

ASIAN DEVELOPMENT BANK

TAR: NEP 32241

TECHNICAL ASSISTANCE
(Financed from the Japan Special Fund)

TO THE

KINGDOM OF NEPAL

FOR

MANAGEMENT REFORMS AND EFFICIENCY IMPROVEMENTS

FOR THE NEPAL ELECTRICITY AUTHORITY

November 2000

CURRENCY EQUIVALENTS

(as of 15 November 2000)

Currency Unit	–	Nepalese Rupee/s (NRe/NRs)
NRe1.00	=	\$0.0134
\$1.00	=	NRs74.72

The Nepalese rupee is pegged to the Indian rupee (Re) at NRs1.60 to Re1.00 and is fully convertible on all current account transactions.

ABBREVIATIONS

ADB	–	Asian Development Bank
DSM	–	demand side management
NEA	–	Nepal Electricity Authority
TA	–	technical assistance

NOTES

- (i) The fiscal year of the Government and NEA ends on 15 July. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY1999 ended on 15 July 1999.
- (ii) In this report, "\$" refers to US dollars.

I. INTRODUCTION

1. During the Asian Development Bank's (ADB) Country Programming Mission of February 1999, His Majesty's Government of Nepal requested assistance with institutional development in the power sector. The Technical Assistance (TA) is included in the country assistance plan for Nepal for 2000. The Fact-Finding Mission was conducted in March 2000, and reached an understanding with the Government on the TA's major components, objectives, cost estimates and financing, and the draft terms of reference.¹ The TA framework is presented in Appendix 1.

II. BACKGROUND AND RATIONALE

2. The power sector in Nepal is dominated by the Nepal Electricity Authority (NEA), a Government-owned and controlled utility that generates 85 percent of the public sector power supply, the balance being provided by two independent power projects. NEA also transmits and distributes all of the public power supply in Nepal, except for the operations of the small Butwal Power Company, which supplies and distributes about 2 percent of the national total in the Butwal region. The total installed generating capacity owned and operated by NEA and the two independent power producers is now 409 megawatts. While NEA has been able to expand service to meet load growth in recent years, NEA's efficiency, autonomy, and management effectiveness is unsatisfactory. Improvements in NEA's operations can best be achieved by increasing NEA's autonomy, establishing a more commercial orientation, and decentralizing some of its operations, particularly distribution.

3. NEA's weak management performance is evident in several problem areas. No direct performance incentives are provided to NEA managers or staff at any level to improve efficiency or performance. Promotions and salary levels follow civil service practices in Nepal and are based primarily on seniority, not on performance, with professional salary levels that are low compared with the private sector. The fear of critical scrutiny in case of a questionable decision seems to be more important than the desire to make a good decision on time. Consequently, all levels of NEA management have had difficulty making critical decisions to resolve construction disputes required for orderly implementation of the Kali Gandaki Hydropower Project.² NEA has paid little attention to commercial matters in its operations. Consequently its financial accounting is disorganized and unsatisfactory; the completion of final audited financial accounts is always late, and the external auditors have raised many qualifications about these accounts. NEA's tariffs are inadequate, and its financial performance falls far short of the performance targets agreed to with ADB. No progress has been made recently to implement several measures required for commercial strengthening of NEA, including a tariff increase, which were agreed to as conditions for effectiveness of the last ADB loan to NEA for the Rural Electrification Project.³ The Government has very close control over NEA management and operations, and the instability of governments in Nepal in recent years has not been conducive to establishing long-term objectives with a steady implementation course. NEA would be able to operate more effectively if it had more autonomy and a senior management group and board of directors appointed on the basis of competence and relevant experience. A critical diagnostic review of NEA's management and recommendations on strengthening and reform of management are required to achieve this.

¹ The TA first appeared in *ADB Business Opportunities* in March 2000.

² Loan 1452-NEP: *Kali Gandaki Hydropower Project*, for \$160 million, approved on 23 July 1996.

³ Loan 1732-NEP: *Rural Electrification, Distribution, and Transmission Project*, for \$50 million, approved on 21 December 1999.

4. The need for NEA restructuring is recognized in the Government's recent draft policy paper on Hydropower Development Policy (Year 2000), which should be approved by cabinet soon. This paper states that NEA shall be unbundled to operate its existing power generation, transmission and distribution systems separately by establishing appropriate institutions. For distribution system operation, local agencies or the private sector shall be encouraged. However, no plans or time frame for unbundling have been prepared yet. The World Bank and ADB have also discussed such reforms in general terms with the Government.⁴ Unbundling all of NEA's operations will be a very complex and lengthy process. However, the less radical step of restructuring NEA's distribution operations should be more manageable and would achieve a large part of the total efficiency gains expected from more difficult overall restructuring. Distribution restructuring should result in more focused attention to cost control and efficiency of distribution operations, and in more regional and local control over both development and operations. Distribution system restructuring should therefore be the first priority and first step in a long-term general plan for overall unbundling.

