

**ASIAN DEVELOPMENT BANK**

**PCR: VIE 25096**

**PROJECT COMPLETION REPORT**

**ON THE**

**POWER DISTRIBUTION REHABILITATION PROJECT**  
(Loan 1358-VIE)

**IN THE**

**SOCIALIST REPUBLIC OF VIET NAM**

**February 2005**

## CURRENCY EQUIVALENTS

Currency Unit – dong (D)

	<b>At Appraisal</b> (15 January 1995)	<b>At Project Completion</b> (1 November 2004)
D1.00 =	\$0.00009	\$0.000063
\$1.00 =	D11,003	D15,750

## ABBREVIATIONS

ADB	–	Asian Development Bank
BTOR	–	Back-to-office Report
DRC	–	District resettlement committee
EIRR	–	economic internal rate of return
EVN	–	Electricity of Viet Nam
FIRR	–	financial internal rate of return
HPC	–	Hanoi Power Company
HPPC	–	Hai Phong Power Company
IDC	–	interest during construction
LA	–	Loan Agreement
LRMC	–	long-run marginal cost
MOE	–	Ministry of Energy
O&M	–	operation and maintenance
PA	–	Project Agreement
PCB	–	polychlorobiphenyl
PC 1	–	Power Company Number 1
PCR	–	project completion report
PECC 1	–	Power Engineering Consulting Company Number 1
PMB	–	project management board

## WEIGHTS AND MEASURES

GWh	–	gigawatt-hour (1,000,000 kWh)
KVA	–	kilovolt-ampere (1,000 volt-amperes)
km	–	kilometer
kV	–	kilovolt (1,000 volts)
KWh	–	kilowatt-hour (1,000 watt-hours)
MW	–	megawatt (1,000,000 watts)
MVA	–	megavolt-ampere (1,000 kVA)
Twh	–	terawatt-hour (1,000 GWh)

## NOTE

In this report, "\$" refers to US dollars.

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## BASIC DATA

### A. Loan Identification

1.	Country	Viet Nam
2.	Loan Number	1358-VIE
3.	Project Title	Power Distribution Rehabilitation Project
4.	Borrower	Viet Nam
5.	Executing Agency	Power Company No. 1
6.	Amount of Loan	
	At Appraisal	\$80,000,000
	At Closing	\$50,164,565
7.	Project Completion Report Number	PCR: VIE 875

### B. Loan Data

1.	Appraisal	
	– Date Started	16 January 1995
	– Date Completed	27 January 1995
2.	Loan Negotiations	
	– Date Started	4 May 1995
	– Date Completed	5 May 1995
3.	Date of Board Approval	8 June 1995
4.	Date of Loan Agreement	16 June 1995
5.	Date of Loan Effectiveness	
	– In Loan Agreement	22 September 1995
	– Actual	22 September 1995
6.	Closing Date	
	– In Loan Agreement	31 December 1999
	– Actual	10 April 2002
	– Number of Extensions	Two
7.	Terms of Loan	
	– Interest Rate	1.0% per annum
	– Maturity (number of years)	40
	– Grace Period (number of years)	10
8.	Terms of Relending	
	– Interest Rate	6.3% per annum
	– Maturity (number of years)	20
	– Grace Period (since first disbursement)	6.5
	– Second-Step Borrower	Hanoi Power Company and Hai Phong Power Company

## 9. Disbursements

## a. Dates

<b>Initial Disbursement</b> 19 April 1996	<b>Final Disbursement</b> 10 April 2002	<b>Time Interval</b> 71.71 months
<b>Effective Date</b> 22 September 1995	<b>Original Closing Date</b> 31 December 1999	<b>Time Interval</b> 51.25 months

## b. Amount

<b>Category<sup>a</sup></b>	<b>Original Allocation</b>	<b>Last Revised Allocation</b>	<b>Amount Canceled</b>	<b>Net Amount Available</b>	<b>Amount Disbursed</b>	<b>Undisbursed Balance</b>
Equipment						
Hanoi	38,209,000	27,368,390	5,368,881	27,368,390	27,350,760	17,630
Hai Phong	19,860,000	12,768,227	4,200,317	12,768,227	12,744,401	23,826
Nam Dinh	5,738,000	5,463,286	(472,035)	5,463,286	5,461,749	1,537
Special						
Equipment	2,400,000	1,398,260	633,974	1,398,260	1,398,260	0
Consulting	2,500,000	2,600,918	(414,579)	2,600,918	2,555,204	45,714
Service Charge	771,000	654,000	0	654,000	654,191	0
Unallocated	10,501,000	1,320,878	7,281,074	1,500,000	0	1,320,878
<b>Total</b>	<b>79,979,000</b>	<b>51,754,150</b>	<b>15,597,632</b>	<b>51,753,081</b>	<b>50,164,565</b>	<b>1,409,585</b>

## 10. Local Costs (Financed)

– Amount (\$ million)	\$10.0
– Percent of Local Costs (%)	40.6
– Percent of Total Cost (%)	13.3

**C. Project Data**

## 1. Project Cost (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Foreign Exchange	79.978	50.165
Local Currency Cost	34.828	24.580
<b>Total</b>	<b>114.804</b>	<b>74.745</b>

## 2. Financing Plan (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Implementation Costs		
Borrower-Financed	24.800	24.580
ADB-Financed	79.978	50.164
Other External Financing		
<b>Total</b>	<b>114.804</b>	<b>74.745</b>
IDC Costs		
Borrower-Financed		
ADB-Financed		
Other External Financing		
<b>Total</b>		

ADB = Asian Development Bank, IDC = interest during construction.

## 3. Cost Breakdown by Project Component (\$ million)

<b>Item</b>	<b>Appraisal Estimates</b>			<b>Actual</b>		
	<b>Foreign</b>	<b>Local</b>	<b>Total</b>	<b>Foreign</b>	<b>Local</b>	<b>Total</b>
110/20 kV Substations	27.1	7.0	<b>34.1</b>	12.025	1.274	<b>13.298</b>
110 kV Lines	1.0	1.1	<b>2.1</b>	1.182	0.760	<b>1.943</b>
20 kV Lines and Cables	7.7	1.8	<b>9.5</b>	8.298	5.813	<b>14.112</b>
Distribution Substations	10.4	1.8	<b>12.2</b>	11.718	2.969	<b>14.687</b>
Low-Voltage Lines	11.9	5.0	<b>16.9</b>	4.825	2.353	<b>7.178</b>
kWh Meters	5.7	0.6	<b>6.3</b>	3.735		<b>3.735</b>
Construction Equipment/Tools	2.4	1.0	<b>3.4</b>	5.170		<b>5.170</b>
Consulting Services	2.5	0.3	<b>2.8</b>	2.555	0.117	<b>2.672</b>
Resettlement Cost	0.0	0.0	<b>0.0</b>	0.000	0.485	<b>0.485</b>
Transport and Handling	0.0	0.0	<b>0.0</b>	0.000	1.468	<b>1.468</b>
Base Cost	68.7	8.6	<b>87.3</b>	49.510	15.239	<b>64.750</b>
Physical Contingencies	6.9	0.9	<b>8.8</b>	0.000	0.000	<b>0.000</b>
Price Contingencies	4.6	5.4	<b>9.0</b>	0.000	0.000	<b>0.000</b>
IDC and Service Charge	0.8	8.9	<b>9.7</b>	0.654	9.341	<b>9.995</b>
<b>Total</b>	<b>80.0</b>	<b>34.8</b>	<b>114.8</b>	<b>50.164</b>	<b>24.580</b>	<b>74.745</b>

IDC = interest during construction, kV = kilovolt, kWh = kilowatt-hour.

## 4. Project Schedule

Item	Appraisal Estimate	Actual
Construction Supervision		
110/20 kV Substations		
Contract Date	Dec 1996	Oct 1999–Jul 2000
Completion	Dec 1998	Sep 2003
Tools and Miscellaneous Equipment		
Contract Date	Jan 1997	Apr 1997
Completion	Jun 1998	Dec 2001
110 kV Lines		
Contract Date	Dec 1996	Dec 2000–Oct 2001
Completion	Jun 1998	Dec 2004
20 kV Distribution		
Contract Date	Jan 1997	Dec 1999–Jul 2002
Completion	Jun 1999	Dec 2004
20 kV/Low-Voltage Substations		
Contract Date	Jan 1997	Dec 1999–Jul 2002
Completion	Jun 1999	Dec 2004
Low-Voltage Distribution		
Commencement Date	Mar 1997	Dec 1999–Jul 2002
Completion	Jun 1999	Dec 2004

kV = kilovolt.

## 5. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 22 September 1995 to 31 December 1995	S	S
From 1 January 1996 to 31 December 1996	S	S
From 1 January 1997 to 31 December 1997	S	S
From 1 January 1998 to 31 December 1998	S	PS <sup>a</sup>
From 1 January 1999 to 31 December 1999	S	PS
From 1 January 2000 to 31 December 2000	S	PS
From 1 January 2001 to 31 December 2001	S	PS
From 1 January 2002 to 31 December 2002	S	PS
From 1 January 2003 to 31 December 2003	S	PS
From 01 January 2004 to 20 February 2004	S	PS

PS = partially satisfactory, S = satisfactory.

<sup>a</sup> Was downgraded in August 1998 to PS rating due to lack of progress in implementation.

**D. Data on Asian Development Bank Missions**

<b>Name of Mission</b>	<b>Dates</b>	<b>No. of Persons</b>	<b>No. of Person-days</b>	<b>Specialization of Members<sup>a</sup></b>
Fact-Finding	8–20 Mar 1993	2	26	a, d
Consultation	1–4 Nov 1994	1	5	a
Appraisal	29 Nov–16 Dec 1994	4	60	a, b, c, e
Reappraisal	16–27 Jan 1995	2	24	a, c, e
Review 1	8–12 Apr 1996	1	5	a
Review 2	20–21 Sep 1996	1	2	a
Review 3	16–18 Apr 1997	1	3	a
Review 4	2–3 Apr 1998 (no BTOR)	2	2	a, c
Development Partner Coordination	27–28 Apr 1998	1	1	c
Energy Sector Reconnaissance	24–25 Nov 1998	2	4	a, c
Review 5	21 May 1999	1	1	a
Review 6 <sup>b</sup>	6–7 Dec 1999	1	2	a
Review 7	14–16 Dec 2000	2	6	a, g
Review 8 <sup>b</sup>	20–26 Jun 2001	2	7	a, g
Project Completion Review <sup>c</sup>	13–26 Jun 2004	4	56	a, d, g, h

BTOR = back-to-office report.

<sup>a</sup> a - project engineer, b - programs officer, c - senior financial analyst, d - senior energy specialist, e - counsel, g - assistant project analyst, h - staff consultant.

<sup>b</sup> Missions were fielded to review progress of projects under several loans. Person-days shown are actual days spent on the Project.

<sup>c</sup> The project completion report was prepared by P. Perera, financial specialist (mission leader), and R.O.V. del Rosario, assistant project analyst, and a staff consultant. M. Bristol was the mission leader for the PCR but retired soon after.



## I. PROJECT DESCRIPTION

1. The primary objectives of the Project were to (i) improve the operational efficiency of Power Company Number 1 (PC 1) by reducing systems losses and improving reliability of supply, (ii) meet the growing demand for power arising from increased economic activities by system reinforcement and expansion, and (iii) provide necessary institutional and management support to power companies to enable them to operate more efficiently and be financially viable. The Project was designed to rehabilitate, upgrade, and reinforce medium-voltage and low-voltage distribution systems in three major cities in northern Viet Nam. The three cities were (i) Hanoi, the nation's capital, with a population of about 2.1 million; (ii) Hai Phong, a major port, with a population of about 1.5 million; and (iii) Nam Dinh, an industrial city, with a population of about 0.3 million.<sup>1</sup> The selection of Hanoi, Hai Phong, and Nam Dinh was based on economic and administrative importance, as well as major share in total electricity consumption (about 40% of all electricity consumed in northern Viet Nam) and the resultant economic benefits due to loss reduction and overall system improvement of the major urban centers of northern Viet Nam.

2. The Project was conceived based on the findings of the study undertaken in 1993 by the then Ministry of Energy, with assistance from the Government of Canada, to improve the electricity distribution systems in the three major urban centers in northern Viet Nam. The study recommended that the medium-voltage network of the urban distribution systems should adopt a common voltage level of 20 kilovolts (kV). Accordingly, the Project was designed to (i) provide 20 kV power injection points by installing 110/20 kV substations, (ii) upgrade medium-voltage distribution systems from 6 kV and 10 kV to 20 kV, (iii) convert existing medium-voltage/low-voltage substations to 20 kV low-voltage substations, (iv) install additional 20 kV/low-voltage substations, (v) rehabilitate old and deteriorated low-voltage distribution lines, and (vi) install kilowatt-hour (kWh) meters to reduce nontechnical losses. The Project, as envisaged at appraisal, consisted of construction and/or installation of the following components: (i) 8 110/20 kV substations, of which four will be in Hanoi, three in Hai Phong, and one in Nam Dinh; (ii) 19 kilometers (km) of 110 kV lines; (iii) 340 km of 20 kV overhead lines and underground cables, including associated switching facilities; (iv) 1,297 20 kV/low-voltage distributions substations; (v) 1,265 km of low-voltage lines; and (vi) 140,500 consumer service meters.

3. Two advisory technical assistance undertakings<sup>2</sup> were proposed on grant basis in conjunction with the Project. The first was to improve financial management of the power companies. The second was to improve power distribution planning skills within the sector. The technical assistance for the improvement of financial management consisted of two parts: (i) a national tariff study and (ii) advisory services to improve accounting and financial and management information systems of power companies. The Project also financed project implementation consultancy services.<sup>3</sup>

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<sup>1</sup> Estimated population in 1994.

<sup>2</sup> ADB. 1995. *Technical Assistance to the Socialist Republic of Viet Nam for the Improvement of Financial and Accounting Systems of the Power Companies*. Manila (TA 2345-VIE, for \$1,200,000) and ADB. 1995. *Technical Assistance to the Socialist Republic of Viet Nam for the Training in Distribution Planning*. Manila (TA 2346-VIE, for \$247,000).

<sup>3</sup> ADB. 1995. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Socialist Republic of Viet Nam for Power Distribution Rehabilitation Project*. Manila (Loan 1358-VIE, for \$80 million, approved on 8 June 1995).

## II. EVALUATION OF DESIGN AND IMPLEMENTATION

### A. Relevance of Design and Formulation

4. As outlined in *Economic Review and Bank Operations Paper for Viet Nam*,<sup>4</sup> one of the objectives of the Asian Development Bank's (ADB's) interim operational strategy was to provide financial support for an intensive program of rehabilitating, upgrading, and developing the country's physical infrastructure to promote growth in production and trade. The Project was designed in conformity with this strategy. Given the Government's objective of doubling the 1990 per capita gross domestic product by the year 2000 and the resulting need to increase the per capita electricity consumption, the power sector was a priority area for ADB intervention.

