxai	173.3 km	6,586.0	1,646.5	8,232.5
2. Oudomxai to Namo	35.7 km	1,104.9	276.2	1,381.1
3. Namo to Louang Namtha	43.1 km	1,335.6	333.9	1,669.5
4. Hin Heup to Vang Vieng	46.4 km	1,437.5	359.4	1,796.9
5. Nam Ngum to Thalat	0.5 km	155.1	38.8	193.8
Subtotal (A)	303.5 km	10,619.1	2,654.8	13,273.8
B. 115 kV Substations				
1. Louang Phrabang Extension	2x12.5 MVA	843.6	93.7	937.3
2. Udomxai	1x12.5 MVA	1,254.0	139.3	1,393.3
3. Louang Namtha	1x12.5 MVA	1,032.3	114.7	1,147.0
4. Vang Vieng Extension		144.9	16.1	161.1
5. Nam Ngum Switchyard		1,420.2	14.3	1,434.5
6. "T" Tap at Hin Heup		298.3	33.1	331.5
7. "Interface" at Phonsavan		120.5	13.4	133.9
8. "Interface" at Xaignaburi		120.5	13.4	133.9
Subtotal (B)		5,234.3	438.1	5,672.5
C. Medium Voltage (34.5 and/or 22 kV) Distribution System				
1. Xaignabouli Feeders	231.2 km	1,802.0	933.0	2,735.0
2. Xieng Khoung Feeders	167.4 km	1,302.6	672.3	1,975.0
3. Oudomxai Feeders	199.9 km	1,768.9	833.2	2,602.2
4. Louang Namtha Feeders	69.5 km	573.0	286.8	859.8
5. Xaisomboun Feeders	128.0 km	907.1	500.4	1,407.5
Subtotal (C)	796 km	6,353.7	3,225.7	9,579.3
D. Low Voltage (LV) (400 V) Distribution System and Household Connections				
1. Xaignabouli Feeders	138.0 km	467.4	397.8	865.2
2. Xieng Khoung Feeders	78.0 km	168.9	143.8	312.6
3. Oudomxai Feeders	248.0 km	507.0	431.6	938.6
4. Louang Namtha Feeders	100.0 km	249.6	212.5	462.1
5. Xaisomboun Feeders	44.0 km	57.9	49.3	107.2
Subtotal (D)	608 km	1,450.8	1,235.0	2,685.8

Item	Unit	Foreign Exchange	Local Currency	Total Cost
E. UXO Clearance				
1. for 115 kV Transmission Lines		1,107.4	474.6	1,582.0
2. for 34.5/22 kV Distribution Lines		581.8	249.3	831.2
3. for 380V Distribution Lines		152.9	65.5	218.4
Subtotal (E)		1,842.1	789.5	2,631.5
F. Other Costs				
1. Land acquisition		0.0	250.0	250.0
2. Benefit Monitoring Program		0.0	10.0	10.0
3. Consulting Services for Project Implementation		2,790.0	310.0	3,100.0
4. Other Consulting Services		360.0	40.0	400.0
Subtotal (F)		3,150.0	610.0	3,760.0
Base Costs (A-F)		28,650.0	8,953.0	37,603.0
Cost Summary				
Base Costs		28,650.0	8,953.0	37,603.0
Physical Contingencies ^a		2,628.6	839.3	3,467.9
Price Contingencies ^b		3,942.0	1,447.2	5,389.2
Taxes and Duties		0.0	979.2	979.2
IDC ^c		678.8	3,394.0	4,072.8
Total Cost		35,899.4	15,612.7	51,512.1
Percentage		69.7%	30.3%	100.0%

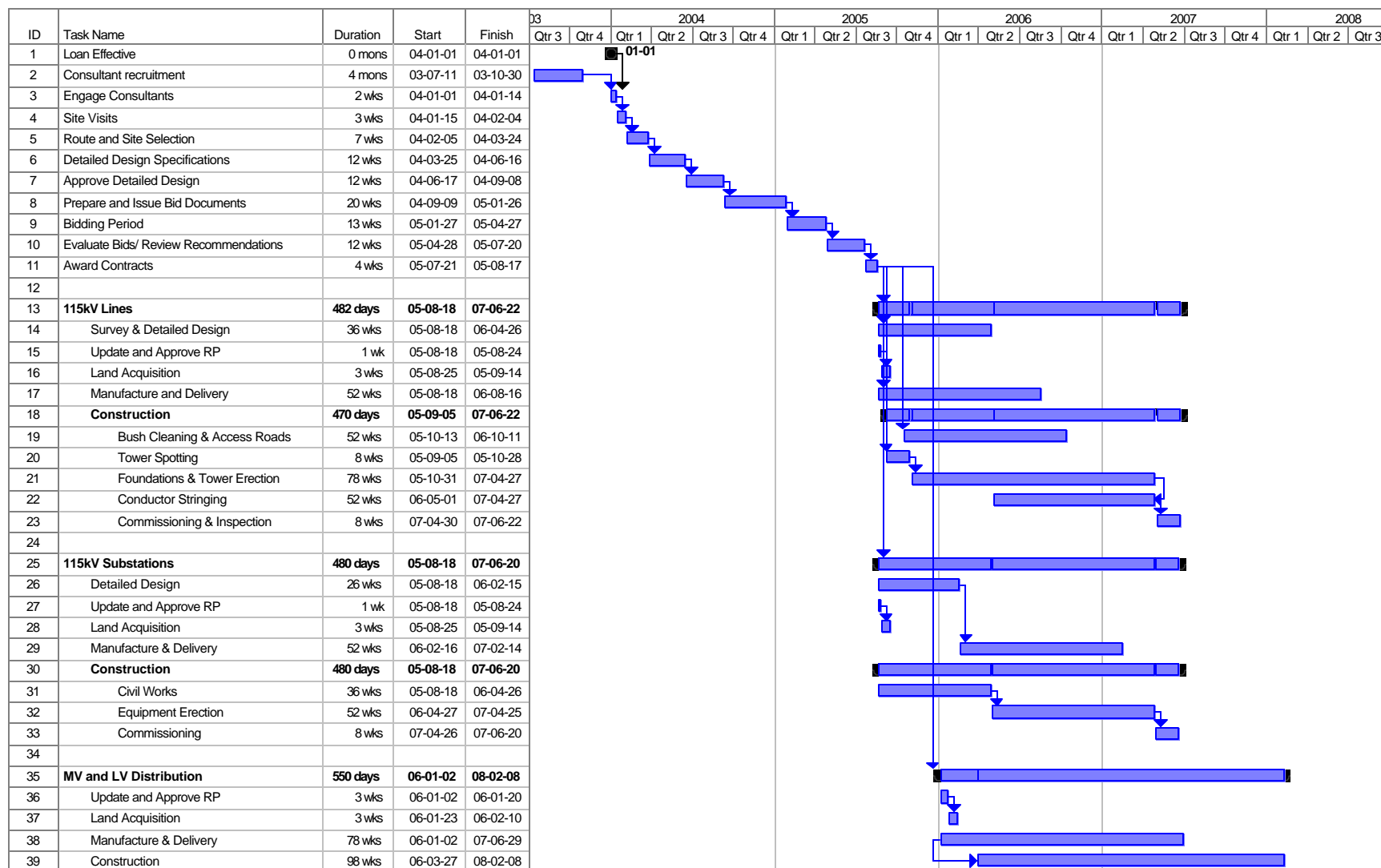
IDC = interest during construction, km = kilometer, kV = kilovolt, MVA = megavolt-ampere, UXO = unexploded ordnance, V = volt.

^a Computed at 10% of base cost.

^b Computed on the basis of foreign currency inflation at 2.4%.

^c The interest rate under Asian Development Fund loan is estimated at 1%.

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INDICATIVE PROCUREMENT PACKAGES

PACKAGE	Type of Contract	Number of Contract	Mode of Procurement	Financing Source	Cost Estimate (\$million)		
					Foreign Cost	Local Cost	Total Cost
1. 115 kV Transmission Lines Including Shield-wire Installation^a					11.7	3.2	14.9
1.1 Lot A – Louang Phrabang – Oudomxai	Turnkey	1	ICB	ADB/EdL	6.6	1.6	8.2
1.2 Lot B – Oudomxai – Namo – Louang Namtha	Turnkey	1	ICB	ADB/EdL	2.4	0.7	3.1
1.3 Lot C – Hin Heup – Vang Vieng, Nam Ngum – Thalot	Turnkey	1	ICB	ADB/EdL	1.6	0.4	2.0
1.4 UXO Clearance	Turnkey	1	ICB	ADB/EdL	1.1	0.4	1.5
2. 115 kV Substations and Substation Extensions^a	Turnkey	1	NCB	NDF	5.2	0.4	5.6
3. Supply of MV and LV Distribution Material and Equipment					7.9	2.9	10.8
3.1 Procurement of MV and LV conductors	Goods Supply	1	ICB	ADB/EdL	3.0	0.0	3.0
3.2 Procurement of Line Materials	Goods Supply	1	ICB	ADB/EdL	2.4	0.1	2.5
3.3 Procurement of Distribution Transformers	Goods Supply	1	ICB	ADB/EdL	1.2	0.0	1.2
3.4 Procurement of Poles and Cross-arms	Goods Supply	1	ICB	ADB/EdL	0.3	2.8	3.1
3.5 Procurement of Meters	Goods Supply	1	IS	ADB/EdL	0.3	0.0	0.3
3.5 Procurement of Construction Equipment and Tools	Goods Supply	1	ICB	ADB/EdL	0.7	0.0	0.7
4. MV and LV Distribution					0.7	1.8	2.5
4.1 Installation	Construction	1	LCB	EdL	0	1.5	1.5
4.1 UXO Clearance	Turnkey	1	ICB	ADB/EdL	0.7	0.3	1.0
5. Consulting Services for Project Implementation	Consultancy	1	NCB	NDF	2.8	0.3	3.1
6. Other consulting services	Consultancy	1	ICB	ADB/EdL	0.4	0.0	0.4

UXO – unexploded ordnance, ADB - Asian Development Bank, EdL - Electricité du Lao, ICB - international competitive bidding, IS - international shopping, LCB - Local competitive bidding, LV - low voltage, MV - medium voltage, NCB - Nordic Competitive Bidding, NDF - Nordic Development Fund.

^aContract for this package include UXO clearance.

TERMS OF REFERENCE FOR PROJECT IMPLEMENTATION CONSULTANTS

A. Introduction

1. Electricité du Laos (EdL) intends to provide electricity to Sayaburi, Xieng Khouang, Oudomxai, Louang Namtha, and Xaisomboun in northern Lao People's Democratic Republic (Lao PDR). The Project consists of (i) construction of about 303 kilometers (km) of 115-kilovolt (kV) transmission lines, including shield-wire distribution at 34.5 kV; (ii) three 115.0, 34.5, and 22.0 kV substations, and other extension work; (iii) construction of about 796 km of medium-voltage (34.5 and 22.0 kV) distribution lines and distribution substations; (iv) construction of approximately 608 km of low-voltage [380-volt (V)] distribution lines and transformers, and connection of about 33,800 households; and (v) miscellaneous work, including unexploded ordnance (UXO) clearance, benefit monitoring program, and resettlement and compensation program.

2. A team of international consultants will be recruited to help EdL implement the Project and improve the agency's project management capacity. Consultants will focus on supervising and guiding project implementation and training EdL staff, while EdL's project management unit will be responsible for project implementation. The team will include transmission and distribution specialists, social and environmental management and monitoring specialists, and a UXO quality assurance specialist. The consultants will perform the above tasks in the Lao PDR to improve the design and project supervision skills of EdL staff and, where possible, will use local expertise.