5. NEA's efficiency can also be improved in some other areas with less ambitious measures. The planning procedures used in the past by NEA and its consultants for optimum hydro project sizing have not been based on a very accurate analysis of the differences in value between wet season and dry season power generation. The tariff structure for bulk power purchases by NEA from private hydro projects also does not adequately recognize these differences in values. Therefore, a more accurate analysis of the monthly variations in value of hydropower generation is required to improve NEA's project planning and for the negotiation of power purchase agreements.

6. NEA's power system has a relatively low annual load factor⁵ of about 52 percent. The high peak loads in relation to average power loads are costly for NEA to supply, which leads to relatively high average costs of power supply. NEA's high average tariffs also make it important and worthwhile for NEA to assist its customers to use electricity in the most economically efficient manner. These two considerations provide the justification for demand-side management (DSM) study, which has the objectives of improving efficiency of electricity consumption, and reducing NEA's peak loads so that average power supply costs can be reduced.

III. THE TECHNICAL ASSISTANCE

A. Objectives

7. This advisory TA has several objectives, which are to reform and strengthen NEA's management; to evaluate options for restructuring NEA's distribution system to improve accountability and efficiency; and to help NEA improve its efficiency and reduce costs of power supply.

B. Scope

8. The TA includes four distinct components.

⁴ See draft Power Sector Development Strategy for Nepal, September 2000, prepared by the World Bank in consultation with ADB staff. This study identifies several models for restructuring and unbundling Nepal's power sector. The first draft of this study was discussed at a workshop in Nepal in February 2000, also attended by ADB. The second draft of this study is now being reviewed by the Government.

⁵ Annual load factor is the ratio of average load to peak annual load.

1. Management Reforms in NEA

9. This study will evaluate the organization and effectiveness of NEA's management structure and procedures and recommend improvements. NEA's relations with the Government will be reviewed, with a view to make NEA more autonomous. The conversion of NEA to a corporation or company, with a more independent board of directors, will be one option. The study should evaluate not only the functional structure of management, but also policies and procedures for establishing performance targets for managers, for monitoring performance, for promotions, and for other performance incentives. Outline terms of reference for this study are presented in Appendix 2. NEA's weak institutional capacity in financial management and accounting is one problem area (para. 3). However, other assistance is already planned in this area, including two sizeable components under Loan 1732-NEP (footnote 3) to establish computerized customer billing systems and to revalue NEA's fixed assets and establish computer databases for these. The World Bank is also planning to assist NEA with establishment of computerized accounting systems under its planned Power Development Project. Therefore, additional special assistance on this subject under this TA is not a priority.

10. The consultants will interview NEA staff, and retired senior NEA staff, as well as NEA board members and government officials, and other public stakeholders to seek their views on how effective the current management systems and procedures are, their strengths and weaknesses, and to prepare proposals for improvement. NEA's performance and management will also be compared with other electric utilities of similar size. Workshops will be organized to brainstorm on problems, to discuss the findings of this study with the stakeholders, including public interest groups, to discuss various options for change and improvement, and to seek consensus on the best program for improvements. The TA will attempt to ensure that some interim reforms are implemented during TA implementation. A follow-up TA may be required if the proposed reforms are complex and require consulting assistance for detailed design and implementation. In such a case, firm commitments to reform will also be required before a follow-up TA is processed.

2. Distribution System Restructuring

11. This study will evaluate the feasibility of different models for restructuring of NEA's electricity distribution system. Such restructuring should improve the efficiency and reduce average costs of distribution, which are currently high. Various models for reform and restructuring of distribution will be evaluated, including: (i) establishment of distribution district profit centers; (ii) bulk power sales by NEA to local cooperatives and municipalities, which will be responsible for distribution; (iii) leasing of NEA's distribution system to independent operators for some branches; (iv) unbundling NEA's entire distribution system into several separate regional companies; and (v) eventual privatization of some or all of these distribution companies. Proposals to establish equity between low cost and high cost distribution areas should be prepared, as well as proposals to provide support or subsidies for expansion of rural electrification. Models for regulation of tariffs also need to be described. The outline terms of reference for consultants to prepare a feasibility study of restructuring NEA's distribution are presented in Appendix 2. The expected benefits as well as the costs and difficulties of each model will be evaluated. Preliminary plans will be prepared for the recommended reforms and restructuring. A follow-up TA may be required if the agreed plan for restructuring is complex and requires consulting assistance for detailed design and implementation.

3. Monthly Marginal Costs of Power and Bulk Tariff Structure

12. NEA needs a more accurate analysis of its monthly marginal costs of power supply with refinement into monthly values of dependable peaking capacity, firm energy, and nonfirm energy. This information is important to (i) optimize the design of new hydro powerplants in feasibility studies; (ii) establish an improved tariff structure that recognizes these refinements for bulk power purchase agreements; and (iii) evaluate the benefits of new transmission interconnections with India for seasonal power trading. Outline terms of reference for this work are presented in Appendix 2.