5. ADB's specific strategy in the power sector in the middle 1990s consisted of (i) rehabilitating and reinforcing transmission and distribution systems to efficiently use the existing generating capacity by removing bottlenecks; (ii) balancing development of new generation, transmission, and distribution facilities to ensure minimum losses; (iii) moving gradually to tariff levels and structures that reflect the economic cost of supply, promote efficient use of electricity, and help raise internal cash for investment needs; and (iv) implementing sector reorganization and institutional reforms to ensure efficient use of resources.

6. Conforming to this strategy, ADB's initial approach was to rehabilitate existing power system facilities, as this approach represented the most cost-effective way of improving the power sector infrastructure in the short term. This would not only address the short-term problem of constrained power supply but would also help improve the operational efficiency of the power system in the long term. Parallel to these efforts, this approach was also intended to provide advisory services for improving power sector operations as a whole, including technical assistance for strengthening sector institutions in the areas of financial accounting and management information systems, improving management and technical skills of the staff members concerned, and instituting suitable tariff policies and structures.

7. Urban distribution systems in Viet Nam in early 1990 were characterized by poor efficiency, quality, and reliability of supply. These deficiencies resulted from inadequate numbers and capacities of high-voltage power injection points or grid substations; undersized distribution transformers, line conductors, and other equipment; inflexible power system operations, such as switching and isolating faults; inadequate monitoring equipment for ensuring stable operation; and old and dilapidated facilities in general. Consultants engaged by PC 1 in 1993 recommended remedial measures, based on detailed system analysis, to address the problems identified. These recommendations included (i) establishing new grid substations to boost voltage levels at strategic locations, (ii) raising the medium-voltage distribution level from 6 kV and 10 kV to 20 kV to reduce losses and increase the power carrying capacity, (iii) rehabilitating low-voltage distribution systems, and (iv) providing adequate metering facilities to monitor system operation and reduce nontechnical losses.

8. Given the poor status of electricity distribution systems in the three cities, the Project was critical in satisfying the greatly increased demand for electricity in these cities since the inception of the loan. However, certain technical design modifications were introduced to the original project design during project implementation, to cope with the greater-than-anticipated demand experienced in the three cities. These changes were within the original project objectives and project scope but related to increasing the substation capacities, reallocating

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<sup>4</sup> ADB. 1993. *Economic Review and Bank Operations Paper for Viet Nam*. Manila.

equipment to meet new demand instead of converting existing substations and medium-voltage lines from 6 kV to 22 kV, and using low-voltage equipment to supply new areas instead of replacing existing areas. Using internal resources, the respective power companies are now carrying out the replacement of the outdated equipment and conversion of the medium-voltage network from 6 kV to 22 kV.

9. The technical assistance (TA) provided under the Project was aimed at further supporting the power sector reforms initiated in 1995 and, in particular, commercializing power companies. The TA provided useful information, exposure, and training to counterpart staff members on modern management practices of distribution utilities and cost-based tariff setting. However, Viet Nam was gradually emerging from a centrally planned economy at the time, and the reforms initiated in 1995 were the initial steps of commercializing the sector. Hence, the recommendations of the technical assistance were not fully implemented, especially the tariff study. Nevertheless, these recommendations contributed to gradual improvements in management practices and the performance of power companies over the last 8 years.

## **B. Project Outputs**

10. The Project consisted of upgrading the 110 kV substations and the transmission network, rehabilitating and expanding the medium-voltage network and low-voltage distribution network and substations, and installing energy meters in the three main cities in northern Viet Nam (i.e., Hai Phong, Hanoi, and Nam Dinh). The breakdown of project components by city and the comparison of actual and appraisal project quantities and costs are provided in Appendix 1.

11. The high-voltage and medium-voltage components were installed and commissioned as envisaged, except the 110 kV transmission line section between Chem and Nhat Tan substations in Hanoi. This section was under construction at the time of the PCR Mission and was expected to be completed by the end of 2004. However, about 67 distribution substations and about 1,300 km of low-voltage line were installed outside the original project area but within the boundaries of the three cities covered under the Project. This was primarily due to delays encountered in the initial stages of the Project, which resulted from procurement problems and the tremendous growth of the load in the project cities in recent years. This tremendous growth prompted some of the original subprojects to be implemented prior to the delivery of material under the Project. The project material was also diverted to supply electricity to newly developed areas, instead of rehabilitating the existing distribution system as originally envisaged. The overhead distribution lines in the central business district of Hanoi, envisaged at appraisal, were replaced with underground cables, on aesthetic grounds.

12. ADB's loan also financed consultant engineering services provided for project implementation. The consultant's involvement with the Project started in March 1996 and concluded in December 2001. The Project also provided two technical assistance activities to provide the necessary institutional and management support to power companies. TA 2345-VIE: Improvement in Financial Management of Power Companies (footnote 2) consisted of two parts (national tariff study and improvement of financial and accounting systems). The first part (national tariff study) was completed in January 1997, and the second part (improvement of financial and accounting systems) was completed in December 1997. TA 2346-VIE: Training in Distribution Planning (footnote 2), consisting of an assessment of organization, procedures, and techniques, as well as the development and conduct of a training program, was completed in March 1998.

### **C. Project Costs**

13. The estimated project cost at appraisal was \$114.8 million (at 1995 prices). The foreign exchange cost was estimated to be \$80.0 million (70% of the total project cost), and the local currency cost was \$34.8 million (30% of the total project cost). ADB's loan of \$80.0 million was meant to finance the entire foreign exchange cost, including the service charge of \$0.8 million during construction. The local currency component of \$34.8 million was financed through contributions from Electricity of Viet Nam (EVN) and domestic bank borrowings.

14. The Project Completion Review Mission estimated the total cost at project completion to be \$74.8 million, representing a cost saving of 35% when compared to appraisal cost estimates. The foreign exchange cost at project completion was \$50.2 million (67% of actual project cost), and local currency expenses were \$24.6 million (33% of the actual project cost). The comparison of actual cost breakdown by city and by project component with the appraisal estimates is provided in the Appendix 1 and summarized in the Basic Data.

15. ADB financed all equipment and material purchases, except two disputed contract packages for distribution transformers and low-voltage underground cables, which amounted to \$2.97 million and \$2.35 million, respectively. The details of ADB-financed contracts are provided in Appendix 2 and summarized in the Basic Data. ADB also financed the foreign exchange cost of consultant services (\$2.55 million) and the service charge on its loan. The counterpart funds financed the costs related to contract packages (disputed) for distribution transformers and low-voltage cables, installation and construction, resettlement, and interest on local currency borrowings.

### **D. Disbursements**

16. Projected and actual disbursements are compared in Appendix 3. The bulk of the disbursements occurred in 1999, due to the 2-year delay in the award of ADB-funded contracts. The total volume of disbursements was \$50.16 million, compared with projected disbursements of \$68.00 million. The Project did not have an imprest account, as ADB did not finance local currency expenses. Two loan cancellations occurred, due to cost savings and a change in project scope. The first cancellation was for \$16.60 million (January 2001) and the second was for \$1.41 million (April 2002). ADB's loan was onlent to EVN at an interest rate of 6.3%, with a grace period until 15 December 2002 and semiannual repayment over a period of 16 years until 15 June 2016. Due to the initial delays experienced by the Project, the grace period was extended by 2 years on 21 February 2001 through an amendment to the relending agreement. The repayment schedule of the Relending Agreement was also amended to complete the repayment by 15 June 2016. Although ADB had been informed of the intention to amend the relending agreement, the prior approval from the Bank had not been obtained for the change of the terms of relending.

### **E. Project Schedule**

17. At appraisal, the Project was estimated to take 4 years, with substantial completion by the end of June 1999 and a loan closing date of 31 December 1999. The loan and the associated TA grants (TA 2345 and TA 2346 [footnote 2]) were approved by ADB on 8 June 1995. The loan and project agreements were subsequently signed on 16 June 1995 and became effective on 22 September 1995. The loan closing date was extended twice from the original closing date of 31 December 1999, first to 30 June 2001 and then to 31 December 2001, due to implementation delays. The loan account was kept open until 10 April 2002,

without a formal loan extension. The chronology of major events is shown in Appendix 4 while the project implementation schedule as prepared at appraisal and compared with actual implementation is shown in Appendix 5. Although the recruitment process of the project implementation consultant was commenced prior to project approval, the consultant was not fielded until March 1996, due to delays in contract signing.

18. Considerable delays occurred in the preparation of the detailed designs and bidding documents for ADB-funded contracts. The procurement process of equipment and material was divided into two phases, and the bid documents for the first phase were finalized in June 1997, 15 months after the appointment of the project implementation consultant. The bid evaluation and approval process within the Government further delayed the contract award, and Phase I contracts were finally awarded from August 1998 to December 1998. The bid documents for Phase 2 were finalized in December 1998, and these were awarded from May 1999 to June 2000. Hence, the contract award was delayed by more than 18 months and 29 months for Phase 1 and Phase 2 bid packages, respectively, when compared to the original project schedule. The major difficulties encountered in project implementation are described in Appendix 6.

19. The detailed designs of the 110 kV substations were prepared by the domestic consultants of EVN (Power Engineering Consulting Company 1 [PECC 1]), based on the specifications prepared by the selected equipment supplier. Considerable delays occurred when finalizing these designs and preparing construction and installation contracts, due to communication problems between the equipment supplier and PECC 1 and inadequate resources allocated for this task by PECC 1. The first bids for the civil and construction work were awarded in June 1999, and work began in October 1999. The contracts for civil works and installation of 110 kV substations were finalized in February 2000, and these contracts were awarded during 2000 for local contractors. The award of installation contracts for some of the major components of the Project were not finalized before the original closing date of the Project.

20. Although the construction work of medium-voltage and low-voltage feeders progressed smoothly, the construction of 110 kV substations and 110 kV transmission lines were further delayed, due to resettlement problems. By the time of loan closing (31 December 2001), three of 11 110 kV substations were commissioned, and six other substations were substantially completed. However, most of the construction work related to 110 kV transmission lines (i.e., over 90% of this work) and medium-voltage and low-voltage feeders (i.e., over 50% of this work) was yet to be completed. The Project Completion Review Mission observed by June 2004 that all 110 kV substations were commissioned and, except for one 110 kV transmission line (from Cham to Nhat Tan, in Hanoi), all 110 kV transmission lines were completed. Over 90% of the MV and low-voltage feeders were completed by June 2004, and the remaining work was completed by December 2004. The remaining medium-voltage and low-voltage lines are related to the subprojects that were introduced to use the surplus material after completing the original subprojects.

## **F. Implementation Arrangements**

21. Implementation arrangements during project implementation were as envisaged at appraisal, with few minor exceptions. The Borrower of the loan was Viet Nam, and the Executing Agency (EA) was PC 1. The director of PC 1 was responsible for the overall management of project implementation and liaising between government authorities and ADB. The main project office was established in Hanoi, with the deputy director (construction) of PC 1

as its head. This person was responsible for procuring equipment, maintaining the project account, receiving deliveries and issuing equipment and material procured under the Project, liaising with ADB and the Government and/or EVN regarding the Project, and coordinating project implementation in the three cities. The main project office was staffed with project management board (PMB) staff members from PC 1. The Hanoi Power Company (HPC), Hai Phong Power Company (HPPC), and Nam Dinh Power Department of PC 1 established project offices and were responsible for the detailed design, as well as preparation and issuance of installation contracts, payment of compensation, and supervision of installation work. The project implementation consultant was provided office space in PC 1's PMB office.

22. The project implementation schedule and major project implementation difficulties are summarized in appendixes 5 and 6, respectively. Delays in the appointment of the consultants, lack of data for existing facilities, changes to preliminary designs, increase in the number of approving parties to the designs, availability of domestic consultants, and delays in the compensation and resettlement portion of the Project led to significant delays in project implementation. This led to two extensions to the loan closing date and a need for the cities to self-fund some of the early expansion and rehabilitation work on their networks. Delayed implementation perhaps even led to some of the equipment and materials procured for the Project not being installed in a timely manner, particularly the medium-voltage/low-voltage substations and the low-voltage equipment and material. Consequently, the unused material was diverted to different subprojects aimed at meeting the unprecedented expansion of the three cities.

23. Although the report and recommendation of the President (footnote 3) envisaged that all three cities would come under PC 1 during the early stages of the Project, power distribution for Hanoi was entrusted to the newly created HPC. Similarly, HPPC was created in 1999 to manage and operate power distribution in Hai Phong. Only Nam Dinh remained within PC 1 until the Project closed. However, PC 1 remained as the Implementing Agency for the entire Project and coordinated the implementation of the entire Project. The splitting of PC 1 into three separate power companies during the Project did not contribute to the delays encountered in project implementation.

24. The requirements for the distribution systems of the three cities changed during project implementation. Consequently, significant amounts of certain equipment and material procured under ADB's loan were transferred to distribution expansion and rehabilitation projects implemented outside the ban's originally designated project area but within the limits of the original cities. The Project Completion Review Mission was assured by EVN and PC 1 that the equipment or material originally designated for one city was not transferred to another city. Although the prior approval of ADB was not obtained for these transfers of material procured under the Project, the Project Completion Review Mission approved these transfers on the grounds that the material was used within the same cities to achieve the original objectives of the Project.

## **G. Conditions and Covenants**

25. Compliance with covenants is summarized in Appendix 7. The Borrower and PC 1 fully complied with 17 (71%) and partially complied with four (17%) of 24 covenants. The covenants relating to tariff adjustments, based on the recommendation of TA 2345 and disposal of polychlorobiphenyls (PCB)<sup>5</sup> in distribution transformers, were not complied with.

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<sup>5</sup> A toxic additive for transformer oil found in transformers manufactured before 1985.

26. TA 2345 recommended that the bulk tariff (i.e., at high-voltage/medium-voltage substations) for power purchases of power companies from EVN and the retail tariffs should be set based on the long-run marginal cost (LRMC) and at tariff levels adequate to achieve a 30% self-finance ratio. A retail tariff structure aimed at recovering distribution cost and the bulk tariff and transparent subsidy mechanisms for poorer consumers was also proposed. However, these recommendations were not implemented, and bulk tariffs continue to be administratively fixed at different levels for different power companies, resulting in more-efficient power companies cross-subsidizing less-efficient power companies. Although EVN presently meets the prudential financial covenants introduced in subsequent ADB and World Bank loans, the retail tariff is not based on the LRMC. The Government agreed with major development partners, including ADB, to implement series of tariff adjustments to achieve an average retail tariff of \$0.07 per kWh by 2005. The series of adjustments, however, was not implemented, except for one tariff increase in 2002, and a new tariff study is being undertaken with World Bank assistance.