3. Consultant services will also include the following to strengthen EdL's capacity to undertake rural electrification:

(i) **Capacity building for socioeconomic assessment.** EdL is planning to establish a socioeconomic cell within the Environment and Social Management Office to improve coordination of electrification data collection, build a consumer database, and build in-house capacity for benefit monitoring. To use benefit monitoring data efficiently and build capacity to evaluate subprojects, the Nordic Development Fund (NDF) and Asian Development Bank (ADB) agreed to support capacity building for economic, social, and poverty impact assessments of subprojects. The capacity-building component will include training of three EdL staff in economic modeling for subproject evaluation. EdL will appoint three staff to the socioeconomic cell, to be trained under the program. A number of field staff will be trained to collect subproject data to feed into the model. The consultants will set up the computerized model, and establish a system for systematic data gathering, including standardized questionnaires for socioeconomic surveys and train staff. The system will ensure that benefit monitoring directly feeds into subproject design and evaluation. The Appraisal Mission estimates that approximately 3 person-months will be required to set up the model, establish systematic data gathering, and train staff. Three more person-months will be required to design and implement the benefit monitoring program. EdL agreed to use NDF credit for consulting services to build capacity for socioeconomic assessment and for the benefit monitoring program.

(ii) **Consumer awareness campaign.** The consultants will help EdL design and implement an information and awareness campaign on safe use of electricity. The awareness campaign will also inform consumers of connection cost policy, tariffs, billing statements and timing of bills and due payment, and disconnection policy. The campaign will be undertaken at least 2 months before connection and take into account language barriers.

B. Scope of Work

1. Engineering Services

4. The consultant will be responsible for detailed engineering; preparation of bid documents; assistance in bid evaluation and contract awarding; and supervision of installation work, final testing, and commissioning. Specifically, the consultant will do the following:

- (i) Collect all engineering data required to design project facilities.
- (ii) Help EdL undertake, through local contractors, engineering surveys and soil investigations, if necessary.
- (iii) Prepare detailed designs for transmission lines, grid substations, medium- and low-voltage distribution lines, and distribution substations, taking into account the design practices used by EdL and international standards.
- (iv) Undertake computerized detailed distribution planning to minimize losses, consistent with costs, acceptable supply quality, and reliability.
- (v) Consolidate the above tasks into a design report giving project details, costs, implementation schedule, and recommendations to mitigate any adverse environmental and sociological impacts, for approval by EdL and ADB.
- (vi) Prepare bid documents for all equipment and services required to implement the Project and suitable for international competitive bidding, international shopping, and local competitive bidding procedures as necessary and acceptable to ADB, NDF, and EdL. ADB-financed procurement of goods and services will be carried out in accordance with ADB's *Guidelines for Procurement*. NDF-financed procurement of goods and services for the substation package will be done in accordance with the *Guidelines of the Nordic Competitive Bidding*.
- (vii) Help EdL invite and evaluate bids and award contracts.
- (viii) Approve the contractors' design drawings and witness tests on equipment if necessary.
- (ix) Supervise the construction of project facilities and help contractors conform to the specifications.
- (x) Help EdL institute cost control, project accounts, and quality assurance mechanisms, and check and approve the contractors' bills.
- (xi) Witness commissioning, guarantee, and acceptance tests, and help EdL take over the completed facilities.
- (xii) Review and compile "as-built" drawings and review the operation and maintenance contractors' manuals for accuracy and adequacy.

- (xiii) Compile a project completion report providing details of project implementation, problems encountered, and solutions adopted, and detailing and explaining any variation in projects costs and implementation times from the original estimates.

2. Unexploded Ordnance Clearing

- 5. The UXO quality assurance specialist will do the following:

- (i) Ensure that the team leader and members are kept informed of all matters related to UXO clearance.
- (ii) Review and approve the methodology to be used by the UXO clearance contractor and/or government agency.
- (iii) Through active field monitoring, ensure that the UXO clearance contractor complies with specifications, and that the correct methodology is followed and procedures are quality assured to detect and dispose of any ordnance found.
- (iv) Supervise the day-to-day duties (including drafting of job descriptions) of the UXO inspectors, if any, who may help the UXO specialist.
- (v) Maintain proper and adequate records of all areas surveyed and all UXO detected and cleared.

3. Technical Support for Distribution Management and Loss Reduction

- 6. Distribution management and loss reduction include the following tasks:

- (i) Help EdL management rationalize distribution in line with best international practices.
- (ii) Propose an implementation plan to EdL within 6 months from the start of the assignment to check and calibrate all system metering and update inaccurate meters, and help EdL implement this plan as well as other recommendations from relevant studies.
- (iii) Train EdL staff to disseminate distribution standards to all main field offices.

4. Social and Environmental Management

- 7. Social and environmental management includes the following tasks:

- (i) Revise the project environmental and social impact assessment as needed, and optimize locations of substations and routing of lines to minimize any impact.
- (ii) Help EdL's Environmental and Social Management Office update the agreed-on resettlement plan for each component after detailed design is completed for each component, and implement and monitor the approved updated resettlement plans.
- (iii) Provide formal and on-the-job training in resettlement, social preparation, social impact assessment, resettlement, and other social impact monitoring, gender,

and social development related to power transmission and distribution projects to ensure that expertise is transferred to EdL's Environment and Social Management Office, provincial and district staff, and other members of the project team and independent external monitoring agency, and to reinforce the existing knowledge of the staff and resettlement committees.

- (iv) Monitor compliance with the updated resettlement plan and ensure that all information dissemination, consultation, disclosure, compensation, and resettlement activities have been satisfactorily completed in accordance with the agreed-on resettlement plan and Loan Agreement and that income restoration measures are in place before civil works start.
- (v) Before award of civil works contracts, verify and confirm that all people affected have been satisfactorily compensated and resettled, and rehabilitation measures are in place, in accordance with the requirements of the approved updated resettlement plan, government procedures concerned, and ADB's policy on involuntary resettlement, and that the contract area is free of all encumbrances.

5. Capacity Building for Socioeconomic Assessment

8. The economist (3 person-months) will work closely with counterpart staff and complete the following tasks:

- (i) Set up a standardized spreadsheet model to evaluate economic feasibility and social and poverty impacts of subprojects.
- (ii) Design standardized survey questionnaires and data imputation sheets and subproject evaluation.
- (iii) Establish and test criteria for subproject definition.
- (iv) Train staff in economic analysis, subproject evaluation, data gathering, imputation, and running and updating the spreadsheet model.
- (v) Train field staff to use survey questionnaires and collect data.
- (vi) Help build capacity of the EdL socioeconomic cell.

6. Project Performance Monitoring and Evaluation

9. The economist (2 person-months) will work closely with counterpart staff and complete the following tasks:

- (i) Design a benefit monitoring and evaluation (BME) system to assess the social, poverty and economic impacts of electrification. The BME will feed directly into the evaluation of future electrification subprojects.
- (ii) Develop indicators to assess social, poverty, and economic benefits of electrification. Develop impact indicators to assess affordability of tariffs and cost of connection and inside wiring, and willingness to pay. Design corresponding standardized survey questionnaires.
- (iii) Train staff in field survey techniques and data imputation.

- (iv) Implement the baseline survey and conduct a distributional analysis of expected impacts of electrification. Assess potential impacts of tariff changes and the ability of poor to pay for upfront charges and costs associated with connection.
- (v) Submit a report on the BME to ADB and NDF for review and approval.

7. Consumer Awareness Campaign

10. The communications specialist (1 person-month) will closely collaborate with EdL counterpart staff to conduct the following tasks:

- (i) Assess the most efficient and appropriate means to disseminate information to consumers, many of whom are illiterate and with widely diverse cultures and languages.
- (ii) Help EdL design and implement a campaign to disseminate consumer information on safe use of electricity, connection costs, inside wiring, tariffs, billing, and payment.

C. Reporting Requirements

11. Besides the design report, the consultants will provide a brief inception report within four weeks from the start of the assignment, a quarterly progress report (including BME activities and a report on completion of land acquisition and resettlement activities before the order can be given for commencement of civil works) within 15 days from the end of each quarter, and a project completion report at the end of the assignment. Three copies of these reports will be provided to EdL, three to ADB (two to Manila and one to the Lao Resident Mission), and two to NDF.

D. Expertise Required and Person-Month Estimates

12. About 100 person-months of international consulting are needed for consulting services for planning, design, and construction of high-voltage transmission lines, shield-wire distribution; high-voltage substations; low-and-medium voltage lines and substations; loss reduction; and environmental and sociological aspects of infrastructure development.

13. An international quality assurance expert (4 person-months) with experience in UXO detection and clearing will also be required.

14. The economist will have experience in project evaluation of power projects and have a background in economic, social, and poverty impact assessment and evaluation of rural electrification projects with a focus on end-consumers. The consultants will have experience in training and capacity building in economic modeling. Experience from the region, preferably from the Lao PDR, is required. The economist (5 person-months) will conduct tasks related to capacity building for socioeconomic assessment and benefit monitoring.

15. The communications specialist will have experience in developing and implementing effective communication, media, and information dissemination programs in developing countries, preferably in the region and Lao PDR. The consultant will be familiar with issues related to rural electrification, end-consumer preferences, barriers of low-income groups, and cultural diversity, and have strong communication skills.

16. The resettlement and social development specialist will have experience in designing and implementing resettlement projects in the region to ADB or World Bank standards, and in designing and delivering formal and on-the-job training in resettlement and social development.
17. A total of 110 person-months of international consulting, to be associated with about 20 person-months of local expertise, will be spread over four years.

E. Executing Agency

18. EdL, the executing agency, will provide office space at its headquarters, secretarial services, fax and telephone facilities, transport to project sites, and interpreters as required.

TERMS OF REFERENCE FOR CONSULTING SERVICES FOR INDEPENDENT POWER PRODUCER DEVELOPMENT AND INSTITUTIONAL RESTRUCTURING

A. Background

1. In March 2001, the Ministry of Industry and Handicrafts (MIH) published the Power Sector Policy Statement, which defines the priorities and objectives of the Government. The statement emphasizes the need to strengthen and clarify the framework for independent power producer (IPP) development to facilitate and promote transparent private participation in the power sector.

2. The statement does not specify sector-strengthening strategies. These were explored at a workshop held in November 2002 and, based on these discussions, MIH and the Lao National Committee on Energy (LNCE) developed the Power Sector Policy Implementation Plan. The plan defines the actions and time frame to strengthen of the power sector, including those to improve promotion, selection, and development of IPPs.

3. The statement emphasizes the need to reform institutional structures to clarify responsibilities, strengthen commercial functions, and streamline administration. The Government has recognized the need to restructure how it participates as an equity investor in IPP projects so that the benefits to the people are maximized and that Electricité du Laos (EdL) can focus on its core operations of domestic power supply and distribution.

4. To support IPP development and institutional restructuring, MIH and LNCE will conduct a detailed study on IPP project selection and implementation, and stakeholder consultation. The consulting services are to develop a systematic framework for IPP selection and project development that will do the following:

- (i) Include transparent IPP project selection criteria and clear project implementation procedures.
- (ii) Maximize revenue and nonrevenue benefits from IPP development.
- (iii) Identify and structure a publicly owned vehicle to own and manage the Government's existing and future IPP investments to bring financial expertise and discipline to bear on IPP investment decisions and allow EdL to focus on its utility responsibilities.

B. Scope of Work

5. The scope of work involves the development of a systematic IPP framework to develop private generation. In particular, the consultant will do the following:

1. Rationalize Independent Power Producer Mandates

6. Tasks include the following:

- (i) Review existing memorandums of understandings (MOUs) and concessions, outline which are inactive, and determine which of the inactive mandates are still legally binding.

- (ii) Develop criteria to determine which of the legally active mandates continue to serve the national interest, taking into account project economics and finance ability, power market, environmental and social impacts, and characteristics of the developer. Advise the Government on options regarding those mandates that are no longer in the national interest.
- (iii) Assess inactive MOUs and concessions, and determine which can be terminated with little or no negotiation or compensation. Outline the procedures to terminate and provide draft documentation to formally terminate inactive mandates.

2. Develop Independent Power Producer Project Selection Criteria

7. Tasks include the following:

- (i) Review recent power generation planning studies and project feasibility studies, including the following:
 - (a) Power System Development Plan, (ongoing, World Bank);
 - (b) Power Development Plan 2001-2010, (November 2001, EdL);
 - (c) Power Sector Strategy Study (March 2002, ADB); and
 - (d) Hydropower Development Strategy Study (September 2000, World Bank).
- (ii) Group potential IPP generation projects into generic categories according to their financing and risk characteristics. Prepare risk matrixes and propose implementation modalities and indicative financing plans tailored for each project category. A project may be included in more than one category, depending on the proposed development of a site (e.g. domestic or export, storage vs. run-of-river, availability of multilateral support, etc.).
- (iii) Propose objective criteria to decide which projects or categories of projects are best suited for private sector participation. The criteria will be designed to evaluate those projects with the greatest likelihood to reach financial close and to benefit the Lao PDR. Accordingly, they will be selected based on the following, among other criteria:
 - (a) expected revenue benefits to the Government, with emphasis on taxes, royalties, and/or dividends for export projects and low off-take price for domestic projects;
 - (b) expected nonrevenue benefits (e.g. fulfillment of power market requirements, regional development, stability of domestic power system, and local infrastructure);
 - (c) avoidance of adverse social and environmental impacts;
 - (d) avoidance of opportunity costs (e.g. impacts on other projects and land uses); and
 - (e) ability to reach financial close (e.g. likelihood of financial support from reputable developers, commercial banks, multilateral agencies, and other lenders).

3. Develop Independent Power Producer Project Implementation Procedures

8. Tasks include the following:

- (i) Outline transparent and competitive developer selection and project procurement models. They should be suitable for awarding IPP concessions, taking into account the characteristics of different project categories defined under 7 (ii) above.
- (ii) Any proposals for use of selection models that do not include some form of competitive bidding (negotiated or unsolicited) should be identified, and the circumstances where they could be permitted outlined.
- (iii) Prepare a draft manual on IPP project procurement procedures, specifying procedures for evaluating and awarding IPP concessions for the different project categories. Where appropriate, the procedures will include flow charts, diagrams, and other formats for clear presentation. For each procurement model, the draft manual will stipulate systematic IPP procedures to promote projects, prequalify developers, evaluate and select project developers, and award IPP licenses. The manual will set out the requirements for each stage of the procurement process:
 - (a) screening and selection of projects,
 - (b) selection of appropriate procurement models,
 - (c) prequalification of prospective developers,
 - (d) preparation of procurement documentation,
 - (e) request for proposals and draft agreements,
 - (f) evaluation and ranking of proposals, and
 - (g) negotiation of final project agreements and awarding of concessions
- (iv) Propose objective prequalification criteria to assess project developers. The criteria should ensure that developers have international experience in developing, financing, constructing, and operating hydropower projects. Special attention should be given to the developer's experience in complying with social development, environmental, and resettlement policies associated with hydropower development.
- (v) Specify clear project implementation sequences and steps, defining the following:
 - (a) actions and outcomes;
 - (b) prerequisite approvals and consent;
 - (c) responsible agencies; and
 - (d) timelines.
- (vi) Review progress made by United Nations Industrial Development Organization (UNIDO) consultants on project-specific agreements and any model concession agreements and power purchase agreements (PPAs). Drawing on these agreements where appropriate, prepare model agreements suitable for different project categories:
 - (a) standardized MOU;
 - (b) request for proposals (e.g. invitation to bid, instructions to bidders, etc.) for use in competitive solicitations; and
 - (d) PPA specifically for EdL off-take.

4. Identify an Agency to Own and Manage the Government's Existing and Future Independent Power Producer Equity Investments

9. Tasks include the following:

- (i) Analyze the benefits and risks inherent in the Government's policy of investing in IPP projects. Outline decision criteria to help the Government in its equity investment decisions.
- (ii) Identify an appropriate entity (existing or new) to own and manage the Government's existing and future IPP equity investments and leave EdL to focus on its utility responsibilities. Consultants should review any previous reports on segregation of IPP benefits from EdL.
- (iii) If establishing a new company is recommended, determine which government agency should hold the majority of shares. Determine whether any other institutions should hold a minority interest to increase the company's credibility and ability to raise financing.
- (iv) Outline steps required (institutional, legal, financial, etc.) to establish a new entity with such a mandate and to transfer existing IPP shares from EdL. Review what changes, if any, may be necessary to the Electricity Law to establish this entity.
- (v) Propose the organizational structure and composition of the entity and describe how it can bring financial expertise and discipline to bear on the investment decisions it makes. Prepare an initial business/operating plan, capital structure, and, from existing IPP financial flows to EdL, assess initial financial forecasts to determine self-sufficiency.

C. Implementation Arrangements

10. EdL will be the executing agency for consulting services. It will provide administrative services, office facilities, phone and fax facilities, documents, and information as required to efficiently execute the services. Consultants will be required to coordinate all work with the committee for planning and cooperation, MIH, and LNCE. EdL will facilitate interaction with other government agencies to ensure efficient consulting services.

11. UNIDO is helping LNCE develop IPPs and structure contracts. While a portion of UNIDO's scope has been focused on specific IPP projects, substantial progress has been made in drafting model agreements and documents. Consultants must interface closely with UNIDO and LNCE to ensure that efforts are not duplicated. UNIDO has expressed its willingness to coordinate with ADB-financed consultants once they are engaged.

D. Reporting Requirements

12. The consultants will provide the reports specified below, and all reports must be prepared in 20 hardcopies and three CD-ROMs.¹ The following reports should be distributed as directed by EdL to MIH, Committee for Planning and Cooperation, LNCE, and ADB:

¹ Compact discs-read only memory.

- (i) inception report, within 4 weeks from the start of the assignment;
- (ii) interim report, within 2 months after approval of the inception report;
- (iii) draft final report, within 2 months after the approval of the interim report; and
- (iv) final report, within 1 month after the approval of the draft final report.

13. Along with the draft final report and final report, the consultants will prepare and submit to EdL supporting documents concerned, including (i) model procurement documents; and (ii) a draft IPP project procurement procedure manual, based on the study results.

14. Before submission of the inception report, the consultant will conduct a workshop including all stakeholders. A second workshop must be organized shortly after completion of the draft final report.

E. Expertise Required and Person-Month Estimates

15. The consultants will include specialists in (i) IPP hydropower development, (ii) infrastructure investment promotion and project financing, (iii) legal and regulatory issues in IPP development, and (iv) institutional framework for private participation.

16. An estimated total input of 13 person-months of international consulting services will be recruited by MIH, in accordance with the ADB's *Guidelines on the Use of Consultants by Asian Development Bank and Its Borrowers*, and the quality- and cost-based selection method as set out in ADB's *Handbook for Users of Consulting Services* (September 2002) will be used to select consultants.

ECONOMIC ANALYSIS

A. Load Forecast

1. Load forecasts were estimated for four major consumption categories: domestic, commercial, agriculture/irrigation, and industrial. The domestic category was further divided by income level and whether households are using off-grid services or not. To accommodate other consumer categories, a residual amount of demand was allocated for other domestic and industrial consumers.

2. For the domestic category, 1,900 villages in 21 districts in the project area, identified from existing data, were screened to prepare a list of villages within several kilometers of the main roads as principal candidates for electrification and to obtain population and household data for load forecasting. Subsequent field visits indicated that many communities were too remote to be economically connected to the grid in the short to medium term. Thus, the number of villages under consideration for electrification was reduced to about 700. These villages were assigned to one of four classifications based on income level and typical pattern of energy consumption. Data on population, population growth, and migration patterns were also considered.

3. Some 800 households in the study area were surveyed to obtain indicative measures of economic activity, social and housing conditions, ownership of households assets, and energy use. Livelihood and production systems of households were also assessed as well as the energy sources that are used for those activities. The analysis of energy use of households included information on sources, use and cost of different fuels for different household and agricultural activities, supply of electricity and other energy sources, and attitudes toward electricity. Selected villages that had been electrified in the last 3–4 years were also surveyed to prepare demand forecasts for individual villages.

4. Based on the socioeconomic survey carried out under the project preparatory technical assistance (PPTA),¹ a list of typical household appliances and their daily use in hours was established to arrive at a daily load pattern for domestic consumers. Assumptions were made about the percentage of ownership of these appliances for the three different income levels for year 0, the year of project commissioning, and for year 15 after commissioning to reflect induced consumption patterns as a result of economic growth. The load pattern was further analyzed by applying these consumption patterns by income level to four village classifications. Each classification was assumed to have a fixed mix of the three income classifications. Established consumers using off-grid services are assumed to have a higher annual consumption than first-time consumer households since the former will have already purchased more diverse appliances than the latter. A fourth domestic category was introduced to reflect consumption by the poor. Their share was calculated based on the census data of households below the national poverty line for each district.

5. To calculate the replacement portion of energy to be displaced by the Project, households consuming power from off-grid systems available for restricted hours a day were surveyed and the billing information reviewed to calculate monthly consumption rates. Consumption rates range from 4.0 kilowatt-hour (kWh)/month to 33.5 kWh/month for a system that operates only 4 hours daily. A monthly electricity consumption of 4 kWh is equivalent to operating two small kerosene or diesel lamps, the main alternate energy source for lighting, for

¹ ADB. 1997. *Technical Assistance to Lao PDR for the Northern Area Rural Power Distribution Project*. Manila.

three hours daily. The survey found that residential consumers prefer to have at least one light in each room plus one outside light. Assuming that poor households live in single-room houses, a replacement consumption of 44 kWh/year for poor households appears realistic.

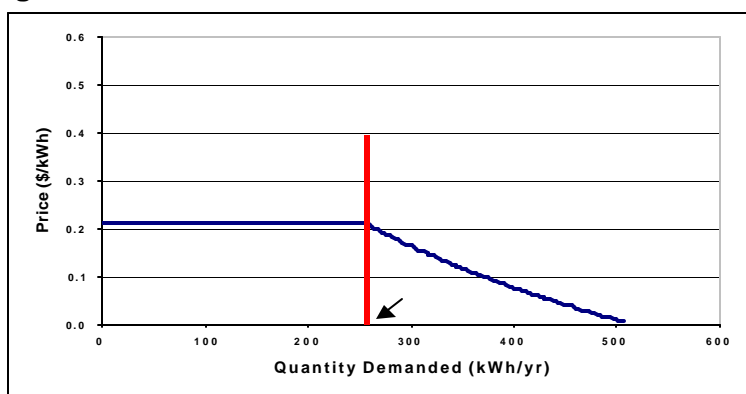
6. For nonpoor first-time domestic customers, the replacement portion is considerably higher although electricity is initially only used for lighting. However, nonpoor domestic customers live in larger houses and use more lights longer. Using two 20-watt (W) fluorescent lights, one 40 W fluorescent bulb, and one 60 W incandescent light for a few hours each day results in annual consumption of 254 kWh per year. Besides better and more lighting, the nonpoor established domestic customers have small appliances such as fans, radios, sewing machines, and color televisions, resulting in a replacement portion of about 560 kWh/year.