27. The initial environmental examination report requires all transformers replaced under the Project to be tested for PCB, and if the presence of PCB is detected, the transformers must be disposed of according to Vietnamese regulations for disposing of hazardous material. The testing equipment was purchased under the Project for this purpose. However, this equipment could not be used, as the validity period expired due to long project implantation delays. ADB review missions and the project implementation consultant raised this issue during the implementation phase, but EVN told the Project Completion Review Mission that all transformers replaced during the Project were tested for PCB. The Project Completion Review Mission could not find any written records to independently verify this claim.

28. The audited project accounts were submitted only after 1999, and, during the period 1995–1998, only unaudited project accounts were submitted. The covenant related to the submission of audited company accounts for PC 1 was also met only after 1999, as EVN and its affiliates were not audited by independent auditors prior to 1998. Although the project completion report was submitted within 3 months of loan closure, the Project was only partially completed by the time of the preparation of the project completion report. The recommendations of the technical assistance on improving financial management of power companies were not fully implemented within 6 months, as covenanted. But some of these recommendations formed the basis for ongoing reforms and the improvements in the performance of power companies, as shown by reduction in losses and efficiency measures.

## **H. Related Technical Assistance**

29. Two technical assistance activities were associated with the Project: (i) TA 2345–VIE and (ii) TA 2346-VIE (footnote number 2).

30. The performance of these two activities was assessed by the Operation Evaluation Department as part of the recent technical assistance performance audit report on advisory technical assistance for power sector institutional strengthening in Viet Nam.<sup>6</sup> Hence, the performance of these activities was not assessed as part of this project completion report.

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<sup>6</sup> ADB. 2004. *Technical Assistance Performance Audit Report on the Technical Assistance for Power Sector Institutional Strengthening in Viet Nam*. Manila.

## I. Consultant Recruitment and Procurement

### 1. Consultant Recruitment

31. The project implementation consultant was recruited in accordance with ADB's *Guidelines on the Use of Consultants*, using advance selection procedures. ADB approved advance action for this recruitment. A total of 85 person-months of international consultant services was envisaged at appraisal. The consultant's scope included assisting PC 1 in project management and procurement, as well as supervision of installation and final testing and commissioning. Due mainly to the need to extend the loan implementation period twice, from the original date of 30 June 1999 to 31 December 2001, the consultant's involvement in the Project was also extended by about 27 person-months, to about 112 person-months.

### 2. Procurement

32. Procurement for goods and services financed by ADB was undertaken in accordance with ADB's *Guidelines for Procurement*. Procurement of equipment and material was carried out primarily on the basis of international competitive bidding. A preference margin of 15% was awarded to local suppliers. Direct purchasing procedures were used in the supply of equipment and material for one small package, due to its special nature as an interface with existing equipment. Appendix 2 provides a list of the procurement packages financed by ADB and other pertinent details associated with them. Two bid packages for procurement of low-voltage distribution transformers and low-voltage underground cables, amounting to \$5.3 million, were not financed by ADB, as ADB did not approve the procedure adopted in bid evaluation by the Executing Agency.

33. ADB financed procurements were divided into the following bid packages:<sup>7</sup>

- (i) Package A: 115/22 kV Substations: Supply of Materials. This package was divided into nine lots. The total contract value was \$13.09 million, compared to budgeted value of \$15.00 million.
- (ii) Package B: 115 kV Transmission Lines. This package was awarded for \$1.17 million, compared to budget of \$1.20 million.
- (i) Package C: Supply of 22 kV Cables, Conductors, Insulators, and Accessories. This package was divided between six suppliers, and the total contract value was \$7.78 million, compared to the budget of \$15.50 million.
- (ii) Package D: Supply of Low-Voltage Cables, Conductors, and Accessories. This was awarded to a Vietnamese and Thai company, at a cost of \$5.11 million, compared to the budget of \$9.60 million. The contract awarded to the Vietnamese company was not financed by ADB, due to noncompliance with ADB procurement guidelines.
- (iii) Package E: Supply of Concrete Poles and Hardware for Medium-Voltage/Low-Voltage Networks. This package was divided between three Vietnamese suppliers for \$2.67 million, compared to the budget estimate of \$3.90 million.
- (iv) Package F: Supply of 22 kV/Low-Voltage Distribution Transformers. This package was divided between two lots. The first lot was awarded to a Vietnamese contractor for \$2.43 million, compared to the budget estimate of \$3.50 million. The second lot awarded to another Vietnamese supplier was not financed by ADB, due to noncompliance with ADB procurement guidelines.

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<sup>7</sup> Packages C through I were procured in two phases.

- (v) Package G: Supply of Equipment and Material for 22 kV/Low-Voltage Substations. This was divided into four lots and awarded to three suppliers. The total contract value was \$9.66 million, compared to the budget estimate of \$12.80 million.
- (vi) Package H: Supply of Test, Construction, and Management Information System. This was divided into three lots and awarded to three suppliers for a total value of \$4.42 million, compared to the budget estimate of \$2.00 million.
- (vii) Package I: Supply of Meters. This was divided into two lots for a total value of \$1.24 million, compared to the budget estimate of \$1.70 million.

34. Civil and construction works were carried out using the city utilities' own labor or local contractors selected through local competitive bidding. These contracts were financed through counterpart funds. In Hanoi, 60 civil works and construction packages were planned. Of these, seven were cancelled, mainly because the rehabilitation work was carried out prior to the commencement of the Project. In Hai Phong, 24 civil works and construction packages were planned. Of these, one was cancelled, mainly because the rehabilitation work was carried out prior to the commencement of the Project. In Nam Dinh, 16 civil works and construction packages were planned and carried out.

## **J. Performance of Consultants, Contractors, and Suppliers**

### **1. Consultant Performance**

35. During the initial phase of the Project, when the consultant's main duty was to prepare the bid documents for ADB-financed procurement packages, the consultant's performance was not up to the standards required. As a result, this phase took much longer than originally scheduled. During the procurement stage, the consultant assisted the EA in bid evaluation, but the delays experienced at this stage were not the consultant's fault. Due to slippage in procurement activities and delays in designing civil and construction packages, the consultant was asked to add an engineering coordinator to the field staff to help coordinate the exchange of information between equipment suppliers and the local engineering team carrying out the detailed designs for civil works and construction and preparing the bidding documents for installation work. The consultant's efforts during this time contributed to the finalization of detailed designs for 110 kV/medium-voltage substations and construction contracts for these substations. The consultant's contract was ended prior to the completion and commissioning of any of these substations or 110 kV substations, due to delays encountered at early stages of the Project. As a result, the consultant was not able to make a significant contribution to supervising the construction and commissioning the equipment purchased under the Project.

### **2. Contractors and Suppliers Performance**

36. The contractors for the supply of the equipment and material performed satisfactorily. For the most part, their obligations were met completely and without much delay. Where problems occurred with equipment or material, the contractors responded quickly and settled these problems to the satisfaction of PMB and the consultant. Where delays occurred, these were due mainly to delays in finalizing detailed designs of transmission lines and civil works.

37. The contractors for the civil and construction works also performed satisfactorily, with little support from the project implementation consultant. An ADB mission visited the sites of the major works and was satisfied with the results. This mission learned during project

implementation that the main challenge faced by PMB was to get the work into the hands of the contractors. Once this happened, progress was made quickly.

#### **K. Performance of the Borrower and the Executing Agency**

38. The EA performed well, given some extenuating circumstances, and its performance can be assessed as satisfactory. The EA (PC 1) was quick to establish the project office and a productive working relationship with the consultant and ADB. Throughout the Project, the EA staffed PMB adequately and remained extremely focused on the job at hand. With the restructuring of the power sector in 1995 and the creation of EVN, with responsibility for overseeing all aspects of electrical energy production, transmission, and distribution within Viet Nam, PC 1 became an affiliated unit of EVN, with responsibility for power distribution (i.e., 110 kV and below) in northern Viet Nam, except Hanoi. HPC and HPPC were created out of PC 1 in 1995 and 1999 to manage power distribution in Hai Phong and Hanoi. However, PC 1 continued to serve as the Project's EA and coordinated the implementation of the entire Project.

39. These developments caused the hierarchy of approvals associated with the Project to become extended. At the outset, PC 1 was to have approval rights for all aspects of the Project. With the creation of EVN, this approval process evolved in such a way that EVN and, at an early stage, the Ministry of Industry had approval requirements that had to be met before the award of contracts by PC 1. This created, at times, significant delays in the awarding of contracts. ADB noted to the EA that a more streamlined procedure was needed to help avoid additional delays. The EA responded and, together with EVN, provided a preapproval process that tended to reduce the approval cycle somewhat. The finalization of the detailed designs and preparation of civil works contracts took a long time, due to a lack of capacity and staff resources of domestic consultants employed by the EA.

40. Compensation and resettlement became significant factors in the delays suffered by the Project. Acquisition of land required for new and extended substations, new 110 kV transmission lines, and new MV and low-voltage facilities became difficult primarily because the price permitted to be offered by the Government was far short of the appraised value of the land, especially in urban areas, and this resulted in strong opposition by affected people.

#### **L. Performance of the Asian Development Bank**

41. Based on the interviews of the Project Completion Review Mission, the Borrower and the EA expressed their appreciation for the assistance, advice, and cooperation provided by ADB over the course of the Project. The EA and EVN expressed their appreciation of ADB's understanding of the changes required in the implementation plan as the Project progressed. During implementation, ADB monitored progress closely; fielded numerous review missions; remained in close communication with the EA and the implementation consultant; and provided valuable assistance in resolving some of the more difficult procurement, compensation, and resettlement problems. As a result, ADB's performance can be assessed as satisfactory. ADB undertook one fact-finding mission, one consultation mission, one appraisal mission, one reappraisal mission, eight review missions, and one project completion review mission. These missions included numerous visits to all project cities, many of the works sites, and all borrower and EVN offices.

### III. EVALUATION OF PERFORMANCE

#### A. Relevance

42. The Project expanded and rehabilitated a significant part of the power distribution systems in northern Viet Nam's three largest cities. The Project was in line with ADB's country strategy, specifically ADB's interim operational strategy for Viet Nam. At the time when the Project was started, these distribution systems were in desperate shape. They lacked any capacity to expand and were suffering from high energy losses, both technical and nontechnical; serious lack of reliability; and unsafe operations. The Project was commenced when the responsible authorities had little in the way of funding sources to undertake urgently needed rehabilitation and expansion of the distribution networks of the three cities, at a time when the cities were experiencing rapid economic growth. The Project was highly relevant for the Government's strategic objectives and ADB's strategy for Viet Nam.

43. The Project brought these three cities reliable, expandable, safe (operationally), and well-designed power distribution systems that will stand for them well into the future, even as the country enjoys growth that is more aggressive than that envisaged and customer demand for a reliable power supply increases. The project components were complemented by assistance provided through the associated technical assistance activities, which were designed to improve the management capacity of the institutions associated with power distribution and help these institutions cope with the increasing demands of managing the rapidly expanding power distribution sector in Viet Nam.

#### B. Efficacy in Achievement of Purpose

44. Although the Project experienced considerable delays, mainly due to procurement and resettlement problems, it achieved all of its main objectives (i.e., to improve the reliability of the distribution systems in the three cities, reduce losses, allow future expansion, and upgrade the standards of facilities). Hence, the Project could be assessed to have efficaciously achieved its purpose, despite the delays experienced. The evaluation of the Project's impact in meeting its objectives could be undertaken for each city using several criteria, such as reduced outage rates, improved reliability, and reduced technical and nontechnical losses.

45. The power distribution systems presently have significantly more spare capacity than they did at the outset of the Project, despite unprecedented load growth in certain areas. Although the load growth in the three cities concerned substantially exceeded the projected values of the feasibility study prepared in 1993, the capacity of the distribution systems in 2003 was adequately expanded to meet the requirements of the increased demand. The installed capacity of the 110 kV/medium-voltage substations and medium-voltage/low-voltage substations had significant excess capacity in 2003, and the distribution lines also have excess capacity, as indicated by relatively low distribution losses in 2003.

46. It must be noted that significant improvements were made to improve the status of the distribution systems of the three cities, to reduce distribution losses and forced outages, prior to the commencement of the Project (i.e., 1993–1998). Table 1 shows the rapid increase in demand for electricity and the maintenance of distribution losses at a relatively low level during 1998 and 2003. However, the rapid load growth experienced during 1998 and 2003 would have resulted in significant deterioration of the quality of supply, in the absence of investments made under the Project. The feasibility study and the technical assistance provided under the Project

at an early stage indirectly contributed to this by alerting the senior management of EVN to the poor status of distribution systems in these cities in the middle 1990s.

**Table 1: Electricity Demand and Loss Data for the Three Cities**  
(1998 and 2003)

<b>Item</b>	<b>1998</b>	<b>2003</b>
<b>Hanoi</b>		
Peak Load (MW)	400.00	674.00
Energy Sales (GWh)	1,949.00	3,290.00
Distribution Losses (%)	12.07	9.23
MV Outages	310	222 <sup>a</sup>
<b>Hai Phong</b>		
Peak Load (MW)	131.00	200.00
Energy Sales (GWh)	706.00	1,149.00
Distribution Losses (%)	8.42	6.34
<b>Nam Dinh</b>		
Peak Load (MW)	21.00	37.00
Energy Sales (GWh)	285.00	493.00
Distribution Losses (%)	7.77	4.80
MV Outages	163	91

GWh = gigawatt hour, MW = megawatt, MV = medium -voltage.

<sup>a</sup> Refers to the expanded area of supply.

Source: PC 1, PC Hanoi, and PC Hai Phong.

### C. Efficiency in Achievement of Outputs and Purpose

48. The Project is considered efficient in the achievement of outputs and purpose, despite the delays that are mainly attributable to multiple layers of approval for procurement under the project, various delays in finalizing technical designs, and several resettlement problems encountered during implementation. Although the number of substations and the length of power transmission and distribution lines installed under the Project exceeded the quantities estimated at appraisal, the total project cost at completion was substantially less than the project cost estimated at appraisal (i.e., \$74.75 million, compared to \$114.8 million). This was due to the savings in the procurement of equipment, which resulted from the reduction in cost that occurred because of the Asian financial crisis and the highly competitive prices the EA managed to obtain for construction and installation work carried out by domestic contractors.