7. Induced consumption for poor households is assumed to be for lighting only since other appliances might be too expensive. Acquisition of more lighting sources and longer daily use will result in an annual consumption after 15 years equivalent to the replacement portion of nonpoor first-time households. They are assumed to acquire the same type of small appliances as the nonpoor established households had during year 1 and, thus, their annual consumption after 15 years is estimated to be about the same. Nonpoor established households will make more intensive use of their existing appliances and lighting sources once connected to the grid. However, such households will also acquire more appliances, of which refrigerators and fans are the most popular, resulting in an annual consumption of about 1,400 kWh. Graphs showing the demand curves for the three domestic categories are in Figures A11.1–A11.3.

8. Given the limitations of Electricité du Laos (EdL) to connect all households immediately, 50% of all rural and 60% of urban households are assumed to be electrified in the first year of project commissioning, then rise gradually to 80% for rural and 90% for urban households over 10 years.

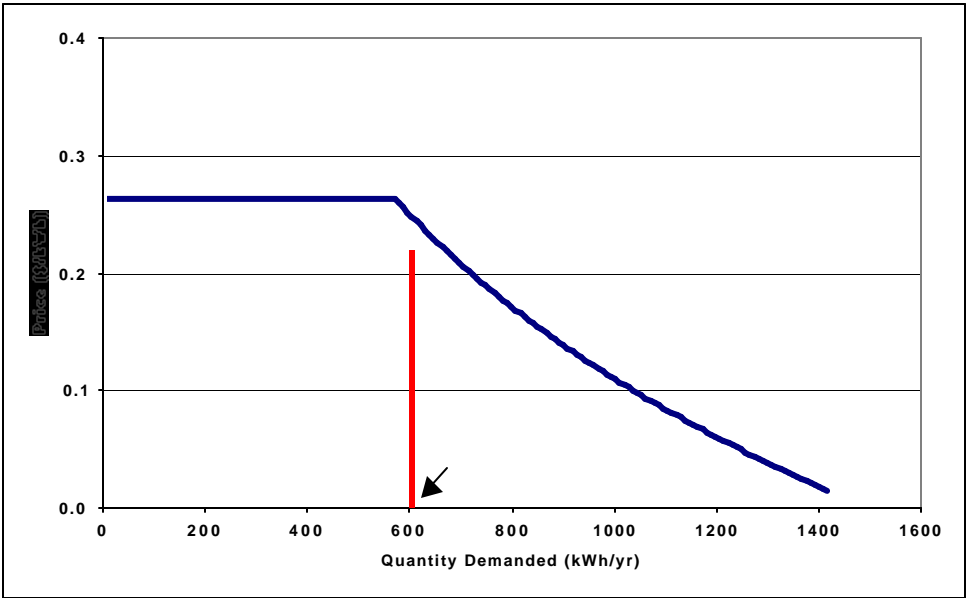
9. A similar analysis was carried out for nondomestic consumption. The energy situation for commercial and industrial activities in each project area was analyzed. If grid or off-grid supply was available, the data on number of customers and operating hours per day were collected. Provincial authorities were interviewed about ongoing and planned investment and expected power demand. For each of the four village classifications a number of commercial and industrial uses are assumed based on the field survey findings. For example, the largest village would have government offices, a hospital, and senior-level schools, as well as an allowance for larger industrial supply such as a sawmill or garment factory. The remote village would have instead a junior school and community water pumps and only less industrial consumption.

Figure A11.1: Demand Curve—Non-Poor New Customer



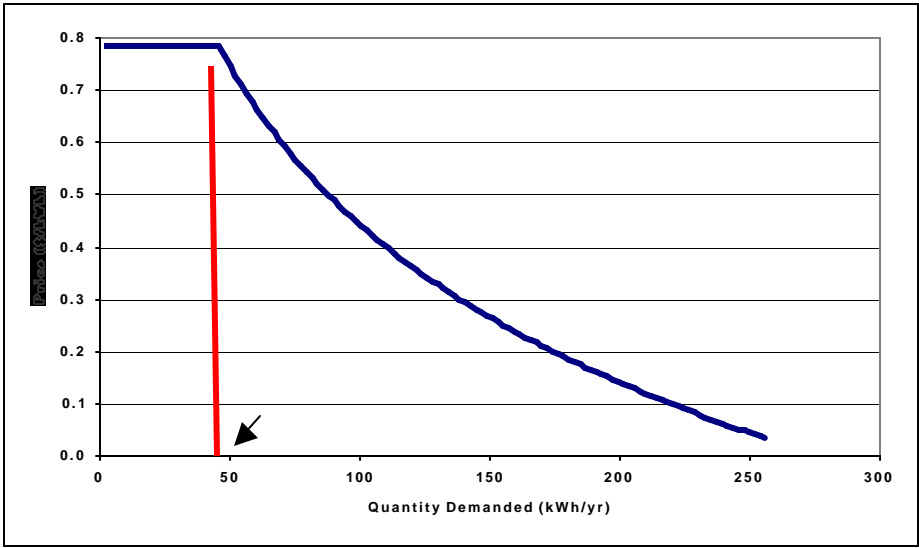
kWh/yr = kilowatt-hour per year.

Figure A11.2: Demand Curve—Non-Poor Existing Customer



kWh/yr = kilowatt-hour per year.

Figure A11.3: Demand Curve—Poor New Customer



kWh/yr = kilowatt-hour per year.

10. Electricity consumption for irrigation pumping and rice milling is included in the agriculture/irrigation category. In the absence of specific plans to make irrigation pumping more available, and considering that not all households will have access to individual pumps, the forecast includes a fixed allowance per household for all village classifications. This estimate was based on assumptions about water requirements for irrigating rice and average lift, and that about 20% of households would opt for electric pumping. Electricity consumption for rice milling has been estimated based on daily rice consumption and the operating specifications of a medium-sized rice mill.

B. Long-Run Marginal Cost and Economic Subsidies

11. The Power Supply Tariff Study² calculated the economic long-run marginal cost (LRMC) based on the capital expenditure plan as agreed on by EdL and the Ministry of Industry and Handicrafts, which foresees a total investment of \$730 million in 2001-2010. This ambitious plan reflects the Government's objective of increasing electricity coverage to 90% of households by 2020. LRMC reflects the incremental costs of all adjustments in the system development plan and system operations that are attributable to an increase in demand sustained long into the future. As grid outreach is limited, LRMC will be expected to increase in the medium to long term until a balance between power demand and supply is achieved. In other words, LRMC reflects the cost to the economy of connecting and supplying future customers, which provides an indication for tariff-setting principles. If tariffs are kept below the average LRMC, the economy as a whole subsidizes power consumption of those connected to the electricity grid at the expense of those that are not.

12. Effective 1 March 2002, the Government increased tariffs and rationalized the tariff structure for domestic consumers by reducing tariff blocks to three and drastically increasing the tariff for the highest block. About 15% of sales occur in the lifeline block set at 50 kilowatt-hour (kWh)/month, thus protecting the poor consumers. In the same tariff order, the Government announced that tariffs for all categories will increase by 2.3% per month over 36 months. The following table compares projected average tariff levels with LRMC per customer category for 2001–2004.

**Table A11.1: Long-Run Marginal Cost and Projected Average Tariffs
for the Years 2001-2004**

Customer Category	2001		2002		2003		2004	
	Tariff (KN/kWh)	LRMC	Tariff (KN/kWh)	LRMC	Tariff (KN/kWh)	LRMC	Tariff (KN/kWh)	LRMC
Residential	174	861	241	861	296	947	389	1,013
Commercial	386	727	488	727	638	800	838	856
Govt. Offices	335	603	422	603	546	664	716	710
Irrigation	132	569	176	569	228	626	299	670
Industry	335	570	400	570	491	626	645	671
MV Services	319	488	374	488	491	537	645	575
Average	221	741	283	741	355	815	467	872

Govt. = government, KN = kip, kWh = kilowatt-hour, LRMC = long-run marginal cost, MV = medium voltage.

13. Table A11.1 shows that no customer category pays the full cost of supply and, consequently, the system has no cross-subsidies. In 2004 tariffs for government offices and

² EdL. February 2002. Power Supply Tariff Study—Final Report.

medium-voltage services customer will be slightly higher than their respective cost of supply. Given the limited sales to those categories, the revenues will not be sufficient to cover the subsidies extended to other consumers, although the average revenue increases from 29% of LRMC to 53%. Almost all domestic consumption is subsidized by EdL's export earnings, reducing earnings. For FY2001 the economic subsidy—the difference between LRMC and financial revenue—amounts to KN350 billion.

14. All customer categories are subsidized, but the greatest subsidies are given to residential and irrigation customers who jointly account for about 72% of total sales. Given the high total domestic consumption at about 68% and the absence of time-of-day pricing or energy efficiency programs, the daily load curve peaks only once, for three hours, in the evening. As the industrial load rises continuously, this pattern of use is expected to change, but not in the short run. Since the system is entirely hydro based, the difference between the peak and off-peak marginal energy cost at bus bar is small, with KN286/kWh versus KN248/kWh. When including system losses, the difference between peak (KN404/kWh) and off-peak (KN313/kWh) marginal energy cost at low-voltage level increases visibly, with an annual average of KN324/kWh. Current tariffs for residential and irrigation customers do even cover the off-peak energy cost. Since class-specific load research has not been carried out in EdL, other countries' experiences were used as a reasonable basis to estimate class coincidence and class load factors to estimate marginal capacity cost and strict LRMC for each tariff class.

15. While government subsidy of electricity consumption can be justified economically, the subsidy budget should be calculated transparently. Current subsidies should also be assessed to see if they are sufficiently targeted and whether the intended beneficiaries are indeed reached or whether most subsidies go to customers able to pay. Moreover, the current subsidy structure limits the ability of EdL reach the Government's 90% electrification target.

C. Economic Analysis

16. An economic evaluation was carried out for the entire Project, consisting of transmission and distribution investments. The results are summarized below. Details of the economic internal rate of return (EIRR) calculations are in Table A11.2.

17. The vast majority of households in the Lao PDR have no access to grid electricity. However, province-sponsored systems and privately operated generators based on diesel or small hydro systems and imports from Thailand provide limited amounts of electricity. Thus, even in the absence of grid supply, a certain amount of electricity is consumed by the residential, industrial, and commercial sectors, albeit at substantially higher prices than paid by EdL customers.

18. The economic benefits of extending grid supply to unserved areas are estimated based on the cost of alternative energy sources used for existing consumption levels, and based on the willingness to pay for induced consumption as a consequence of the availability of reliable grid supply. Benefits were estimated separately for poor and nonpoor residential consumers, and for industrial, commercial, and irrigation customers. To underline the differential cost structure of grid and off-grid supply, it is worth noting that in Louang Nam Thai, where a diesel generator produces electricity for about 4 hours/day, customers are asked to pay a tariff of 1,200 KN/kWh, while in Xaiboury customers are required to pay KN1,800/kWh, and in Xaisomboun, KN2,000/kWh, for the same standard and quality of supply. In Pak Lai, where power is imported from Thailand, connected households that have 24-hour supply pay KN564/kWh. However, no new connections are possible in Pak Lai due to capacity constraints

in Thailand. These tariffs must be compared with the recently announced new tariffs of KN64/kWh for the first 50 kWh block of domestic consumption and KN150/kWh for the next block of 50 kWh. Even after the recent tariff increase, none of the customer categories (except for embassy and entertainment) pay a tariff equal to even the lowest tariff for off-grid supply, but the highest EdL tariff (for the commercial category) equals only 83% of the rate charged to customers in Pak Lai. Neither diesel nor kerosene and gasoline are subsidized, so nonelectrified consumers are paying actual cost of supply for these energy sources.

19. Unelectrified households typically get energy from four sources: (i) candles and simple kerosene or diesel lamps for lighting, (ii) dry-cell batteries for lighting and radio, (iii) car batteries for televisions, and (iv) small diesel generators for most household and many commercial activities. The economic value of electricity for domestic use was evaluated on the basis of a demand curve consisting of the estimated costs of alternative sources of basic energy for lighting and induced demand for other uses at rates approaching the domestic tariff level. The cost of self-generation, and the tariff for off-grid supply are much higher than EdL's current and future tariffs. Not all domestic consumption will be so expensive, so only the initial portion of domestic consumption is valued accordingly (replacement portion). Additional consumption has decreasing marginal values until the lower limit for marginal consumption becomes almost equal to expected tariff levels (induced portion).

20. Derivations for the willingness-to-pay demand curve have been made for three different domestic categories, and conservative assumptions have been used for all. For poor consumers the initial point on the demand curve (44 kWh/year) has been valued as the cost of a small kerosene lamp (KN7,200/kWh). For nonpoor, established consumers, the initial portion of consumption (560 kWh/year) has been valued as the cost of a small residential diesel generator at KN2,480/kWh. For nonpoor, first-time consumers the initial consumption portion (254 kWh/year) is valued as the average of the average initial tariff for off-grid electricity provision and the unit cost of small diesel generators, at KN2,019/kWh. The average willingness to pay for the remaining area under the demand curve has been estimated at KN2,646/unit for poor and KN1,019/unit for nonpoor consumers.

21. Estimated costs for private power supply for commercial customers are based on the use of a 40 kW gas oil generator and a 35% load factor, and for industrial customers, on a 200 kW gas oil generator, also with a 35% load factor. The economic replacement cost for commercial customers is KN1,550/kWh, and for industrial consumers, KN1,140 kWh, while the average willingness to pay for induced commercial consumption is KN812/kWh, and for industrial consumption, KN635/kWh. The cost of alternative energy sources for irrigation is based on the estimated cost for diesel pumps with an 8-horsepower motor. The economic replacement cost for initial consumption is estimated at KN1,935/kWh, and for induced consumption, at KN790/kWh.

22. To convert financial project cost into economic cost, taxes and duties were deducted. No price contingencies are included in the base capital cost but the economic capital costs include physical contingencies. Costs were separated into foreign exchange and local costs, and a standard conversion factor of 0.9 was applied to local costs. Annual operation and maintenance costs were calculated in economic prices as a percentage of the total capital investment cost. The economic cost includes provision for residential house wiring, which is excluded from financial costs. Energy costs have been valued based on the long-run marginal cost for generation and transmission as calculated by the recently completed Power Supply Tariff

Study.³ System losses were calculated for each feeder based on the estimated peak demand, and the load and loss factor and were included in estimation of energy costs.

23. On the basis of a comparison of economic costs and benefits over a 35-year project lifetime, including a 2-year construction period and excluding any residual value, the EIRR was estimated at 23.3%, with a net present value of KN356,168 million. Extensive sensitivity testing shows that the Project will remain robust for all 13 variables tested, with only minor impacts on the EIRR (Table A11.3). The most significant impact resulted from a 20% reduction of total benefits. The EIRR dropped to 18.3%. Risk analysis was undertaken by running simulations for the energy input cost and for all seven willingness-to-pay values. The Project is very robust, with only a 5% probability that the EIRR will drop below 13%. Distribution analysis (Supplementary Appendix C) for the Project shows that electricity customers and local labor are the main project beneficiaries, whereas the return of the Project for the Government is negative. This is the result of the highly subsidized tariff structure, the cost of which is shared by the public utility, and thus the Government, through lost tax income. The Project's poverty impact ratio (Supplementary Appendix C) is 10%, primarily due to the fact that the share of the poor in the overall loss to the economy is higher than the benefits they receive as consumers and project workers. Risk analysis (Supplementary Appendix C) shows that the probability of the poverty impact ratio falling below 5% is 5%.

Table A11.2: Sensitivity Testing

Item			Change	EIRR	NPV (in KN million)
Capital Cost			20%	19.2	294,748
Energy Cost			LRMC + T	20.9	276,291
Benefits			20%	18.3	146,060
Willingness to Pay	Poor	Off-grid		21.8	275,094
	Non-poor	Off-grid		20.1	247,671
	Commercial	Off-grid		24.3	388,028
	Irrigation	Off-grid		23.2	355,374
	Industry	Off-grid		24.0	377,052
	Other	Off-grid		24.0	377,354
Alternative Fuel Cost not Updated				19.2	220,249
Delays	1-year			21.7	309,973
	2-year			19.7	252,701
Exchange Rate			11,000	20.55	304,850

EIRR = economic internal rate of return, KN = kip, LRMC = Long-run marginal cost, NPV = net present value, T = transmission cost.

Source: Staff estimates.

³ Ibid.

Table A11.3: Economic Internal Rate of Return
(KN million)

	Project Benefits							Project Costs										Net Benefits
	Domestic		Comm	Irrigation	Industrial	Others	Total Benefits	Transmission		Distribution			House Wiring	Connection Costs	Energy Costs	Total Costs		
	Non-Poor	Poor						HV	O&M	MV	O&M	LV						
																	Investment	
2004	-	-	-	-	-	-	-	21,161	-	-	-	-	-	-	-	21,161	(21,161)	
2005	-	-	-	-	-	-	-	53,687	-	-	-	10,202	4,957	1,283	-	70,128	(70,128)	
2006	12,587	808	15,828	1,010	2,422	787	33,442	105,651	1,659	54,787	1,387	10,202	4,957	1,283	7,161	187,086	(153,644)	
2007	28,166	2,124	32,779	2,095	5,025	3,241	73,431	57,336	2,233	54,787	2,447	2,780	1,114	288	15,671	136,656	(63,225)	
2008	31,488	2,791	33,941	2,174	5,213	5,009	80,616	-	2,233	-	2,488	2,780	1,114	288	17,067	25,971	54,645	
2009	35,167	3,667	35,145	2,255	5,407	6,883	88,523	-	2,233	-	2,530	2,780	1,114	288	18,560	27,504	61,019	
2010	39,229	4,817	36,391	2,339	5,608	15,253	103,637	-	2,233	-	2,562	1,866	860	222	22,092	29,833	73,804	
2011	42,953	6,210	37,752	2,431	5,828	16,936	112,109	-	2,233	-	2,593	1,866	860	222	23,716	31,490	80,619	
2012	46,954	8,005	39,163	2,526	6,056	18,699	121,404	-	2,233	-	2,625	1,866	860	222	25,451	33,256	88,147	
2013	51,228	10,319	40,628	2,625	6,292	20,548	131,640	-	2,233	-	2,657	1,866	860	222	27,303	35,140	96,499	
2014	55,759	13,301	42,147	2,728	6,539	22,485	142,959	-	2,233	-	2,689	1,866	860	223	29,281	37,152	105,807	
2015	60,520	17,146	43,723	2,835	6,794	30,898	161,917	-	2,233	-	2,707	1,068	493	128	33,331	39,959	121,958	
2016	63,509	21,451	45,382	2,947	7,063	34,111	174,464	-	2,233	-	2,726	1,067	493	128	35,445	42,091	132,373	
2017	66,367	26,837	47,103	3,064	7,343	37,557	188,271	-	2,233	-	2,744	1,067	493	128	37,695	44,359	143,912	
2018	68,999	33,574	48,890	3,185	7,633	41,253	203,535	-	2,233	-	2,762	1,067	493	128	40,091	46,774	156,761	
2019	71,279	42,004	50,745	3,312	7,936	45,216	220,491	-	2,233	-	2,780	1,068	493	128	42,644	49,345	171,146	
2020	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2021	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2022	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2023	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2024	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2025	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2026	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2027	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2028	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2029	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2030	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2031	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2032	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2033	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2034	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2035	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2036	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2037	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
2038	73,048	52,549	52,670	3,443	8,250	55,850	245,809	-	2,233	-	2,780	-	-	-	47,300	52,313	193,496	
															IRR	=	23.35	
															NPV	=	356,168	

IRR= internal rate of return, NPV= net present value.

FINANCIAL ANALYSIS

A. Introduction

1. The project financial analysis from the perspective of Electricité du Laos (EdL) is based on total project financial cost and additional revenue generated from new and incremental energy sales. All revenue and costs are based on 2003 base figures. The Project is assumed to operate for 35 years, including the implementation period. This operating period corresponds to the estimated useful life of the assets being constructed. No salvage value is assumed at the end of the operating period.

B. Capital Costs

2. Capital costs include transmission and substation costs (115.0 kilovolt [kV]), distribution costs (34.5 kV and 22.0 kV), and low-voltage (400 volt [V]) costs of wiring to the external household electricity meter. Investments in residential house wiring are the responsibility of the house owner and, therefore, excluded from this analysis. Capital costs include the base project costs plus physical contingencies but exclude price contingencies and interest during construction capitalized on the loan. The analysis assumes construction of 115 kV transmission lines in years 2 and 3 (2005-2006) and medium- and low-voltage distribution lines in years 3 and 4 (2006-2007). Household connections will start in 2006 and continue in the service areas through 2020. Capital costs associated with these connections are appropriately reflected.

C. Demand Forecast / Sales Revenue

3. The demand forecast is based on the forecast developed under the project preparatory technical assistance.¹ Total expected sales are based on newly electrified customers in the project areas, and the incremental sales in Louang Phrabang resulting from additional transmission capacity. The bulk of the energy demand forecast is for residential and commercial end users. Industrial demand from the prospective cement plant at Namo is forecast at 50% capacity in 2010 and full capacity in 2020. Total energy demand is forecast from 2006 to 2020, when all incremental electricity usage and new connections from the Project are assumed to be fully realized. Sales revenue is based on demand forecast per customer category and reflects the planned increase in retail tariffs from 2002 to 2005, which the Government approved in April 2002 and implemented in May 2002 (2.3% per month for 36 months). The weighted average real retail tariff for the project areas will be approximately KN612/kWh (\$0.0526/kWh) in 2005, which is still below the long-run marginal costs but represent a significant step to cost recovery. Total revenue also includes connection charges (meter, installation) paid by new customers. While customers may amortize connection charges under this Project, revenue accrues to EdL as services are performed.

D. Operation and Maintenance Costs

4. These costs include the cost of energy sent out to the transmission system, transmission and distribution losses, operation and maintenance (O&M) costs, and general and administrative expenses. The incremental financial cost of electricity generation is assumed at KN95/kWh (\$0.01/kWh). Estimated costs for transmission and distribution losses have also been included in operating expenses. Based on EdL operating data from 2000, the average O&M cost per customer is KN235,000, which is assumed to stay constant as more customers

¹ ADB. 1997. *Technical Assistance to Lao PDR for the Northern Area Rural Power Distribution Project*. Manila.

are connected. Average administrative and staff costs are also based on 2000 operating data at KN72,000 per customer.