49. Due to the difficulty in identifying the benefit and revenue streams attributable to the specific subprojects financed under the Project, the financial and economic viability of the entire investment in power distribution undertaken in the three cities during 1999–2004 were assessed. The methodology and the assumptions used are explained in detail in Appendix 8, and the results are summarized in Table 2. The economic internal rate of return (EIRR) and the financial internal rate of return (FIRR) for all three cities are above the opportunity cost of capital (i.e., 12.0%) and weighted average cost of capital (4.6%), respectively. As shown in Table 2, the Project financed a significant proportion of the investments made in the distribution systems in the three cities during 1999–2004. The Project's contribution to the resultant improvement in the performance of the distribution systems in three cities, as demonstrated by high EIRR and FIRR

<sup>8</sup> Refers to the expanded area of supply.

compared to opportunity cost of capital and weighted average cost of capital, respectively, is substantial. The significant difference between EIRR and FIRR is due to the fact that the economic benefits were valued at willingness to pay for electricity, which is significantly higher than the prevailing tariffs used for valuing the financial benefits. The relatively low FIRR for Hanoi is due to the higher investment requirement of the capital city.

**Table 2: Summary of Economic and Financial Analyses**  
(1999–2004)

Item	EIRR (%)	FIRR (%)	Investment Financed Under the Project (%)
Hanoi	58.3	11.6	28.0
Hai Phong	40.1	21.1	53.0
Nam Dinh	46.8	20.7	58.0

EIRR = economic internal rate of return, FIRR = financial internal rate of return.

Source: Asian Development Bank estimates, Appendix 8.

#### **D. Preliminary Assessment of Sustainability**

50. The Project's facilities were designed and constructed according to international standards, and the Project Completion Review Mission observed that the 110 kV/medium-voltage substations built under the Project were very well maintained and staffed with competent personnel. The rapid expansion of the cities, as well as urbanization and industrialization and the resultant demand for electricity, would require continuous investment in the power distribution systems of the three cities. Since the closure of ADB's loan in 2001, the respective power companies have invested significant amounts, using domestic resources, to maintain the growth momentum and the quality of supply. This is reflected in the continuous drop in the distribution losses, despite the high growth in demand.

51. The long-term sustainability of the investments made under the Project depends on the financial viability of EVN, the parent company of the power companies. The financial performance of EVN and the power companies is summarized in Appendix 9. Despite its ambitious capital expansion program, EVN can maintain its financial viability should tariff increases be implemented as proposed and additional financial income from equity be realized. The proposed power sector reforms aimed at creating a wholesale power market and other measures proposed under the Electricity Law enacted in 2004, and these reforms should also improve the sustainability of the sector by improving the transparency of transfer prices among sector entities. Given the high economic growth momentum of Viet Nam and the improvement in the financial and operational performance of the sector, the Project's benefit are highly sustainable through continuous investments financed through internally generated resources.

#### **E. Environmental, Sociocultural, and Other Impacts**

52. During appraisal, estimates showed that less than 200 households would be affected. Because of the limited number of affected people, no resettlement plan was elaborated at the feasibility and design stages. Since then, resettlement was carried out by each PMB (Hanoi, Hai Phong, and Nam Dinh) according to the national and provincial laws and decrees applicable for each city. The major environmental and sociocultural issues associated with the Project are summarized in Appendix 10.

53. Based on the data available with the EA, a total of 325 people were affected by the Project. Of these people, 237 lost agricultural land and 69 lost residential land. However, severely affected people (i.e., those who lost more than 20% of their agricultural land) counted only for four households in Hai Phong and 12 in Hanoi. In Nam Dinh, the total amount of agricultural land for affected farmers was not available, but all farmers affected were compensated with agricultural land. Although the affected people were in general satisfied with the amount of compensation paid, based on the random interviews conducted by the Project Completion Review Mission, in Haiphong some affected people complained that they were unable to earn a wage and enjoy a standard of living in their new location equal to that which they had in their old location. These complaints, however, were the exception rather than the rule.

54. Considerable project-related delays were recorded, especially in Hai Phong and Hanoi, where disagreement occurred regarding the amount of compensation to be paid to people occupying land without legal rights as well as to people who are using land meant for agricultural use as residential land. As the compensation was paid according to the prevailing Vietnamese regulations, the principle of full market value was not applied when the ownership and right of residency were not clearly established. The rapid urbanization and expansion of city limits with associated appreciation of land prices in urban areas also contributed to the disagreement on the official price of land and the perceived market price of land. The expectation of the affected people that the acquired agricultural land would be reclassified as residential land in the near future, due to rapid urbanization, was another reason for disagreement on the market price.

55. In general, the construction works were carried out with appropriate respect for the environment. The affected population and the local authorities were satisfied with the Project. However, the procedures for testing and handling replaced distribution transformers with potential for PCBs needs to be improved. Testing the old transformers manufactured prior to 1985 for PCB was proposed, and if the PCB content is more than 50 parts per million, these transformers must be transported, stored, and eliminated according to the Vietnamese legislation. However, whether these procedures are adhered to in actual practice is unclear.

#### **IV. OVERALL ASSESSMENT AND RECOMMENDATIONS**

##### **A. Overall Assessment**

56. The Project is considered successful, based on a review of its relevancy, efficacy, efficiency, and sustainability and on its impact on the development of the institutions directly involved, namely EVN, HPC, HPPC, Ministry of Industry, Nam Dinh Power Department, and PC 1. The only significant negative aspect of the Project was the delay in its eventual implementation. So, despite this negative aspect, the Project is rated successful. Appendix 11 includes a quantitative assessment of project performance based on ADB's criteria for determining project ratings.

##### **B. Lessons Learned**

57. Significant aspects of the environment within which the Project had to be implemented changed during the course of the Project. Such aspects as the establishment of EVN in 1995, revision of PC 1's role with the presence of EVN, and the decision to remove HPC and HPPC from PC 1 complicated and encumbered the approval process in a way that was not fully appreciated at the outset of the Project. The difficulties with the compensation and resettlement

aspects of the Project were also not foreseen. These led to a significant delay in implementation. The unprecedented load growth in certain areas and the rapid urban development not foreseen at the design stage also affected the project implementation. Hence, it is necessary to allow sufficient flexibility in the project design to cope with these unforeseen circumstances.

58. Although the project implementation consultant finished working when the Project was only 75% complete, the remaining work went ahead without this person's involvement, with no apparent detrimental impact on the Project's effectiveness. The utilities technical group had been, for some time, in the business of designing expansions to their medium-voltage and low-voltage systems, selecting construction contractors and implementing the work. The group picked up quickly on the improved standards of design for the systems introduced to them by the consultants. The effectiveness of the consultants apparently ended when the designs of the 110 kV (transmission lines and 110/medium-voltage substations) were complete and when procurement of the equipment and material for the Project was complete.

### **C. Recommendations**

59. The quantities that were procured and the quantities required once the technical designs were finalized were in some cases significantly different. Technical designs should therefore be completed prior to the placement of orders for equipment and material. However, this requires a quick procurement process, and delegating the approval of procurement to the management of EVN is further recommended. The multiple layers of approval required for technical design and bid document and contract award was the main reason for the delays encountered during the Project. This could be overcome if ADB agrees with the Government at the outset on the approval process for bid document and contract award applicable to ADB-financed contracts under loans.

60. The Project also suffered considerable delays resulting from the problems associated with the resettlement and compensation of affected people. These problems could be significantly avoided if a resettlement plan and/or framework is prepared at the outset for projects. The procedures for determining the market value should be clearly specified in the resettlement plan and based on consultations with the affected communities prior to the commencement of a project. It is recommended that compensation and resettlement work be completed prior to starting civil and construction contracts. Future ADB projects to Viet Nam would have an approved resettlement plan prior to the commencement of these projects, in accordance with the relevant ADB guidelines and policies now applicable.

61. Given the large amount of distribution and transmission projects being carried out in Viet Nam and the limited capacity in the domestic consultancy firms affiliated with EVN, it may be worthwhile for EVN to consider undertaking similar projects on a turnkey basis, where the supplier is responsible for detailed engineering. This would also eliminate delays encountered due to communication problems between equipment suppliers and the domestic consulting firms responsible for preparing the designs and contracts for construction and civil works based on the specifications provided by equipment suppliers.

62. More specific environmental requirements regarding the testing and disposal of transformers should be included in the loan covenant and bidding documents, so that such specific environmental requirements (including documenting and reporting) will be adequately included in the contract documents and so that contractors will carry out mitigation measures as part of their contractual obligations.

63. Given the significant problem with procurement related to missing equipment and material, EVN should strongly consider implementing a computerized inventory control system.

64. The scopes of the Project and the material requirements changed during implementation, due to rapid changes to the urban landscape in northern Viet Nam. ADB loans should therefore be flexible enough to allow changes in the types of subprojects and materials to be financed under a loan within the overall objective of a project. With this in mind, ADB should take a sector loan approach when becoming involved in projects similar to the one examined in this report.

**PROJECTED AND ACTUAL COST BREAKDOWN**  
(\$ '000)

Item	Qty	Appraisal			Actual			Total Cost	
		Foreign Cost	Local Cost	Total Cost	Foreign Cost	Local Cost	Total Cost		
<b>Hanoi</b>									
110kV Lines	km	7.5	412	445	857	10	636	381	1,017
110/20kV Substations	no.	4	13,612	3,750	17,362	4	6,908	671	7,579
MV Cubicles	no.	32	1,000	-	1,000	75			
20kV U/G Cables	km	92	4,416	1,104	5,520	146			
20kV O/H Lines - New	km	87	589	171	760	31	4,881	1,649	6,530
20/0.4kV Substations - New	no.	742	5,336	878	6,214	638	7,328	1,407	8,735
Low Voltage Lines	km	830	8,300	3,320	11,620	1,560	3,003	180	3,183
kWh Meters	no.	101,000	4,545	455	5,000	91,030	2,898	0	2,898
<b>Subtotal</b>			<b>38,210</b>	<b>10,123</b>	<b>48,333</b>		<b>25,654</b>	<b>4,288</b>	<b>29,942</b>
<b>Hai Phong</b>									
110kV Lines	km	11	604	653	1,257	5	277	283	560
110/20kV Substations	no.	3	10,208	2,438	12,646	2	3,918	469	4,387
20kV U/G Cables	km	12	576	144	720	85			
20kV O/H Lines	km	110	759	305	1,064	48	2,410	2,923	5,333
20/0.4kV Substations	no.	413	4,163	735	4,898	470	3,090	1,175	4,265
Low Voltage Lines	km	280	2,800	1,120	3,920	397	1,299	0	1,299
kWh Meters	no.	25,000	750	75	825	27,100	590	0	590
<b>Subtotal</b>			<b>19,860</b>	<b>5,470</b>	<b>25,330</b>		<b>11,584</b>	<b>4,850</b>	<b>16,434</b>
<b>Nam Dinh</b>									
110kV Lines	km	0.05	3	3	6	5	270	95	365
110/20kV Substations	no.	1	3,269	795	4,064	1	1,199	135	1,334
20kV U/G Cables	km	3	144	36	180	13			
20kV O/H Lines	km	35	240	90	330	62	1,007	1,242	2,249
20/0.4kV Substations	no.	142	872	158	1,030	233	1,301	386	1,687
Low Voltage Lines	km	155	775	620	1,395	46	523	0	523
kWh Meters	no.	14,500	435	44	479	10,000	247	0	247
<b>Subtotal</b>			<b>5,738</b>	<b>1,746</b>	<b>7,484</b>		<b>4,547</b>	<b>1,858</b>	<b>6,405</b>
Construction Equipment & Tools			2,400	1,000	3,400				
MIS Info for 3 cities							1,398	0	1,398
Locally funded Pkg D2							0	2,174	2,174
Equipment and Tools							3,772	0	3,772
Transport, handling							0	1,468	1,468
Consulting Services			2,500	300	2,800		2,555	117	2,672
Resettlement							0	485	485
<b>Subtotal</b>							<b>7,726</b>	<b>4,244</b>	<b>11,969</b>
<b>Base Cost</b>			<b>68,706</b>	<b>18,638</b>	<b>87,344</b>		<b>49,511</b>	<b>15,240</b>	<b>64,750</b>
Contingencies*			6,871	1,864	8,734		0	0	0
Price Contingencies**			3,630	5,408	9,038		0	0	0
IDC & Service Charges			771	8,918	9,689		654	9,341	9,995
<b>Total</b>			<b>79,980</b>	<b>34,829</b>	<b>114,808</b>		<b>50,165</b>	<b>24,581</b>	<b>74,745</b>

\* 10% of the base cost.

\*\* Estimated at the Asian Development Bank's escalation rate of 2.7% per annum for foreign costs and 12% per annum for local costs for 1995 and 8.0% per annum thereafter.

IDC = interest during construction, Info = information, kV = kilovolt, kWh = kilowatt-hour, MIS = management information system, MV = medium-voltage, O/H = overhead, Pkg = package, U/G = underground.

Source: Asian Development Bank estimates, based on data provided by Power Company 1, Hanoi Power Company, and Hai Phong Power Company.

### SUMMARY OF ASIAN DEVELOPMENT BANK FUNDED CONTRACTS

PCSS No.	Description	Contract Amount	Amount Disbursed (\$)
0001	Consultant	2,600,917.51	2,555,204.00
0002	Package A: Lots 5A–8A 115/11 kV station equipment and materials (Hai Phong and/or Nam Dinh)	6,908,479.00	6,908,289.00
0003	Package A: Lots 5A–8A 115/11 kV station equipment and materials (Hai Phong and/or Nam Dinh)	5,116,392.00	5,116,393.00
0004	Package B: Materials for 110 kV transmission lines, conductors, towers, and insulators	1,189,440.61	1,182,687.00
0005	Package B: Insulators	295,410.00	295,410.00
0006	Package B: Insulators	980,724.00	980,724.00
0007	Package F: Distribution transformers 160 kVA–630 kVA	2,240,396.82	2,420,397.00
0008	Package H: Lot 2, supply of construction equipment	1,165,308.00	1,165,309.00
0009	Package H: Lot 3, supply and installation of management information	1,398,260.00	1,398,260.00
0010	Package A: Lot 9, supply of telecommunications systems	929,031.87	929,032.00
0011	Package C: Lot 1, 22 kV cables and conductors	3,822,389.00	3,819,611.00
0012	Package D: Lot 1, supply of low-voltage cable and accessories	2,939,217.60	2,939,218.00
0013	Package G: Lot 1, supply of kiosk substations	1,677,927.00	1,677,927.00
0014	Package H: Lot 1, supply of testing equipment	1,677,927.00	1,677,927.00
0015	Package I: supply of meters	568,775.00	568,775.00
0016	Package G: Lot 2, supply of equipment and materials for 22.0/0.4 kV substations	4,247,183.00	4,246,843.00
0017	Package C: Lot 2, supply of cable accessories and 22 kV cable accessories	367,237.50	367,237.50
0018		352,754.50	356,583.00
0019	Supply of 22 kV cables, conductors, insulators, and accessories	116,186.00	116,186.00
0020	Supply of concrete poles and hardware	956,083.68	904,714.00
0021	Supply of high-force poles	590,933.00	582,213.00
0022	Supply of kiosk substations	651,396.51	590,210.00
0023	Supply of meters	590,933.00	590,933.00
0024	Supply of 22 kV cables and conductors	2,761,337.00	2,761,321.00
0025	Supply of meter cabinets under Package I2, Lot 2	2,575,900.00	2,575,900.00
0026	LSA extension for Nam Dinh substation	22,507.00	22,086.00
0027	Supply of 22.0/0.4 kV substation equipment under Phase 2, Bid Package G2, Lot 2	3,666,000.00	3,182,153.00

Co. = company, kV = kilovolt, kVA = kilovolt-ampere, No. = number, PCSS = procurement contract summary sheet  
\$ = dollars.