E. Turnover and Profit Tax

5. The Government charges EdL a 5% turnover tax on all domestic sales, which has been included in the financial analysis. EdL also pays profit tax of 35% on net income. If EdL's net income for the year is negative, then the Government assesses 1% on total turnover as minimum profit tax on EdL.

F. Weighted Average Cost of Capital

6. The Project's weighted average cost of capital (WACC) comprises three financing sources: Asian Development Bank (ADB) loan, Nordic Development Fund (NDF) loan, and government counterpart funds (equity). The ADB and NDF loans are concessional (assuming a Ministry of Finance relending rate of 6%), so the real cost falls below the minimum rate test of 4%. Individual real costs are shown in Table A12.1.

7. Determining the cost of EdL equity is complicated as debt and capital markets are underdeveloped. The opportunity cost of government counterpart funds, in real terms, has been calculated according to the following methodology. The Government does issue bonds periodically (not at fixed intervals), but they may not be default free, so the dollar savings rate offered by the Banque pour le Commerce Extérieur Lao at 6% for 1 year has been selected as the risk-free equity rate of return.² To this risk-free rate 4% has been added as an appropriate premium to reflect the volatile nature of inflation and financing using external currencies. After converting this nominal rate into real terms, the opportunity cost of EdL funds has been computed to be 7.42%.

Table A12.1: Weighted Average Cost of Capital

	Financing (\$ million)	Weighting (%)	Real Cost	Minimum Rate Test (%)	Composite Capital Cost (%)
ADB Loan (Special Fund)	30.00	58.2	3.90%	4.00	2.33
NDF Loan	10.00	19.40	3.90%	4.00	0.78
EdL Equity	11.51	22.30	7.42%	—	1.66
	51.51	100.00			4.77

ADB = Asian Development Bank, EdL = Electricité du Laos, NDF = Nordic Development Fund.

G. Results and Conclusions

8. The financial internal rate of return (FIRR) on the Project is based on its capital and O&M costs and the revenue generated from new connections and incremental energy sales. The project FIRR is 2.71%. The pro forma net annual revenues are generally positive and cover project operating expenses. However, with a WACC at 4.77%, financial returns of the investment do not exceed the total project financing cost.

9. Although the Project's financial performance is marginal, its impact on EdL's operation is minimal compared to EdL's total domestic sales. Total projected energy sales from the project areas are only 8% of EdL's projected domestic turnover in 2010. A more meaningful measure of project performance is the average cost recovery ratio (financial benefit-cost ratio). Based on

² Commercial banks in the Lao PDR do not offer savings rates longer than 1 year. As information was insufficient to reflect typical long-term cost of capital, the 1-year savings rate has been used.

the projected real tariffs in 2005, the Project's cost recovery ratio is 95%, which means that 95% of the Project's total capital and operating costs are recovered directly from sales revenue.

10. The main constraint is the current and projected level of retail tariffs, which do not yet fully recover the cost of service, especially for residential consumers. No real tariff increases have been assumed in this base case beyond what has been approved and implemented in the current tariffs (2.3% per month for 36 months, ending in mid-2005). These scheduled tariff increases were adjusted to reflect real increases in 2003 terms. However, the Government should continue to move to full cost recovery long run marginal cost (LRMC) (calculation of approximately KN741/kwh in 2001) to ensure viability of future connections. For the Project to be financially viable (FIRR exceeding WACC), EdL should continue to increase average tariffs by approximately 9% per year from 2006 to 2010.

11. A low FIRR raises the important question of how the Project can be sustainable so that economic benefits materialize and accrue to the targeted beneficiaries. Without cross-subsidization from other consumer groups, rural electrification is rarely financially viable in developing member countries. While almost all consumer groups will be below the LRMC when connections begin, the cross-subsidy needs to come from another source within EdL or directly from the Government. Current fiscal problems prevent an explicit subsidy transfer from the Government. EdL earns additional revenue (in dollars and baht) from exporting surplus energy to Thailand. Even as more energy is required domestically, exports to Thailand will remain a significant portion of EdL's turnover as new generation is commissioned and connected to EdL's supply system. Export revenue boosts the finances of EdL, hedges a portion of its foreign exchange risks, and helps it meet its financial obligations to lenders and the Government. The revenue is, in effect, a government subsidy to EdL for carrying out the Government's rural electrification programs. Taking these into consideration, the Project will be sustainable despite its marginal financial performance.

Table A12.2: Financial Internal Rate of Return (FIRR)

(All figures in KN million unless otherwise noted)

Year	Capital Costs	Cumulative # of New Connections	Connect. Revenue	ELECTRICITY SALES					TOTAL REVENUE	O&M Costs	Turnover Tax	Profit Tax	TOTAL COSTS	Net Benefits
				Poor Residential	Non-Poor Residential	Commercial	Irrigation	Industrial						
2004	25,878	-	-										25,878	(25,878)
2005	71,103	-	-										71,103	(71,103)
2006	195,065	9,502	1,425	21	1,139	8,100	148	1,486	12,318	7,657	616	1,133	204,471	(192,152)
2007	138,719	19,004	1,425	25	2,867	16,773	307	3,082	24,480	10,971	1,224	231	151,145	(126,665)
2008	3,345	21,140	320	31	3,352	17,368	318	3,197	24,587	12,051	1,229	243	16,868	7,718
2009	3,471	23,277	320	37	3,909	17,984	330	3,316	25,897	13,161	1,295	256	18,183	7,714
2010	2,418	25,413	320	45	4,546	18,622	342	7,355	31,230	14,890	1,562	309	19,179	12,052
2011	2,509	27,061	247	54	5,164	19,318	356	7,489	32,628	15,890	1,631	324	20,354	12,274
2012	2,604	28,709	247	64	5,854	20,041	370	7,629	34,205	16,924	1,710	340	21,577	12,628
2013	2,702	30,357	247	76	6,622	20,790	384	7,774	35,894	17,993	1,795	356	22,846	13,048
2014	2,805	32,005	247	90	7,688	21,567	399	7,925	37,918	19,100	1,896	377	24,178	13,740
2015	1,665	33,654	247	107	8,929	22,374	415	11,997	44,070	20,837	2,203	438	25,144	18,925
2016	1,727	34,599	142	124	10,112	23,223	431	12,162	46,194	21,770	2,310	554	26,362	19,832
2017	1,793	35,544	142	143	11,409	24,104	449	12,334	48,580	22,745	2,429	1,192	28,158	20,422
2018	1,860	36,489	142	165	12,829	25,018	466	12,512	51,132	23,763	2,557	1,920	30,100	21,032
2019	1,931	37,434	142	190	14,379	25,967	485	12,697	53,860	24,829	2,693	2,748	32,201	21,659
2020	-	38,380	142	220	16,069	26,952	504	16,805	60,691	26,535	3,035	4,849	34,419	26,272
2021		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2022		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2023		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2024		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2025		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2026		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2027		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2028		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2029		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2030		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2031		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2032		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2033		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2034		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2035		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2036		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2037		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
2038		38,380		220	16,069	26,952	504	16,805	60,549	26,535	3,027	4,849	34,412	26,137
									728,732	335,149	36,437		765,833	
									Financial Benefit/Cost Ratio	95.2%			FIRR	2.71%
Notes:														
(1) Capital costs for low-voltage wiring continues as new connections are made														
(2) O&M Costs include energy cost, T&D losses, G&A, connection costs but excludes depreciation and interest														
(3) Turnover tax is 5% of turnover, profit tax is 1% of turnover when net profit is negative (as in this case)														
										WACC	4.8%		FNPV	(101,879)
											8.0%		FNPV	(180,512)
											10.0%		FNPV	(202,401)

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

1. An initial environmental examination (IEE) for the Project was undertaken as part of the project feasibility study. The Project is classified as environmental category B, as per *Environmental Assessment Guidelines* of the Asian Development Bank (ADB). The IEE is based on an analysis of the impacts of the proposed works and a visual assessment of the project areas. The IEE's main findings are summarized below.

A. Description of the Project

2. The Project will extend the transmission and distribution system in the northern rural area. Project details are given in the main text of the report.

B. Description of the Environment

1. Physical Resources

3. The northern provinces are predominantly steeply dissected hill country, ranging from 320-meter (m) valley bottom areas such as Sayaburi and Louang Phrabang to over 2,000 m mountain ridges. About 85% of Louang Phrabang Province is cut into mountainous, as is Oudomxai. The slopes of the lower hill zone are steep where tributaries have down V-shaped valley bottoms. Upper hill slopes are less steep and more rounded. Large flat areas are rare, occasionally along the Mekong and other major rivers where valleys open up to allow river flood plains to develop.

4. The steep mountain slopes are particularly prone to erosion and mass wasting when vegetation is removed and soil exposed to rainfall and surface water flows. Water quality of mountain streams and rivers is generally quite high but can be rapidly degraded when soil that is eroded or wasted from exposed slopes enters the streams and increases turbidity, thereby degrading water quality for aquatic organisms, and domestic and livestock consumption.

5. The climate is subtropical. The rainy season starts in April and ends in September or October, when the region receives 85–91% of its annual rainfall.

2. Ecological Resources

6. The steep terrain of the northern region is part of an intricate system of streams and rivers that form the Mekong River watershed. No significant wetland areas exist aside from the network of streams and rivers. Many villagers supplement their diets with fish, fresh water crabs, and other aquatic organisms caught from streams and ponds.

7. The latest satellite data of the northern provinces indicates that only 21% is covered by forest. Only small pockets of primary forest are left in the project area. The Government has established 20 national protected areas throughout the country. Provinces and districts have also established a number of provincial protected areas and district protected areas (DPAs). However, their borders are often not clearly defined, and the protection level not defined.

8. Nam Phouy national protected area lies 5 kilometers (km) from the 22-kilovolt (kV) line between Xaibnabouli and Ban Namxong. Residents exploit the natural resources of the area, which is an important habitat for species such as the Asian elephant, tiger, gaur, Asian wild dog, and Asiatic black bear.

3. Human and Economic Development

9. Agriculture, forestry, and fishing are the major economic sectors. Rice cultivation occupies about 80% of all agricultural land. Commercial crops include sugarcane, tea, coffee, sesame, and cotton. Nearly 90% of rural households raise livestock, including water buffaloes, cattle, pigs, and poultry, for household consumption and to sell.

10. Small- and medium-sized enterprises operate in the project area, including garment and furniture factories; and agro-processing establishments, including distilleries, breweries, and meat-processing factories. Phongsali and Sayaburi have sawmills with 50-200 employees each.

11. The Plain of Jars in Xieng Khouang is a world heritage site and major tourist attraction, as is the town of Louang Phrabang.

C. Screening of Potential Environmental Impacts and Mitigation Measures

12. The following potentially significant impacts have been identified and their mitigation measures are available:

1. Natural Vegetation and Wildlife

13. The 115 kV lines will be sited to minimize impacts on natural resources. The Project will rely on existing roads for construction and maintenance. No new roads will be constructed, and only small access tracks for light-duty vehicles will be needed at selected spots for construction and maintenance. Due to the poor habitat conditions and heavy human activity along the alignments, fauna and flora will not be significantly affected. The 34.5 and 22.0 kV distribution systems will generally be situated within existing rights of way and, therefore, the impacts generated by the distribution network are much less significant than those of the 115.0 kV system.

14. Close attention will be paid to provincial protected areas, DPAs, and forests to avoid or minimize impacts on the environment. The alignment is planned along highways, where the environment has been degraded by human activities. Several provincial protected areas and DPAs are near the highways although they are not well demarcated, and two DPAs straddle the highway in Oudomxai. During the detailed design survey, the alignment will be selected in close consultation with local forestry officials to minimize further environmental degradation. If secondary or plantation forest needs to be cut, it will be done in close consultation with the Department of Forestry. Compensation will be paid according to Lao Forestry Law and regulations for compensatory planting. In dissected or steeply undulating areas, clearing of the right of way will not be necessary where the tops of the highest trees are a safe distance from the conductor. To avoid possible wildlife poaching by construction contractors, project staff and work crews will not be allowed to possess firearms or animal traps.

15. EdL will maintain the corridor by manually trimming vegetation not by using herbicide. Vegetation beneath the transmission lines will be maintained in an early seral stage to provide minimum clearance of 10 meters from the conductors.

16. The Project will involve only minimal excavation that could contribute to soil erosion and sedimentation of water sources.

2. Land Use and Resettlement

17. During selection of the alignments, efforts were made to avoid existing settlements; private and community structures; agricultural land; mature forest; areas of social, historical, and cultural value; and environmentally sensitive areas. During the detailed alignment survey, villagers along the route will be consulted. The potential for resettlement is minimal, and a short resettlement plan has been prepared in accordance with ADB's policy on involuntary resettlement. The resettlement plan will be updated after detailed project design, and approved by ADB before implementation.

3. Health and Safety

18. Main health risks during construction may arise from (i) inadequate sanitation facilities in workers' camps, (ii) introduction of sexually transmitted or other diseases by immigrant workers, (iii) outbreaks of malaria in the labor force, and (iv) explosion of unexploded ordnance (UXO). To avoid these risks (i) the contractor will prepare a worker health and safety plan, (ii) workers will receive health and safety training, (iii) workers will undergo pre-employment health screening, and (iv) UXO will be cleared before construction. Local villagers will also receive health education.

4. Encroachment on Historical and Cultural Sites

19. The project area encompasses two world heritage sites: the Plain of Jars and the town of Louang Phrabang. The transmission lines will avoid them.

D. Institutional Requirements and Environmental Monitoring Program

20. Throughout project implementation, EdL will be responsible for ensuring that the Project fully complies with ADB's Environmental Assessment Guidelines and the Government's environmental regulations, and meet the IEE's mitigation and monitoring requirements. Project budget will be set aside to implement the mitigation measures to ADB's satisfaction. EdL will establish a project environmental management office consisting of a representative of EdL's Environmental and Social Management Office, the contractor, and relevant government ministries, especially the Science, Technology, and Environment Agency (STEa), to ensure implementation of the environmental management plan and monitoring.

21. The environmental management office will prepare monthly environmental management reports for submission to EdL, and the reports will be sent to other ministries and STEa for review and inspection. EdL also will prepare quarterly summaries for inclusion in the quarterly progress report to ADB.

E. Findings and Recommendations

22. The environmental screening process for the Project was adequate. Overall environmental impacts are deemed to be minor because of the following:

- (i) Careful consideration has been given to route selection to avoid environmentally sensitive areas and areas of social, historical, and cultural value.
- (ii) Two households might be resettled. If they are, they will be adequately compensated.
- (iii) Measures are readily available to mitigate potential impacts, with adequate monitoring.

F. Conclusions

23. Compensatory and mitigation measures have been identified to address potential impacts. The IEE, therefore, is sufficient and, with the recommended environmental monitoring program, is the completed environmental assessment report for the Project. No further assessment is needed and the Project will expect minor impacts that can be mitigated.

SUMMARY SHORT RESETTLEMENT PLAN

A. Scope of the Resettlement Plan

1. A social analysis carried out in the project area concluded that the Project would require minimal land acquisition and resettlement. A short resettlement plan has been prepared for the Project in compliance with the Asian Development Bank (ADB) policy on involuntary resettlement and the *Handbook on Resettlement: A Guide to Good Practice*. The only project sites that can be identified are for the substations. Transmission and distribution line alignments cannot be identified until after detailed design. However, as alignments will be selected to avoid all but two possible houses, and most, if not all, residential and agricultural land, land acquisition impact will be insignificant. The resettlement plan will be updated following detailed design and submitted to ADB for approval before implementation.

B. Scope of Land Acquisition and Resettlement

2. The 115-kilovolt (kV) transmission line alignments will be sited to avoid, wherever possible, crossing villages and other settlement areas as well as agricultural land and trees. Only restricted land use for agriculture will be permitted below the 115 kV lines. Transmission line towers will also be situated to avoid agricultural land. The number and location of towers will be determined during detailed design. Each landowner will lose only a small area for a tower and will be able to cultivate under the transmission lines and towers. The Project will not have a permanent adverse effect on livelihood or income. Farmers will be able to continue growing their crops under the transmission lines and towers. Approximately 5 hectares (ha) of land will be required for permanent acquisition for three substations on scrubland belonging to the local government or Electricité du Laos (EdL), and private scrubland (0.25 ha) will be acquired for one "T" tap junction.¹ Only two houses on 0.25 ha of land in the proposed alignment of the Nam Ngum to Thalat 115 kV transmission line may be affected. If they are, they will be able to move within 500 meters (m). Land may also be required temporarily for access tracks. The construction of distribution systems to provide electricity to villages will not require any land acquisition or displacement of households, although trees and structures will be restricted to 3 m. Electric poles and lines will be located adjacent to existing roads between villages, and in villages, along roads and pathways. Living close to 22.0 kV and 34.5 kV power lines does not pose a health hazard. Land acquisition requirements for each project component are identified in the resettlement plan.

C. Policy Framework

3. The policy framework and entitlements have built principally on the Constitution and Land Law, national policy on resettlement and compensation, decree on resettlement and compensation, and implementation regulations for project-related resettlement and compensation.² The Ministry of Industry and Handicrafts (MIH) has decided to follow these implementation regulations, ADB's policy on involuntary resettlement, and government-approved resettlement plans for other ADB and World Bank projects.

¹ A "T"-shaped junction where a new transmission line is connected to an existing line to tap power supply.

² The draft policy, decree, and implementation regulations have all been prepared under ADB Loan 1867: Environment and Social Program, for \$30 million, approved 6 December 2001 and TA 3746. The final documents was approved by the Government in May 2003.

D. Resettlement Principles and Objectives

4. The following are the key principles and objectives adopted for electricity projects and will be applied to this Project:

- (i) Involuntary displacement will be avoided or minimized wherever possible by exploring all viable alternative project designs and locations.
- (ii) Land acquisition and resettlement will be planned and implemented to cause the least possible social, cultural, and economic disruption.
- (iii) Affected people will be
 - (a) compensated as per the compensation principles below;
 - (b) helped to move, if required, during the transition period to the relocation site; and
 - (c) helped to improve their living standards there.
- (iv) Livelihoods will be restored without detriment to the environment.
- (v) Cultural and religious practices will be respected and, as much as possible, preserved.
- (vi) Special measures will protect socially and economically vulnerable groups such as ethnic minorities, woman-headed families, children and the aged without support structures, and extremely poor people.
- (vii) All people residing, cultivating, or making a living within the project areas before a formally recognized cut-off date will be considered as affected people and entitled to resettlement and rehabilitation assistance to help them improve or at least maintain their pre-project living standards, income-earning capacity, and production levels. Lack of legal titles to the land a person is cultivating or to the place of residence will not be a bar to resettlement entitlements.
- (viii) Replacement residential and agricultural land will be as close as possible to the land that was lost, and acceptable to the affected persons.
- (ix) Temporarily affected land and communal infrastructure will be restored to pre-project condition.
- (x) The compensation and resettlement activities will be satisfactorily completed and rehabilitation measures in place for a contract. The contract area will be free of encumbrances before ADB approves the award of the contract for civil works.
- (xi) The previous level of community services and resources will be improved after resettlement.
- (xii) A project-affected person will not be dispossessed of his or her property nor displaced from his or her place of residence or employment without payment of full compensation and/or without making arrangements for relocation and rehabilitation.
- (xiii) EdL will see that institutional arrangements are in place to ensure effective and timely design, planning, consultation, and implementation of the short resettlement plan.
- (xiv) The entire cost of the resettlement program will be considered as an integral part of the project cost and budgeted in annual and overall project implementation plans.
- (xv) The resettlement programs will be planned and implemented with the consent and agreement of the affected people and host population and will encourage their active participation. A full participatory public involvement process will be implemented.

- (xvi) After detailed project design and identification of affected persons, details of the updated resettlement plan will be disclosed to them in a form and manner that they can understand.
- (xvii) The district authorities will establish a grievance committee to include representatives of MIH and EdL, a representative of the Ministry of Agriculture and Forestry at the provincial level, district and village representatives such as the headman and chief elders, representatives of local organizations such as the Lao Women's Union, and representatives of affected households other than the village heads. The committee will not be dominated by organizations that have a direct interest in project implementation (such as MIH and EdL). Each committee member will receive an honorarium per case reviewed.

E. Entitlement Matrix

5. The summary entitlement matrix (Table A14) summarizes the main types of losses and support for each type. The provinces will prepare compensation unit rates for all categories of loss at full replacement cost.

Table A14: Entitlement Matrix

Type of Loss	Entitled Persons	Compensation Entitlement	Implementation issues
Dwellings (possibly only two affected)	Registered taxpayer or occupant identified during survey	Full replacement cost with no deduction for depreciation or salvageable materials	Stakeholder consensus on replacement value assessment
Residential land (0.25 ha possibly affected)	Registered taxpayer or occupant identified during survey	Compensation with replacement land and helped to develop the new site	Stakeholder consensus on suitability of new land
Expenses of residential relocation	Registered taxpayer or occupant identified during survey	Lump-sum payment of actual relocation cost	Stakeholder consensus on definitions and amounts
Rice storage bins (none affected)	Owner identified during survey	Lump-sum payment for actual relocation cost	Assessment of suitability of relocation sites
Small retail shops (none affected)	Owner identified during survey	Lump-sum payment for actual relocation	Review of shop recorded during survey
Agricultural land	Owner or person with usage rights identified during survey	Replacement land of comparable yield as a priority, or cash at current market value	Detailed survey of final impact area and identification of beneficiaries
Crops and trees	Owner or person with customary usage rights	1 year's advance notice to harvest crops, otherwise anticipated harvest to be fully compensated at market value	Consensus among stakeholders on valuation assessment
Temporary impact during construction	Owner or person with usage rights identified during survey	Extreme care by contractors to avoid damaging property, and immediate payment by contractor where damage does occur to affected families, groups, communities, or government agencies	Damaged property restored immediately to its former condition
Transport allowance	Relocating household	Lump-sum payment for actual cost of transporting household effects and old and new building materials to the new site	Stakeholder consensus on amounts
Transition allowance	All persons displaced and severely affected due to the loss of income and means of livelihood	Lump-sum payment to cover a food allowance and suitable development assistance	Stakeholder consensus on amounts

F. Institutional Framework

6. EdL established the Environmental and Social Management Office to monitor resettlement plan implementation. The office is staffed by an experienced environmental specialist manager, and three other environmental specialists and one social specialist, but needs more qualified social and environmental expertise. The Project will help EdL recruit and train one more social development and one rural development specialist.