Source: Asian Development Bank.

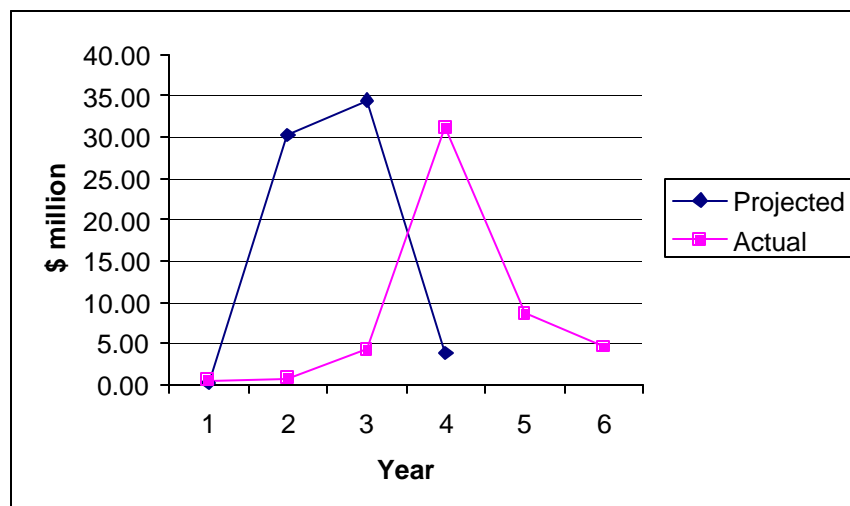
## PROJECTED AND ACTUAL DISBURSEMENTS

**Table A3: Projected and Actual Disbursements 1996-2001**  
(\$ million)

Year	Projected	Cumulative	Actual	Cumulative
1996	0.25	0.25	0.54	0.54
1997	30.24	30.49	0.73	1.27
1998	34.40	64.89	4.23	5.50
1999	3.82	68.71	31.15	36.64
2000			8.63	45.28
2001			4.58	49.85
			0.32	50.17
	68.71		50.17	

Source: Asian Development Bank.

**Figure A3: Annual Disbursement**



### CHRONOLOGY OF MAIN EVENTS

Year	Date	Event
1993	8–20 Mar	Fact-Finding Mission was fielded.
	12 Nov	Management review meeting was held, approving fielding of the Appraisal Mission.
	29 Nov–16 Dec	Appraisal Mission was fielded and recommended that the continued Staff Review Committee meeting be held after (i) formal approval of the Project is granted by the Government (expected in March 1994) and (ii) formal resolution of the relending terms.
1994	15 Mar	The Asian Development Bank (ADB) was informed by the Ministry of Energy (MOE) that a major reorganization of the power sector is underway, with MOE being absorbed by the Ministry of Industry and the power companies being amalgamated into a general power company.
	10 Oct	The Government established Electricity of Viet Nam (EVN) as the agency responsible for operating generating facilities throughout the country. Three new transmission companies will be formed to operate the transmission systems as 220 kV and above. Responsibility for power distribution at 110 kV and below will be vested in three or more power distribution companies who will purchase power from the respective transmission companies.
	1–4 Nov	A special consultation mission was fielded and identified that while the Project itself had not changed substantially since appraisal, major changes in the power sector organization leading to a change in the Executing Agency (EA) (from MOE to EVN) in 1995 would need a reappraisal to be carried out.
1995	16–27 Jan	<p>Reappraisal Mission fielded. Relending arrangements were agreed upon, and the Reappraisal Mission recommended that (i) Board documentation be prepared for an Staff Review Committee meeting, for a project loan of \$80.0 million, as programmed earlier; and (ii) technical assistance activities (two) be processed in conjunction with the loan, namely Improvement of Financial Management of the Power Companies (\$1.2 million).</p> <p>The advisory technical assistance for the Improvement of Financial Management of the Power Companies will be comprised of two parts: (i) a national tariff study and (ii) an advisory service to improve accounting and the financial and management information systems of the power companies.</p>

*Continued next page*

Year	Date	Event
1995	16–27 Jan	The second technical assistance activity, Training in Distribution Planning (footnote 2) is financed by ADB at \$247,000 on a grant basis. Cost estimates were adjusted to reflect January 1995 price levels and ADB's revised rates of price escalation for foreign and domestic goods, raising the project cost from \$108.3 million to \$114.8 million. The foreign cost component remains the same, at \$80.0 million, while the local costs have increased from \$28.3 million to \$34.8 million, mainly due to changes in implementation arrangements and in local price escalation.
	10 Mar	Staff Review Committee meeting was held.
	6 Apr	Government of Japan approves financing of the financial management of the power companies' technical assistance for \$1.2 million.
	4-5 May	Loan negotiations were held in Manila with representatives from the Government.
	12 May	President approved the circulation of Board documents.
	8 Jun	Loan was approved by ADB for \$80.00 million from the Asian Development Fund to the Government. Two technical assistance grants, totaling \$1.44 million, were approved in conjunction with the Project: (i) Improvement of Financial Management of the Power Companies (Japan Special Fund) and (ii) Training in Distribution Planning.
	16 Jun	Loan and project agreements signed.
	3 Aug	Opening of technical proposals at Power Company Number 1 (PC 1).
	22 Sep	ADB declared the loan effective. ADB received the evaluation report of the EA for the engagement of project implementation consultant.
	16 Oct	Consultants Selection Committee met to review the recommendation of the EA and selected the second-ranked consultant (the Canada consultant) as the project implementation consultant.
	23 Oct	ADB selected the United States consultant for TA 2345-VIE Part A: National Tariff Study. For TA 2345-VIE Part B: Improvement of Financial Management of the Power Companies, the Singapore consultant was selected.
	6–10 Nov	TA 2345-VIE: Part A: Contract negotiations with the United States consultant were successfully completed. Contract was signed on 22 November for a \$426,000 ceiling.

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<b>Year</b>	<b>Date</b>	<b>Event</b>
1995	13–17 Nov and 18–20 Dec	TA 2345-VIE: Part B: Contract negotiations with the Singapore consultant were successfully concluded. Contract was signed on 27 December for a \$600,000 ceiling.
	22–30 Nov	Contract negotiations were held between PC 1 and the Canada consultant (the project implementation consultant).
	25 Nov	Notice to proceed of consultants for Part A: National Tariff Study.
	7 Dec	ADB received a copy of the negotiated consulting contract for about \$2.07 million, with a further suggestion for inclusion of a local cost contingency from the Canada consultant.
1996	14 Mar	Contract signed between PC 1 and the Canada consultant.
	21 Mar	PC 1 transmits the notice to proceed to the project consultant no later than 29 March.
	29 Mar	Project implementation consultant commenced work.  By September, detailed design work not yet finished. Inception report also not yet submitted, although due by the end of June.
	8–12 Apr	Two teams already fielded for TA 2345. Both teams having difficulty with the lack of support from EVN in obtaining data required for the study.
	21 Jun	Consultants Selection Committee met to prepare a shortlist for TA 2346-VIE: Training in Distribution Planning.
	23–25 Jun	Invitations to bid for technical assistance consulting services issued to the firms shortlisted during a Consultants Selection Committee meeting.
	6 Sep	Consultants Selection Committee met and reviewed the proposals submitted for consulting services of TA 2346-VIE: Training in Distribution Planning and selected a Canada consultant for a contract with a \$215,000 ceiling.
	4–5 Nov	Contract negotiations held for TA 2346-VIE. Notice to proceed transmitted to the consultant on 18 November.
1996	12 Nov	Inception report received from the project implementation consultant after 8 months.
1997	16–19 Apr	Review Mission findings. Detailed design report due in early July 1996 was still not finished (expected end May 1997). The consultant was asked to prepare a revised program to complete the works, with procurement to be undertaken in two phases.

*Continued next page*

<b>Year</b>	<b>Date</b>	<b>Event</b>
1997	13 Jun	Draft bidding documents were received by ADB for Phase 1 packages.
	19 Jun	Specific notices sent for Phase 1 procurement were published.
	16 July	Invitations to bid issued, under Phase 1, for supply of all of the 110-kilovolt (kV) lines and substations, management information system, and six other packages of medium-voltage and low-voltage equipment and line, consisting of a total of nine bid packages.
	6 Oct	Phase 1 packages bid closing date.
	11 Dec	The bids were still under evaluation. Therefore, no contracts were awarded in 1997.
1998	20 Feb	ADB received evaluation reports for the 22 lots under Phase 1 (value \$36.0 million), of which 13 were approved by ADB.
	2–3 Apr	Review Mission by ADB.
	10 Apr	Consultant team leader to return to Viet Nam to assist with contract negotiations for Phase I and prepare bidding documents for Phase 2.
		Unaudited financial statements for FY1996 submitted to the Review Mission.
	Jul–Aug	PC 1 advised ADB that 16 contract documents were finalized and signed.
	19 Aug	ADB advised Ministry of Planning and Investment of downgraded status of the loan to BAA in ADB due to lack of implementation progress with a view to possible partial loan cancellation and consideration of loan extension.
	25 Aug	ADB received 16 fully signed contract documents under Phase 1, amounting to approximately \$37.4 million. Draft bidding documents for Phase 2 received.
	19 Sep	Invitation for bids of packages under Phase 2, consisting of six packages comprising additional quantities of medium-voltage and low-voltage equipment and lines, were issued.  Final bidding documents for Phase 2 received.
	21 Sep	Bid documents for Phase 2 were issued by the consultant.
	30 Sep	ADB conveyed the comments to the final bid documents.
	5 Oct	PC 1 issued an amendment to the final bid documents.

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<b>Year</b>	<b>Date</b>	<b>Event</b>
1999	19 May	Bid evaluation reports for three of the six Phase 2 packages were submitted to ADB.
	12 Jun	Since the consultant's contract was ending on 30 June, PC 1 requested an extension of the consultant's contract by 18 months, to the end of 2000, with a contract increase of roughly \$0.78 million.
	6 Aug	ADB approved an extension of the consultant's contract to the end December 1999.
	10 Aug	ADB received bid evaluation report for Package F2, wherein two opposing recommendations appeared from the consultant and the EA.
	16 Sep	PC 1 received representation from ABB regarding the EA's decision to award a contract for Package F2.
	25 Sep	State Bank of Viet Nam requested for an extension of the loan closing date to 30 June 2001.
	1 Oct	Tariff was increased by D25 per kilowatt-hour (kWh) to about \$0.05 per kWh.
	18 Oct	ADB requested an assurance from EVN that the Project would be completed on time.
	6–7 Dec	Agreement reached between ADB and EVN on award of seven contracts under Phase 2. Estimates made during the Review Mission show that the Project will be completed by the end of 2001, and the Review Mission recommended that the loan closing date be extended to 31 December 2001.
	Jul–Dec	Bid evaluation report for the remaining Phase 2 packages contracts were submitted in three clusters during this period.
2000	9 Feb	ADB informed PC 1 to award the contentious Package G2, Lot 2, to a Belgium company for approximately \$3.6 million. This was later financed by the Borrower.
	17 Feb	Ministry of Planning and Investment requested use of loan proceeds for flood rehabilitation of the Central Region.
	1 Mar	State Bank of Viet Nam requests extension of loan closing date to 31 December 2001.
	17 Mar	ADB approved request for 2-year extension of loan closing date to 31 December 2001, to complete the original scope of work under the loan.
	12 Jun	Civil works contracts for 110 kV substations in Nam Dinh were awarded.

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<b>Year</b>	<b>Date</b>	<b>Event</b>
2000	31 Jul	Civil works contracts for 110 kV substations in Hai Phong were awarded.
	22 Nov	State Bank of Viet Nam requested a 2-year extension of the repayment and grace periods, respectively, under the subsidiary Loan Agreement. ADB proposed cancellation of \$16.11 million, including the loan funds for Package F2.
	7 Dec	Civil works contracts for 110 kV transmission lines in Nam Dinh were awarded.
2001	9 Jan	ADB advised the Government that loan savings of roughly \$16.26 million was cancelled from the loan, with effect from 15 December 2000.
	5 Mar	In response to the Government's counterpart letter of 18 January 2001, the effective date of cancellation was revised to 18 January 2001.
	31 Mar	The civil works contracts for 110 kV substations in Hanoi were awarded.
	25 Aug	Civil works contracts for 110 kV transmission lines in Hanoi were awarded.
	19 Oct	ADB requested EVN and/or PC 1 to conduct an independent review of the implementation of PC 1's resettlement plan relative to ADB's guidelines.
	21 Oct	Civil works contracts for 110 kV transmission lines in Hai Phong were awarded.
	7 Nov	Installation of 110 kV transmission lines in Nam Dinh was completed.
	30 Nov	Civil works contracts for medium-voltage and low-voltage feeders in Nam Dinh were awarded.
	17 Dec	Consultant submitted its project completion report to the EA.
2002	8 Jan	ADB received from the EA the project completion report.
	10 Apr	Loan account was closed.
	30 May	Civil works contracts for medium-voltage and low-voltage feeders in Hanoi were awarded.
	30 June	Installation of 110 kV substations in Nam Dinh was completed.
	1 July	Civil works contracts for medium-voltage and low-voltage feeders in Hai Phong were awarded.