G. Preliminary Compensation Budget

7. An amount of \$250,000 has been estimated for compensation and resettlement activities. The Government will ensure that it meets any budget shortfall needed to meet the resettlement plan objectives, once the resettlement plan is updated.

H. Monitoring and Evaluation

8. The preparation and implementation of the updated resettlement plan will be monitored by the Environmental and Social Management Office with help from the consultants. They will maintain a database of resettlement monitoring information.

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

A. Linkages to the Country Poverty Analysis

Sector identified as a national priority in country poverty analysis? Yes	Sector identified as a national priority in country poverty partnership agreement? Yes
Contribution of the sector/subsector to reduce poverty in the Lao People's Democratic Republic (Lao PDR): <ol style="list-style-type: none"> 1. The poor in the Lao PDR are heavily burdened by lack of access to modern energy. Poor women are particularly affected as they are responsible for food processing. They spend a large proportion of scarce household cash income on alternative but less efficient sources of energy, are exposed to inadequate and smoky lighting, have little access to information, have little social activity, and spend long hours producing manual energy. Vaccines, medication, and animal vaccines cannot be stored nearby. Children have less time for studying. People feel unsafe at night. Fuel poverty particularly affects the poor because their cash income is scarce, their workload is heavy, and opportunity cost of time high. Inadequate and expensive sources of energy affect reduce the poor's ability to diversify livelihood and income activities. Access to modern energy will significantly reduce the vulnerability of poor households; reduce their expenditure on energy; improve their quality of life; provide increased access to information; and help reduce workload, especially for women. 2. Access to modern sources of energy and the grid in particular is also an equity issue. Access to the grid means access to subsidized energy. Most of the poor do not have access to the grid and, thus, indirectly pay for subsidies that do not benefit them. The poor with no access spend more on energy than the nonpoor. Grid expansion and connecting the poor will substantially reduce these inequities. 3. Electricity is a key input to food processing and small-scale enterprise development. Reliable electricity supply will reduce barriers to expand and enhance productivity. Increased rural commercial activity is key to reduce poverty. Improved electricity supply will lift a significant constraint on economic growth and enable the poor to capture the benefits of economic growth. 	

B. Poverty Analysis Classification: Poverty Intervention

Poverty Profile: <ol style="list-style-type: none"> 4. The poverty profile is based on district poverty data from the latest Lao expenditure consumption survey (1997/98). The estimated poverty incidence among targeted beneficiaries is 43.4%. Poor households make up 41.5% of the total. Nearly 60% of the project beneficiaries are poor, compared to 39% of the total population. Most of the poor in the project area are ethnic minorities. Na Mo is one of the poorest districts, with the poor making up more than 92% of the population.
Connecting the Poor: <ol style="list-style-type: none"> 5. To ensure that they can fully benefit from rural electrification and existing power subsidies, the poor need to have direct access to the grid. Investments in the sector, therefore, should be targeted at the poor. However, targeting investments may be inefficient if barriers prevent poor households from directly accessing electricity. For instance, if the poor are unable to connect, they will not be able to save on expenditures. As the sector contains significant subsidies, an important aspect is the inability to target subsidies when the poor are excluded from access. This has strong distributional effects. If the sector is to become more pro-poor, barriers must be brought down. Two up-front barriers were identified as potentially reducing the poverty impact of the Project and of future investments. 6. The first barrier is the policy of cost sharing, where the village contributes 30% of the low-voltage distribution costs. This was found to have two apparent effects. First, cost sharing burdens poor more than nonpoor villages. As poor villages are more remote and have fewer households (including those who can afford to pay), they pay more per capita than nonpoor villages in less remote areas. Second, poor villages may be deterred entirely from connecting because it is unaffordable. Thus, none of the potential poverty impacts of investments in the sector would be realized. The Fact-Finding Mission found that Electricité du Laos (EdL) was already having difficulty collecting village contributions. MIH and EdL recognized the inequity of the policy and abolished cost sharing policy. 7. The second barrier to access included the lump-sum up-front charges for connection paid by individual households. While the poor may still indirectly benefit in many ways from electrification, poverty impacts will not

be fully realized if the poor are deprived of the most immediate and direct impact of expenditure savings. The Fact-Finding Mission's findings confirm that poor households in electrified villages are either not connected or connect through shared (illegal) connections, and charged a substantially higher flat rate per kilowatt-hour. Thus, even if poor households are connected, they still do not fully benefit from sector subsidies. Most households in electrified areas were able to pay the initial up-front charges by selling cattle or borrowing from relatives. No credit, beyond borrowing from relatives, was available. Some individuals had managed to negotiate with EdL staff to be allowed to amortize the payment. However, the poor are less able to negotiate amortization than the nonpoor. The poor said they would connect if up-front charges could be paid over a longer time. Therefore, formalizing amortization was found to be a viable option to connect poor households.

8. Under EdL's new connection policy, wiring from the pole to the house and inside wiring have been handed over to the private sector¹. The connection fee, cost for installation and material, administration charges, and meter deposit are charged by EdL. It has agreed to offer new consumers the option of amortizing their share of the up-front charges over up to 12 months. This option will apply to residential consumers with 3-ampere connections². To ensure consistency of business practices across branch offices, the amortization will apply to all new consumers and not limited to consumers connected under ADB-supported projects. The private sector is expected to provide credit to households unable to pay in lump sum. This will ensure some economies of scale in providing wiring to villages connected to the grid. However, EdL should carefully monitor private sector services to ensure that they are affordable, of good quality, and safe.

Expected Impacts on the Poor:

9. The most immediate and direct impact of providing reliable electricity services to the poor is expenditure savings on energy (Table A15).

Table A15: Immediate Impact on Poor Households: Cash Savings
(average KN/month)

Location	HH Diesel Expenditure	Initial HH Electricity expenditure	Share of HH Cash Income (%)		Share of Total HH Expenditure (%)	
	@ 3 liters/month	@ 4 kWh	Non-electrified	Electrified	Non-electrified	Electrified
Less remote	10,500	319	14.1	0.43	7.4	0.23
Intermediate remote	12,000	319	16.1	0.43	8.5	0.23
Very remote	13,500	319	18.1	0.43	9.5	0.23
Consumption @ 20 kWh		1740		2.3		1.2

HH = household, kWh = kilowatt-hour.

Source: Lao National Expenditure and Consumption Survey 2 1997/98.

Calculations based on average cash income and expenditure of poor households for the country as a whole.

Cost and consumption data are based on findings from field visits.

10. The poor spend 14-18% of their cash income on unreliable and poor-quality energy for lighting. Access to reliable grid supply of electricity would significantly reduce cash expenditure to well below 1% of cash income or total household expenditure. Most rural poor households have a high degree of subsistence with scarce cash income. The fungibility of available cash will divert household expenditure to other items and change household expenditure patterns. As households are able to diversify livelihoods and earn cash, appliances will become affordable and demand for electricity expand for other purposes than lighting. Poor households increase their consumption sharply during the first 2 years of connection. Consumption levels for poor households will likely be around 20-50 kWh per month, with expenditure shares at about 2-4% of cash income.
11. Another significant economic effect on poor households of providing electricity to villages is the reduction of food-processing costs. Most villages have rice mills operating on diesel, the high cost of which is transferred to consumers, which may deter the poor from using modern rice processing, leave them with manual processing methods, and ultimately raise food prices. The cost of food processing would be expected to decrease as a result of village electrification whether the poor household is electrified or not. As poor households spend a higher share of their expenditure on food (the sum of own produce and purchased food) than nonpoor, a

¹ An exception to the new policy is connections for shield wiring along transmission lines where EdL will complete all connection tasks.

² Poor households are unlikely to connect to loads above 3 amperes.

reduction in food prices would disproportionately benefit the poor.

12. Analysis of poor households' expenditure patterns suggests that they are affected by electrification. A simple regression model gave the following results:

$$\ln(\text{food expenditure}/\text{total expenditure}) = 3.80 - 0.080 \cdot \text{el} + 0.059 \cdot \ln(\text{per capita expenditure}) + 0.07 \cdot \text{Region}$$

$R^2 = 0.24$, $n = 3391$
(* Denotes statistical significance at 0.01 level)

Although this simple model may only explain a part of expenditure patterns, the results suggest that electrification reduces food expenditure shares by 8% when controlling for household per capita expenditure and regional differences. On average non-electrified poor households spend 76% of their total expenditure on food, compared with 64% for electrified poor households, which may be a result of a combined effect of increased incomes and a reduction of food prices. Food prices are expected to go down due to more efficient food processing.

13. Other impacts of electrification on the poor include increased social activity; more access to information and enjoyment from television; ability of children to study at night; and ability to better store vaccines, other medications, and animal vaccines. Electrification will significantly reduce the workload for women and give them time for other activities. Data suggest that women's time spent on food processing will be reduced from 14 to 5 hours if electricity is available, significantly benefiting women's health. While many of these social benefits are difficult to quantify and are subjective opinions of the poor, they do reflect improvements in the quality of life and are equally important to expenditure savings. Many of the social benefits occur on the village level and are "public goods." Thus they do not exclude unconnected households in electrified villages.

Affordability of Tariff Increases:

14. The Government has agreed to maintain a lifeline tariff at consumption levels below 50 kWh, well within the range of consumption levels of poor households. In general, the poor's consumption is determined by the affordability of appliances, and prices are relatively inelastic at these low levels of consumption. Therefore, the poor can be expected to maintain their consumption at a basic-needs level even as tariffs increase. At a consumption of 50 kWh per month a poor household would, assuming initial levels of income or expenditure, spend 5.8% of cash income or 3.1 % of total expenditure on electricity. While this is affordable, incomes are likely to increase as a result of electrification, and the share spent on electricity would be even lower. Average per capita cash income earnings (excluding remittances and pensions to reflect income potential) is about 3.4 times higher for electrified than non-electrified poor households, suggesting that the share spent on electricity would be about 2%.
15. Assuming no sector subsidies and an increase in the lifeline tariff to cost recovery level (from 87 KN/kWh to 947 KN/kWh), the share of cash income spent on electricity would be 7% for 20 kWh per month and 18% for 50 kWh. At the initial consumption level of 4 kWh per month the share would be 1.5%. Differences in total expenditure of electrified and non-electrified households is negligible. The corresponding expenditure shares for electricity would be 2% at 4kWh, 13% at 20 kWh, and 33% for 50 kWh. Thus, while tariff increases are affordable for the poor, cost recovery tariffs at these low levels of consumption will probably not be sustainable. As the poor consume so little, a well-targeted lifeline would be affordable.

C. Participation Process

16. Stakeholder analysis prepared. See above poverty profile and net benefit distribution analysis under economic analysis.
17. Participation strategy. EdL has a participation strategy for land acquisition and resettlement, which is included in the resettlement plan.
18. A consumer awareness program will be prepared and implemented under the Project. The program will include information on safe use of electricity, connection cost policy, tariffs, billing statements and timing of bills and due payment, and disconnection policy. The program will take into account the possibility of language barriers.

D. Potential Issues

Subject	Significant, Not Significant, Uncertain, None	Strategy to Address Issues	Output Prepared
Resettlement	Not significant	Short resettlement plan	Short resettlement plan
Gender	None	None	None
Affordability	Yes	Policy on 30% village contribution to low-voltage distribution lines Initial connection charges for households	Cost-sharing policy abolished Amortization plan for initial connection charges
Labor	None	None	None
Indigenous People	Neutral impact	Although a significant number of indigenous (ethnic minority) households live along project alignments, the Project will not adversely affect them.	No separate output
Other Risks/ Vulnerabilities	None	None	None