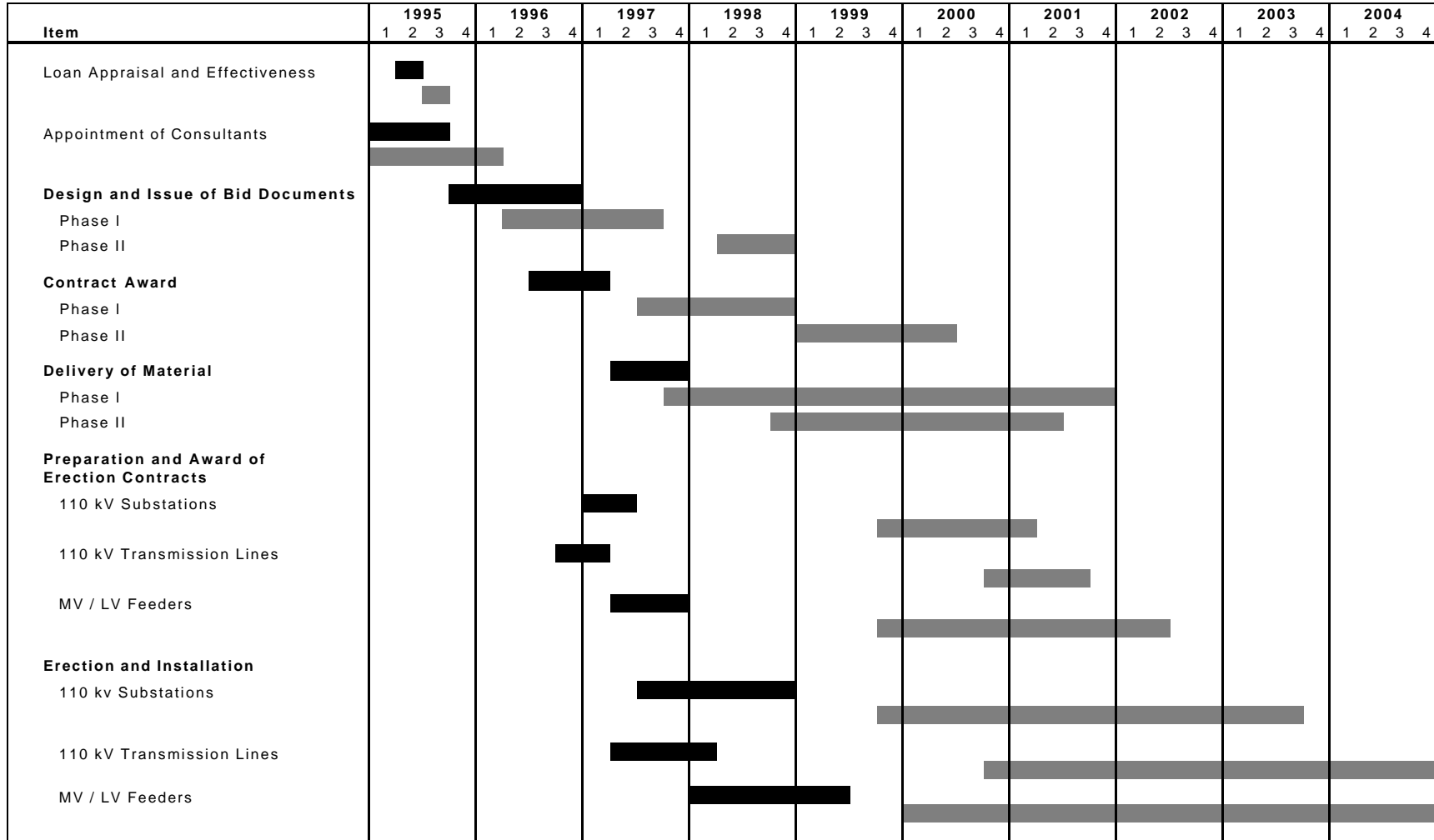
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<b>Year</b>	<b>Date</b>	<b>Event</b>
2003	31 Mar	Installation of 110 kV substations in Hanoi was completed.
	30 Sep	Installation of 110 kV substations and transmission lines in Hai Phong was completed.
	30 Dec	Installation of medium-voltage and low-voltage feeders in Hanoi (within the original project area) was completed.
2004	14–25 Jun	Project Completion Review Mission was fielded.
	30 Jun	Installation of medium-voltage and feeders in Nam Dinh (within the original project area) was completed.
	30 Sep	Use of surplus medium-voltage and low-voltage equipment procured under the Project in Hanoi and Nam Dinh was completed.
	30 Dec	The delayed 110 kV transmission line (Chem–Nhat Tran) in Hanoi and the medium-voltage and feeders in Hai Phong were completed.

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Source(s): Asian Development Bank Review Mission and Records.

### IMPLEMENTATION SCHEDULE



Legend: ■ = Appraisal ■ = Actual

kV = kilovolt, LV = low-voltage, MV = medium -voltage

Source: Asian Development Bank.

## PROJECT IMPLEMENTATION DIFFICULTIES

### A. Design Problems

1. The preliminary and detailed design required for preparing the bidding documents for the material and equipment supply and for the construction and installation contracts suffered considerable delays. The reasons for these delays are numerous. The following list highlights a few of the important reasons:

- (i) Difficulties the consultant had in making arrangements for recruiting local staff members
- (ii) Difficulties the consultant had in establishing logistical support at the outset of the Project
- (iii) Difficulties the consultant had in agreeing the bid packages breakout with the executing agency (EA)
- (iv) Difficulties the consultant had in gaining permission to use and copy much of the pertinent data required for the detailed design
- (v) Difficulties the consultant had in negotiating the subcontracting of the detailed design company for the field surveys and for the detailed design of the substations and transmission lines.
- (vi) Poor performance by the consultant's team leader and this person's absence from the field
- (vii) Difficulties the consultant had in communication with Power Company Number 1 (PC 1)
- (viii) Frequent design changes requested by PC 1
- (ix) Late arrival of information from the material and equipment suppliers
- (x) Erroneous information from the material and equipment suppliers
- (xi) Low priority assigned to the Project by the domestic consultant of the EA (i.e., Power Engineering Consulting Company Number 1 [PECC 1]), who was responsible for the detailed design of substations and transmission lines.
- (xii) Compensation and resettlement problems leading to late determination of final substation locations and line routings as well as final quantities of materials
- (xiii) Problems with the design concept of the use of very high force poles for the 22-kilovolt (kV) distribution design
- (xiv) Late changes in the basic design concept from the use of distribution overhead lines in crowded urban areas to the use of underground cables
- (xv) Late decision on the part of PC 1 and the various design teams from the three cities on the final quantities of material to be procured under Phase II.

### B. Environmental Problems

2. Late in the implementation stages of the Project, a problem was identified with the handling of the replaced distribution transformers that may have contained polychlorobiphenyls (PCB). Although PCB test kits were procured under the Project, they could not be used, due to the expiration of the test kits, which resulted from the long delays experienced. Hence, the replaced old transformers are not tested for PCB, and the procedures adopted for storing and disposing of these transformers are not clear.

### **C. Resettlement and Compensation Problems**

3. Considerable project delays occurred, especially in Haiphong and Hanoi, where officials disagreed about the amount of compensation to be paid to people who are occupying land without legal rights, as well as to people who are using land meant for agricultural use as residential land. As the compensation was paid according to the prevailing Vietnamese regulations, the principle of full market value was not applied when the ownership and right of residency were not clearly established. These problems particularly delayed the Thanh Nhan substation in Hanoi and the Cat Bi and Le Chan 110 kV transmission lines in Haiphong. The building of Nhat Tan substation was delayed due to the need for acquiring land from a graveyard and the cultural practices associated with moving graves in Viet Nam. The rapid urbanization and expansion of city limits, with associated appreciation of land prices, also contributed to the disagreement on the official price and perceived market price of land. The expectation of the affected people that the acquired agricultural land would be reclassified as residential land in the near future, due to the rapid urbanization, was another reason for disagreement on the market price.

### **D. Procurement Problems**

4. The procurement of equipment under the Project was considerably delayed, due to the multiple levels of approval required for bidding documents and contract award within the Government of Viet Nam. Some of the large bid packages required approval from the Ministry of Industry and the Prime Minister's Office, resulting in significant delays. The Asian Development Bank (ADB) and the EA disagreed on the procedures adopted in evaluating two bid packages. This disagreement resulted in considerable delays and ADB's deciding not to finance these packages.

5. Another problem encountered during procurement was the long time gap between the original design of the Project and its implementation. This resulted in the quantities included in the bid packages being significantly different from the quantities required for implementing the Project based on the detailed designs. A change also occurred in the design philosophy when city governments, especially in Hanoi, decided to use underground cables instead of overhead lines for medium-voltage and low-voltage distribution lines. This resulted in shortages in certain material and excess supply of different types of material.

6. There were instances of some of the 110/20 kV transformers being damaged in transit. The contracts for supply of management information system was delayed due to nonperformance by one of the subcontractors.

### **E. Civil Works, Construction, and Commissioning Problems**

7. During the construction of the 115/22 kV substations, the contractors involved ran into many different types of problems, including problems with providing compensation, locating missing materials, and arranging temporary power supplies for some operating substations, all of which delayed the construction. Of particular note, during the commissioning of the substations, problems were found with the 115 kV breakers and two of the 40-MVA transformers, as well as the 22 kV switchgear. With the exception of the problems with the transformers, these problems were resolved with the collaboration of the supplier.

8. The commencement of the civil works and construction of the 115 kV Chem–Nhat Tan and Mai Dong–Thanh Nhan transmission lines in Hanoi and the Cat Bi and Le Chan lines in Haiphong was delayed due to problems with compensation. For example, as of the end of June 2004, the Chem–Nhat Tan transmission line in Hanoi was not yet completed, although scheduled to be so within a few weeks. All the other transmission line work associated with the Project was completed by the middle of September 2003.

9. Since the 115/22 kV substations and their associated transmission lines were in delay, no pressure to make progress with the designs of the medium-voltage (MV) portion of the Project. Another interesting development within the Project during the implementation of this portion of the Project's work was the significant load growth the cities enjoyed late in the design of the medium-voltage networks. As an example, the building of new sports facilities for the Southeast Asia Games held in Hanoi in late 2003 demanded new distribution to be implemented outside the Project's area but within the boundaries of the city. Consequently, the Project's medium-voltage design teams were redeployed to work on the new distribution to support the Southeast Asia Games. Not only were the design teams redeployed but so were significant portions of the medium-voltage material procured under the Project. Another example was the expansion of the boundaries of Hanoi, which occurred in late 2003.

### STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference	Status of Compliance
<p><b>Project Implementation</b></p> <p>1. The Borrower and Power Company Number 1 (PC 1) shall make available funds, facilities, services, equipment, land, and other resources, in addition to the proceeds of the loan, for carrying out the Project.</p> <p>2. The Borrower shall ensure that all activities with respect to carrying out the Project are conducted in accordance with sound administrative policies and procedures.</p> <p>3. PC 1 shall carry out the Project in accordance with plans, design standards, specifications, work schedules, and construction methods acceptable to the Asian Development Bank (ADB).</p> <p>4. PC 1 shall maintain a project office, headed by the deputy director (construction), under the direct supervision of the director, PC 1.</p> <p>5. All goods and services financed out of the proceeds of the loan shall be exclusively used in the carrying out of the Project.</p>	<p>Loan Agreement (LA), Article IV, Section 4.02 Project Agreement (PA) Article II, Section 2.02</p> <p>LA, Article IV, Section 4.03</p> <p>PA, Article II, Section 2.04</p> <p>LA, Schedule 6, para. 2</p> <p>LA Section 3.04</p>	<p>Complied with.</p> <p>Complied with.</p> <p>Complied with.</p> <p>Complied with.</p> <p>Complied with but project scope amended to include some areas in the three cities outside of the original rehabilitation areas. Prior consent from ADB was not obtained, but the Project Completion Review Mission concluded that this is within the original scope and objectives of the Project.</p>
<p><b>Reporting</b></p> <p>6. The Borrower shall furnish, on a periodic basis, all reports ADB may request pertaining to the carrying out of the Project.</p>	<p>LA, Article IV, Section 4.04</p>	<p>Complied with.</p>

*Continued next page*

Covenant	Reference	Status of Compliance
7. PC 1 shall furnish ADB with all such reports and information as ADB shall reasonably request concerning (i) the loan and the expenditure of the proceeds thereof; (ii) the goods and services and other items of expenditure; (iii) the Project; (iv) the administration, operations, and financial conditions of PC 1; and (v) any other matters relating to the purposes of the loan.	PA, Article II, Section 2.08(a)	Partially complied with. For the period 1995–1998 project accounts were submitted and the audited accounts were submitted since 1999.
8. PC 1 shall furnish to ADB quarterly reports on the execution of the Project and a summary financial account for the Project.	PA, Article II, Section 2.08(b)	Complied with.
9. Promptly after physical completion of the Project but no later than 3 months thereafter, PC 1 shall prepare and furnish ADB with a report on the execution and initial operation of the Project, including cost, performance by PC 1 of its obligations, and accomplishment of the purposes of the loan.	PA, Article II, Section 2.08(c)	Not complied with. The report was submitted 3 months after loan closure but before achieving physical completion.
10. PC 1 shall maintain, or cause to be maintained, records and audited accounts adequate to identify the goods and services and other items of expenditure financed out of the proceeds of the loan, disclose the use thereof in the Project, record the progress of the Project, and reflect its operations and financial condition.	PA, Article II, Section 2.06	Complied with.
11. PC 1 shall (i) maintain separate accounts for the Project and for its overall operations; (ii) have such accounts and financial statements of its overall performance audited annually, in accordance with appropriate auditing standards; and (iii) furnish no later than 9 months after the close of the fiscal year certified copies of such audited accounts, in the English language.	PA, Article II, Section 2.09(a)	Partially complied with. PC 1 accounts were not audited prior to 1999.

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Covenant	Reference	Status of Compliance
<p><b>Procurement</b></p> <p>12. All goods and services to be financed out of the loan proceeds shall be procured in accordance with the provisions of schedules 4 and 5 of the LA.</p> <p>13. Procurement of goods and services shall be subject to the provisions of the <i>Guidelines for Procurement under Asian Development Bank Loans</i>.</p> <p>14. The selection, engagement, and services of the consultants shall be subject to the provisions of the <i>Guidelines on the Use of Consultants by Asian Development Bank and its Borrowers</i>.</p>	<p>PA, Article II, Section 2.03(b)</p> <p>LA, Schedule 4, para. 2</p> <p>LA, Schedule 5, para. 3</p>	<p>Complied with.</p> <p>Complied with.</p> <p>Complied with.</p>
<p><b>Operational Matters</b></p> <p>15. The Borrower shall ensure that, following completion of the Project, PC 1 and Hanoi Power Company continue to implement measures to ensure that overall distribution losses within Hai Phong, Hanoi, and Nam Dinh are maintained below 22% of the energy sent.</p> <p>16. The Borrower shall ensure that Electricity of Viet Nam (EVN) and the power companies shall review and consult with ADB upon the recommendations of the technical assistance provided by ADB for carrying out an Improvement of Financial Management of the Power Companies and shall implement the agreed recommendations within 6 months of such agreement.</p>	<p>LA, Schedule 6, para. 3</p> <p>LA, Schedule 6, para. 4</p>	<p>Complied with.</p> <p>Partially complied with. Some of the recommendations were implemented.</p>

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<b>Covenant</b>	<b>Reference</b>	<b>Status of Compliance</b>
17. The Borrower shall ensure that EVN and the power companies shall review and consult with ADB upon the recommendations of the technical assistance provided by ADB for carrying out a tariff review under the technical assistance for the improvement of financial management of the power companies and shall implement the agreed recommendations within 6 months of such agreement.	LA, Schedule 6, para. 5	Not complied with. Extensive consultations took place between ADB and the Borrower and/or EVN regarding tariff reform. However, a well structured tariff scheme as recommended by the consultants was not implemented. Currently, another tariff study is being undertaken under a World Bank loan.
<b>Financial Matters</b>		
18. Except as ADB may otherwise agree, PC 1 shall not sell, lease, or otherwise dispose of any of its assets that shall be required for the efficient carrying out of its operations or that the disposal of which may prejudice PC 1's ability to perform satisfactorily.	PA, Article II, Section 2.12	Complied with.
19. Except as ADB may otherwise agree, the Borrower shall take action as necessary so that PC 1 complies with Section 2.17 of the PA regarding debt servicing.	LA, Schedule 6, para. 6	Complied with.
20. Except as ADB may otherwise agree, PC 1 shall take such action as shall be necessary to maintain at all times a debt service ratio of not less than 1.3:1.	PA, Article II, Section 2.17(a)	Complied with.
<b>Other Matters</b>		
<b>Power Sector Reforms</b>		
21. The Borrower, EVN, and PC 1 shall ensure that ADB's consent is obtained prior to any restructuring of the power sector agencies involved in the Project and transfer of any assets of PC 1.	LA, Schedule 6, para. 7	Complied with. EVN consulted ADB, and ADB consented to splitting PC 1 by creating PC Hai Phong.

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<b>Covenant</b>	<b>Reference</b>	<b>Status of Compliance</b>
<p><b>Land Acquisition</b></p> <p>22. The Borrower shall take all necessary action to ensure that all land, rights-of-way, easements, licenses, and other rights in land or privileges required shall be made available in a timely manner.</p> <p>23. The Borrower and PC 1 shall take all necessary steps during planning and design of project facilities to ensure social acceptance of the facilities.</p>	<p>LA, Schedule 6, para. 8</p> <p>LA, Schedule 6, para. 9</p>	<p>Not complied with. Significant delay occurred in some areas due to compensation problems.</p> <p>Complied with.</p>
<p><b>Environmental Considerations</b></p>		
<p>24. In the design, implementation, and operation of project facilities, the Borrower and PC 1 shall ensure strict compliance with applicable environmental laws and regulations, to minimize adverse environmental impact. The Borrower shall ensure that PC 1 implements the mitigation measures indicated in the initial environmental examination report.</p>	<p>LA, Schedule 6, para. 10</p>	<p>Partially complied with. The testing for PCB of used transformers was not carried out.</p>

## ECONOMIC AND FINANCIAL ANALYSES

### A. Introduction

1. The Project consisted of a large number of subprojects aimed at improving the distribution systems (i.e., 110 kV and below) of the three cities. These subprojects do not have directly identifiable revenue streams, due to the absence of transparent transfer prices at different voltage levels. Hence, the financial economic viability of the overall investment program of the three cities during 1999–2003, of which the subprojects financed under the Project are part, is assessed. Although the Project was approved in 1995, the investments under the Project were commenced in 1999, due to procurement delays, and installation work continued until 2004.

2. The weighted average cost of capital is also calculated for the overall investment program of the three cities and was compared with the financial internal rate of return to ascertain the financial viability of the investment program. The financial analysis is carried out in a consistent manner with the economic analysis. The cash flows are appropriately adjusted to compute the economic benefits and costs of the investment program, and the economic internal rate of return is computed to ascertain the economic viability of the investment program of the three cities.

### B. Methodology of the Analysis

3. The analysis was carried out by comparing the financial and economic costs and benefits under the with and without investment program scenarios. Under the without scenario, there would not have been any investments in the distribution system of the three cities, and the demand (i.e., electricity sales) would have been curtailed when the distribution systems reached operational capacity. As the operational capacity of a electricity distribution system is not clearly defined, the rate of technical distribution losses is used as a proxy for the rate of use of capacity. The technical distribution losses are computed for the period 1999–2010 by assuming that the technical distribution losses are proportional to the total energy sales and by using the energy sales of 1998 as the base year. Technical distribution losses of 20% are considered to be the maximum tolerable level, and the utility was expected to curtail further demand growth once the distribution losses reached 20%.

4. Under the with scenario, the investments undertaken during 1999–2004 were considered, and the reduction in distribution losses compared to the without scenario was attributed to these investments. However, there would not be any new investments after 2004, and the future sales growth would be curtailed when the distribution system capacity, inclusive of the capacity added during 1999–2004, is fully exhausted. The technical distribution losses for 2004–2012 were calculated in a similar manner to the without scenario, but using distribution losses in 2003 as the base. Technical distribution losses of 15% are considered to be the permissible level of losses under this scenario, and new investments would be required to meet any further increase in demand. Technical distribution losses for the three cities under the with and without scenarios are shown in Table A8.1.

**Table A8.1: Estimated Distribution Losses With and Without the Project**  
(%)

Year	Hanoi		Hai Phong		Nam Dinh	
	Without	With	Without	With	Without	With
1999	12.73	11.07	8.85	7.59	8.63	7.68
2000	14.29	10.90	9.92	6.43	9.59	7.50
2001	15.76	11.26	10.99	6.41	10.91	7.10
2002	18.41	10.75	12.62	6.47	11.99	6.20
2003	20.72	9.23	3.73	6.34	13.41	6.18
2004	20.72	9.83	15.30	7.06	15.20	7.00
2005	20.72	10.92	17.60	8.13	17.25	7.95
2006	20.72	12.42	20.27	9.36	19.58	9.02
2007	20.72	13.86	20.27	10.54	19.58	10.24
2008	20.72	15.45	20.27	11.89	19.58	11.62
2009	20.72	15.45	20.27	13.41	19.58	13.19
2010	20.72	15.45	20.27	15.22	19.58	14.97
2011	20.72	15.45	20.27	15.22	19.58	14.97
2012	20.72	15.45	20.27	15.22	19.58	14.97

Source: Asian Development Bank estimates.

5. The actual sales up to 2003 and the projected sales beyond 2003 are used to estimate total revenues, economic benefits, and the distribution losses in the analysis. The revenues due to growth in demand after the system capacity (i.e., including capacity added during 1999–2004) is fully exhausted are not considered for the financial and economic analysis. The financial cost of system failure due to noninvestment in the three cities under the without scenario and the cost of unserved energy were also not considered in the analysis. The incremental financial benefits attributable to the investment program consist of the difference between the revenues and the cost under the with and without scenarios. They are the (i) incremental sales over and above the curtailed sales under the without scenario and (ii) total savings on distribution losses compared to the without scenario.

### C. Financial Analysis

6. The financial analysis was carried out on constant terms using 2003 prices. The investment undertaken during the period was adjusted using consumer price inflation to convert this to 2003 prices. The average sales revenue is used to compute revenues due to incremental sales, and the bulk tariff at which the power companies (i.e., Power Company Number 1, Hanoi Power Company, and Hai Phong Power Company) purchased electricity was used to calculate the cost of energy sold and the savings and cost due to incremental changes in distribution losses. These prices are summarized in Table A8.2. The operation and maintenance cost of the new investments is assumed to be 2.5% of the investments cost.

**Table A8.2: Sale Price of Electricity**

(D per kWh)

Item	Hanoi	Hai Phong	Nam Dinh
Average Sales Price	863	762	596
Bulk Purchase Price	738	561	390

D = dong, kWh = kilowatt hour.

Sources: Hanoi Power Company, Hai Phong Power Company, and Nam Dinh Power Department.

7. The incremental cash flows and the computation of financial internal rate of return of the investment program for the three cities are summarized in Tables A8.3–A8.5.

**Table A8.3: Hanoi Financial Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	(115)		25	(3)		(93)
2000	(229)		58	(9)		(180)
2001	(208)		84	(14)		(137)
2002	(315)	-	168	(22)	-	(169)
2003	(374)	-	283	(31)	-	(122)
2004	(299)	510	196	(38)	(436)	(67)
2005		851	135	(38)	(727)	221
2006		1,319	42	(38)	(1,126)	196
2007		1,768	(59)	(38)	(1,510)	161
2008–2024		2,265	(184)	(38)	(1,935)	109
<b>FIRR</b>						<b>11.6%</b>

FIRR = financial internal rate of return, O&amp;M = operation and maintenance.

Source: Asian Development Bank staff estimates.

**Table A8.4: Hai Phong Financial Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	(11)		5	(0)		(6)
2000	(154)		16	(4)		(142)
2001	(106)		24	(7)		(89)
2002	(89)		36	(9)		(61)
2003	(69)		48	(11)		(32)
2004	(19)		59	(11)		29
2005			78	(11)		67
2006			104	(11)		93
2007		164	80	(11)	(120)	112
2008		350	49	(11)	(257)	131
2009		560	10	(11)	(412)	147
2010–2024		810	(43)	(11)	(595)	161

**FIRR****21.1%**

FIRR = financial internal rate of return, O&amp;M = operation and maintenance.

Source: Asian Development Bank staff estimates.

**Table A8.5: Nam Dinh Financial Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	-60		1	-2		-60
2000	-9		3	-2		-8
2001	-14		6	-2		-10
2002	-22		10	-3		-15
2003	-25		14	-3		-14
2004	-30		18	-4		-16
2005			23	-4		19
2006			30	-4		26
2007		58	22	-4	-38	38
2008		124	13	-4	-81	52
2009		198	1	-4	-130	65
2010–2024		283	-15	-4	-185	79

**FIRR****20.7%**

FIRR = financial internal rate of return, O&amp;M = operation and maintenance.

Source: Asian Development Bank staff estimates.

8. The weighted average cost of capital is calculated for the total investment undertaken in distribution during 1999–2004 in the three cities. The financing sources would consist of the Asian Development Bank's loan and Electricity of Viet Nam's equity contribution financed through retained earnings and local currency loans. The FIRR for all three cities is greater than the weighted average cost of capital of the investment program (i.e., 4.61%).

## D. Economic Analysis

9. The economic analysis was carried out in a manner consistent with the financial analysis using constant 2003 prices and domestic price numeraire. The capital investment is adjusted for taxes, and the cost of imported capital goods (i.e., assumed to be 65% of the capital cost) is further adjusted using a shadow exchange rate factor of 1.1. The economic benefits due to incremental sales for residential and other consumer categories are valued at the willingness-to-pay estimates for residential and other consumers. The cost of sales and the savings per cost due to change in transmission losses are valued at the long-run marginal cost of supplying electricity to the respective power companies. These values are shown in Table A8.6.

**Table A8.6: Cost of Sales and Savings**  
(D per kWh)

Item	Hanoi	Hai Phong	Nam Dinh
WTP (residential)	2,596	2,596	2,596
WTP (other)	1,212	1,212	1,212
LRMC of bulk supply	799	780	860

D = dong, kWh = kilowatt-hour, LRMC = long-run marginal cost, WTP = willingness to pay.

Source: ECA Consulting Associates. 2003. *Interim Report: Electricity of Vietnam Tariff Study*.

**Table A8.7: Hanoi Economic Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	(110)		27	(3)		(86)
2000	(219)		63	(9)		(165)
2001	(199)		91	(14)		(122)
2002	(302)		182	(22)		(142)
2003	(358)		307	(31)		(83)
2004	(286)	968	212	(38)	(472)	383
2005		1,661	146	(38)	(787)	982
2006		2,561	45	(38)	(1,220)	1,347
2007		3,436	(64)	(38)	(1,636)	1,697
2008-2024		4,399	(199)	(38)	(2,096)	2,066
<b>EIRR</b>						<b>58.3%</b>

EIRR = economic internal rate of return, O&M = operation and maintenance.

Source: Asian Development Bank staff estimates.

**Table A8.8: Hai Phong Economic Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	(10)		7	(0)		(3)
2000	(148)		23	(4)		(129)
2001	(102)		33	(7)		(75)
2002	(85)		51	(9)		(43)
2003	(66)		66	(11)		(10)
2004	(18)		82	(11)		53
2005			109	(11)		98
2006			144	(11)		133
2007		324	111	(11)	(168)	256
2008		692	68	(11)	(358)	391
2009		1,103	14	(11)	(573)	532
2010-2024		1,630	-59	(11)	(829)	730
<b>EIRR</b>						<b>40.1%</b>

EIRR = economic internal rate of return, O&M = operation and maintenance.  
Source: Asian Development Bank staff estimates.

**Table A8.9: Nam Dinh Economic Analysis**

Year	Capital Investment	Incremental Sales	Incremental Losses	Incremental O&M Cost	Cost of Incremental Sales	Net Cash Flow
1999	(58)		3	(2)		(56)
2000	(9)		6	(2)		(5)
2001	(13)		13	(2)		(2)
2002	(21)		22	(3)		(2)
2003	(24)		31	(3)		4
2004	(29)		39	(4)		6
2005			51	(4)		47
2006			65	(4)		61
2007		203	49	(4)	(84)	165
2008		434	29	(4)	(179)	280
2009		696	2	(4)	(286)	408
2010–2024		994	(33)	(4)	(409)	549
<b>EIRR</b>						<b>46.8%</b>

EIRR = economic internal rate of return, O&M = operation and maintenance.  
Source: Asian Development Bank staff estimates.

## FINANCIAL PERFORMANCE OF EXECUTING AGENCY

1. Although the Project's Executing Agency was Power Company Number 1 (PC 1), PC 1 became an affiliated unit of Electricity of Viet Nam (EVN) at the commencement of the Project. During the implementation of the Project, the responsibility for power distribution in the cities of Haiphong and Hanoi was entrusted to two newly created power companies. (i.e., Hai Phong Power Company and Hanoi Power Company). The bulk tariff at which the power companies purchased electricity from EVN at the 110-kilovolt level was administratively set by EVN, to ensure the financial viability of each power company. Hence, it is more pertinent to assess the financial performance of EVN and the three power companies (i.e., PC 1, Hanoi Power Company, and Hai Phong Power Company) responsible for power distribution under the Project.

### A. Historical Financial Performance of Electricity of Viet Nam

2. As reflected by the energy sales (shown in Table A9.1), EVN's operations increased by over 75% between 1999 and 2003, representing an annual growth rate of 12%. Total electricity sales increased from 19.5 terawatt-hours (TWh) in 1999 to 34.4 TWh in 2003. Although the average tariffs net of sales tax has only increased marginally from D662 per kWh (\$0.0575 per kWh) in 1999 to D792 per kWh (\$0.0503 per kWh) by 2003, the net profit margin improved from 7.7% to 13.3% per annum, due to improvements in operational efficiencies. This enabled the net profits to reach D4,179 billion (\$249 million) by 2003, from D1,088 billion (\$78 million) in 1999.

3. The liquidity of EVN also improved during the period under consideration, as reflected by a reduction in receivables, from 29 days of turnover in 1999 to 20 days of turnover in 2003. At the same time, EVN maintains an average payable turnover rate of 200 days (partially due to treatment of some capital expenditures as current). This discrepancy between receivables and payables resulted in EVN's accumulating a significant cash surplus.

**Table A9.1: Financial Performance of EVN 1998–2003**  
(D billions)

Item	1999	2000	2001	2002	2003
Total Revenue	14,124	16,513	19,209	23,566	29,582
Revenue from Electricity Sales	12,934	15,135	17,540	21,474	27,281
Profit before Interest and Tax	2,618	2,100	2,127	3,110	7,159
Net Profit	1,088	883	999	1,650	4,179
Cash Flow from Operations	5,882	7,311	6,739	8,412	13,665
New Borrowings	6,201	8,866	6,132	6,507	11,632
Net Capital Injections	(287)	371	519	175	352
Investments	11,666	13,697	9,206	9,913	9,691
Debt Service	1,254	2,036	3,811	2,822	2,292
Self Financing Ratio (%)	22.7	32.9	49.4	46.4	72.3
Debt Service Coverage Ratio	4.8	3.0	1.8	3.5	5.9
Debt to Equity Ratio	0.7	0.9	0.9	1.0	1.1
Return on Net Fixed Assets (%)	8.9	6.7	5.1	5.9	11.3

Source: Annual Reports of EVN (1999-2003).

4. Cumulative capital investments and the debt service of EVN during 1998–2003 amounts to D58.7 trillion (\$4.0 billion) and D12.6 trillion (\$850.0 million), respectively. These investments were financed through cash flows from operations amounting to D39.2 trillion (\$2.6 billion), borrowings of D46.6 trillion (\$3.2 billion), and capital injections of D1.9 trillion (\$140.0 million). Although these increased borrowings have increased EVN's debt to equity ratio from 0.7 in 1998 to 1.1 by 2003, EVN still retains the capacity to absorb further borrowings to finance its investments in the context of strong growth in future cash flows and low initial gearing.

## B. Financial Projections (2004–2010)

5. Although the corporate structure of EVN is envisaged to be changed under the proposed power sector reforms, EVN is likely to remain as a holding company owning significant stakes of the operating subsidiaries. Electricity sales would reach 80.5 TWh in 2010, compared to 34.5 TWh in 2003, with annual growth rate slowing to 12.5% from 2005 onward, from 15.5% in 2003 and 2004. Energy losses are expected to be reduced to 13.5% by 2010, from 15.8% in 2003. EVN should purchase 32.6 TWh from third parties (private power producers and joint venture companies), out of the total generation of 93 TWh in 2010, at an average cost of D730 (\$0.42) per kWh, compared to the 2.1 TWh EVN purchased from independent power producers in 2003.

6. The aggregate financial projections of EVN for the time period and the key financial ratios for 2004–2009 are shown in the Table A9.2. The detailed financial projections of EVN on annual basis are provided in Table A9.3.

**Table A9.2: Financial Performance of EVN 2004–2009**  
(D billions)

Item	2004	2005	2006	2007	2008	2009
Total Revenue	34,633	40,099	50,229	57,153	65,056	74,104
Revenue from Electricity Sales	31,547	36,532	45,805	52,117	59,321	67,568
Profit before Interest and Tax	5,236	3,851	7,129	7,609	9,870	12,154
Net Profit	2,637	1,306	3,442	3,442	4,661	5,805
Cash Flow from Operations	13,451	14,078	17,643	19,199	24,500	27,514
Equity Proceeds		655	1,172	2,321	720	1,863
New Borrowings	12,583	18,183	22,030	26,441	26,824	31,093
Capital Injections	359	594	729	890	891	1036
Investments in Fixed Assets	19,426	27,838	33,979	40,660	41,373	47,312
Equity Investments in Joint Ventures	799	1,345	1,772	2,030	1,623	
Debt Service	4,351	6,088	7,968	10,380	13,294	16,272
Self Finance Ratio (%)	41.7	32.3	31.8	29.1	27.8	28.4
Debt Service Cover Ratio	3.1	2.4	2.4	2.1	1.8	1.9
Debt to Equity Ratio	1.2	1.5	1.7	1.8	1.9	2.0
Return on Net Fixed Assets (%)	9.1	6.4	11.5	12.1	13.1	12.2

Source: RRP of the Northern Power Transmission Sector Project.

### C. Financial Performance of Power Companies

7. The Financial performance of PC Hanoi, PC Hai Phong, and PC 1 are summarized in Table A9.3 below. It must be noted that only PC 1 was covenanted to provide audited financial statements to ADB, and the Project Completion Review Mission encountered difficulties in obtaining financial statements from PC Hai Phong.

**Table A9.3. Financial Performance of Hanoi Power Company, Hai Phong Power Company, and Power Company Number 1**  
(D billions)

Item	1999	2000	2001	2002	2003
<b>Hanoi Power Company</b>					
Average Sale Price (D/kWh)	713	742	741	772	863
Average Purchase Price (D/kWh)	596	627	629	660	738
Total Revenue	1,488	1,726	1,938	2,347	2,918
Purchase Cost	1,371	1,598	1,796	2,174	2,674
Net Profit	53	41	34	48	27
Fixed Assets	286	452	577	740	1,071
Long-term Liabilities	110	117	98	114	134
Return on Assets (%)	18.6	9.0	5.9	6.5	2.5
<b>Power Company Number 1</b>					
Average Sale Price (D/kWh)	502	522	519	532	596
Average Purchase Price (D/kWh)	315	348	333	347	390
Total Revenue	2,831	3,473	4,073	4,840	6,231
Purchase Cost	2,444	3,091	3,591	4,309	5,591
Net Profit	110	57	82	52	132
Fixed Assets	1,574	1,933	2,739	3,302	4,266
Long-term Liabilities	525	746	1,286	1,603	1,864
Return on Assets (%)	7.0	3.0	3.0	1.6	3.1
<b>Hai Phong Power Company</b>					
Average Sale Price (D/kWh)	669	677	680	700	762
Average Purchase Price (D/kWh)	489	512	501	516	561
Total Revenue	514	577	639	756	895
Purchase Cost	397	455	493	584	688
Net Profit	31	22	23	26	22
Fixed Assets	291	308	336	474	647
Long-term Liabilities	7	21	264	310	272
Return on Assets (%)	10.8	7.0	6.7	5.5	3.5

D = dong, kWh = kilowatt hour.

Source(s): Annual Reports of PC 1, Hanoi Power Company, and Hai Phong Power Company.

## **ENVIRONMENTAL AND RESETTLEMENT IMPACTS**

1. The following was prepared based on the project completion report (PCR) submitted by the Executing Agency (EA) at the time of the Asian Development Bank (ADB) project closure, and the observations made by ADB's Project Completion Review Mission. The EA did not submit a resettlement completion report to cover the issues pertaining to the installation work carried out after ADB project closure.

### **A. Resettlement and Compensation Monitoring**

2. At the time of the inception of the Project, it was estimated that less than 200 households would be affected. Because of the limited number of affected people, no resettlement plan was elaborated at the feasibility and design stages. Resettlement was since then carried out by each project management board (Hanoi, Hai Phong, and Nam Dinh), according to the national Vietnamese legal framework and provincial legal framework for each city.

3. The resettlement implementation organization of the Project consisted of the following levels:

- (i) Project management board (PMB) of the respective city: Director of power company is also director of PMB; deputy-director of power company is steering director of the Project. A member of PMB is in charge of compensation and resettlement implementation.
- (ii) District resettlement committee (DRC). The deputy chair of the district people's committee is chair of district resettlement committee. The members of DRC are representatives of Cadastral Department, Financial and Price Department, Urban Management Department, and National Front.
- (iii) Chair of the communal people's committee is member of district resettlement committee.

4. Since no resettlement plan was established at the outset of the Project, the PCR submitted by the EA focused on the Project's compliance with ADB's policy toward affected people (or households), as it was known then, as follows:

- (i) displaced people should be compensated for their losses at full replacement cost prior to project implementation;
- (ii) displaced people should be assisted with the move and supported during the transition period in the resettlement site, if one existed; and
- (iii) displaced people should be assisted in their efforts to improve their former living standards, income earning capacity, and production levels, or at least to restore them.

5. A random sample of project affected people were interviewed by the Project Completion Review Mission, and it was observed that they were generally satisfied with their compensation payment and pleased with solution of land exchange agreed between them and the local authority. In fact, for the areas surveyed, all the population in the project area, not only the affected people but also the nonaffected people and local authorities, were satisfied with the Project. The survey conducted by the Borrower with the assistance of the implementing consultants, as part of the Borrower's PCR also showed that almost all of the surveyed affected

people had higher incomes compared with those they had before the Project. Almost all of them said their lives were better after the Project than before project implementation.

6. A total of 325 people were affected by the Project. Of this, 237 lost agricultural land and 69 residential land. However, severely affected people (those who lost more than 20% of their agricultural land) accounted only for four households in Hai Phong and 12 in Hanoi. In Nam Dinh, the total amount of agricultural land for affected farmers was not available, but all of them were compensated with agricultural land. The only noted exception to this endorsement to the resettlement and compensation was in Haiphong, where some affected people complained they were unable to earn a wage and enjoy a standard of living in their new location equal to that which they had in their old location. But these complaints were the exception rather than the rule. The data related to the resettlement activities associated with the Project are summarized in Table A10.

**Table A10: Resettlement Data<sup>a</sup>**

<b>Location</b>	<b>Agricultural Land</b>	<b>Residential Land</b>	<b>Graves</b>	<b>Ponds and Gardens</b>	<b>Total</b>
<b>Hanoi</b>					
Nhat Tan Substation	13		15		
Thanh Nhan Substation		30			
Chem-Nhat Tan TL	78				
Mai Dong/Thanh Nhan TL	1			1	
<b>Subtotal</b>	<b>92</b>	<b>30</b>	<b>15</b>	<b>1</b>	<b>138</b>
<b>Hai Phong</b>					
Le Chan Substation	25				
Cat Bi Substation	22	2			
An Lac Substation	11	2			
Cat Bi TL	40	20			
<b>Subtotal</b>	<b>105</b>	<b>35</b>			<b>140</b>
<b>Nam Dinh</b>					
My Sa Substation	13				
My Xa-Khu Tam TL	27	4		3	
<b>Subtotal</b>	<b>40</b>	<b>4</b>		<b>3</b>	<b>47</b>
<b>Total</b>	<b>237</b>	<b>69</b>	<b>15</b>	<b>4</b>	<b>325</b>

<sup>a</sup> The number of affected people per household.

TL = transmission line.

Source: Project Completion Report of the Borrower.

7. Project delays were considerable, especially in Hai Phong and Hanoi, where disagreements occurred concerning the amount of compensation to be paid to the people who are occupying the land without legal rights as well as to people who are using land meant for agricultural use as residential land. As the compensation was paid according to the prevailing Vietnamese regulations, the principle of full market value was not applied when ownership and

right of residency were not clearly established. These problems particularly delayed the Thanh Nhan substation in Hanoi and the Cat Bi and Le Chan 110-kilovolt transmission lines in Hai Phong. The building of Nhat Tan substation was delayed due to the need for acquiring land from a graveyard and the cultural practices associated with moving graves in Viet Nam. The rapid urbanization and expansion of city limits with associated appreciation of land prices in urban areas also contributed to the disagreement on the official price of land and the perceived market price of land. The expectation of the affected people that the acquired agricultural land would be reclassified as residential land in the near future, due to rapid urbanization, was another reason for disagreement on the market price.

## **B. Environment**

8. The environmental impact assessment (EIA) of the Project was completed in June 1996. The environmental monitoring focused on three aspects:

- (i) compliance of the construction works with the EIA;
- (ii) grievances and comments of affected people and local authorities; and
- (iii) management of oil and equipment potentially containing polychlorobiphenyls (PCB), a hazardous waste.

9. In general, the construction works were carried out with appropriate respect for the environment. The affected population and the local authorities were highly satisfied with the Project. However, the procedures for testing and handling replaced distribution transformers with potential for PCBs needs to be improved. It was proposed to test the old transformers manufactured prior to 1985 for PCBs, and if the PCB content is more than 50 parts per million, these transformers must be transported, stored, and eliminated according to Vietnamese legislation. However, it is not clear whether these procedures are adhered to in actual practice. Due to the long delays encountered in commencing installation work, the validity period of PCB testing equipment procured under the Project had expired, and equipment could not be used for testing for PCBs. More than 1,000 transformers were to have been replaced during the Project. It is understood through interviews with the EA that the replaced transformers were removed from service, and those that were not placed back into service elsewhere were moved to storage yards, tested for PCBs, and labeled accordingly.

10. In general, construction works were carried out with appropriate respect for the environment in each city. The Project will constitute an improvement in environment and worker and population safety, compared with the situation before project implementation. Due to the urban locations of 110-kilovolt/medium-voltage substations installed under the Project, noise pollution and groundwater and surface water pollution, due to leakage of transformer oil, were noted.

## QUANTITATIVE ASSESSMENT OF OVERALL PROJECT PERFORMANCE

### Table A11.1: Overall Rating

Criteria	Assessment	Rating (0–3)	Weights (%)	Weighted Rating
Relevance	Highly Relevant	3	20	0.60
Efficacy	Efficacious	2	25	0.50
Efficiency	Efficient	2	20	0.40
Sustainability	Most Likely	3	20	0.60
Institutional Development	Moderate	1	15	0.15
<b>Overall Rating</b>				<b>2.25</b> (Successful)

## Notes:

- Relevance: Project objectives and outputs were relevant to strategic objectives of the Government and ADB.  
 Efficacy: Project achieved its targets and objectives.  
 Efficiency: Project achieved objectives in an efficient manner.  
 Sustainability: Project benefits and development impacts are sustainable.  
 Institutional Development: Project had beneficial impacts on government policy and institutional capacity, and other positive social impacts.  
 Source: Asian Development Bank Staff estimates.

### Table A11.2: Rating System

Rating Value	Relevance	Efficacy	Efficiency	Sustainability	Institutional Development
3	Highly Relevant	Highly Efficacious	Highly Efficient	Most Likely	Substantial
2	Relevant	Efficacious	Efficient	Likely	Significant
1	Partly Relevant	Partly Efficacious	Partly Efficient	Less Likely	Moderate
0	Irrelevant	Inefficacious	Inefficient	Unlikely	Negligible

## Notes:

- Rating:  
 > 2.5 = Highly successful  
 1.6-2.5 = Successful  
 0.6-1.6 = Partly successful  
 < 0.6 = Unsuccessful