4. Demand-Side Management Study

13. The demand-side management (DSM) study will assess the patterns of electricity end use by NEA's main customer categories (domestic, commercial, and industrial), to determine the efficiency of consumption, and to research opportunities for improvements in efficiency of end use. The study will evaluate the expected benefits, the expected costs and implementation arrangements, and the overall feasibility of establishing DSM programs and efficiency improvements in various subsectors. The most cost-effective programs will be identified, and detailed plans for a DSM program will be prepared. Refinements of the tariff structure and introduction of time-of-day tariffs will be one of the options to consider for larger commercial and industrial consumers. The ultimate objectives will be to improve efficiency of energy consumption, and to reduce the high peak loads on NEA's power system and reduce costs of power supply. Outline terms of reference for this component are presented in Appendix 2.

C. Cost Estimates and Financing Plan

14. The estimated total cost of the TA is \$975,000 equivalent, of which the foreign exchange cost is \$720,000 and the local currency cost \$255,000 equivalent. ADB will finance \$800,000, which will cover all costs for international and domestic consulting. The ADB budget also includes provision for a small study tour to evaluate distribution sector restructuring, and for travel costs to Manila for a midterm review of the TA with senior ADB staff. The TA will be financed on a grant basis from the Japan Special Fund, funded by the Government of Japan. The Government and NEA will contribute about \$175,000 in local currency equivalent in the form of services and facilities. Details of the cost estimates and financing plan are shown in Appendix 3.

D. Implementation Arrangements

15. The Ministry of Water Resources, which contains NEA, will be the Executing Agency. The Government will appoint a steering committee composed of senior Government and NEA officers, chaired by the secretary of water resources, to provide guidance to the consultants and review their work at appropriate times. The steering committee should be broad-based, and represent various stakeholders. The Ministry or NEA will appoint a TA manager, who will be a senior professional, to work with the consultants on a full-time basis; NEA will also appoint other staff to work with the consultants on a part-time basis as required.

16. Consultants will be engaged by ADB to conduct these studies. The international consultants, in association with domestic consultants, will be recruited in accordance with ADB's *Guidelines on the Use of Consultants*, to provide about 18 person-months of international consulting services and about 15 person-months of domestic consulting services. The table provides a breakdown of the consulting inputs for each component.

Table: Consulting Requirements (person-months)

Component	International	Domestic
NEA Management Reforms	6	6
Distribution System Restructuring	6	6
Marginal Cost Study	3	0
Demand-Side Management Study	3	3
Total	18	15

NEA = Nepal Electricity Authority.

17. ADB will recruit the consultants to conduct studies for the TA components. Because of the wide ranged expertise required, the work will be divided into two parts for the purpose of recruiting consultants. Part 1 will include NEA management reforms and distribution system restructuring; and part 2 the marginal cost study and DSM study. Consulting firms may submit proposals to conduct either or both parts, but the proposals will be evaluated separately.

18. For part 1, the international consultants must be experienced in the evaluation and improvement of management practices for similar electric utilities, and management and restructuring of distribution system operations. The international consultants will be encouraged to associate with domestic consultants who are familiar with NEA's operations, with methods to promote improved management, and with the likely feasibility and acceptability of different models for restructuring NEA management and NEA distribution operations.

19. For part 2, the international consultants must be experienced in long-run marginal cost analysis of power supply, including experience in generation planning, computer modeling of power system operations, and loss-of-load probability studies. For the DSM study, the consultant must have experience planning DSM programs for low-income Asian countries. Domestic consultants will also be engaged to assist with survey work and evaluate options.

20. The TA will be implemented over about 10 months, beginning in March 2001. The major milestones and reports required from the consultants will include an inception report (1 month after start); issues and options report for part 1 studies (2-3 months after start); workshops in Nepal (for part 1); midterm tripartite review in Nepal, for both parts (month 5); midterm tripartite review in Manila for part 1 studies (month 6); draft final report (8 months after start); final tripartite review meeting in Nepal (month 9); and final report (month 10).

21. ADB missions will meet with the consultants and the Government to review progress and provide guidance at the tripartite midterm reviews in Nepal and in Manila, and at the final tripartite review meeting in Nepal. Staff from the ADB's Nepal Resident Mission will provide review and guidance when required. A midterm review of the TA in Manila is planned with the consultant and key NEA and Government officers.

IV. THE PRESIDENT'S DECISION

22. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance, on a grant basis, to His Majesty's Government of Nepal in an amount not exceeding the equivalent of \$800,000 for the purpose of Management Reforms and Efficiency Improvements for the Nepal Electricity Authority, and hereby reports such action to the Board.

TECHNICAL ASSISTANCE FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>1. Goal</p> <ul style="list-style-type: none"> Promote economic growth and standards of living, in both rural and urban areas, through improved access to electricity. Improve financial and operational performance of Nepal Electricity Authority (NEA), and its governance. 	<ul style="list-style-type: none"> Increase national electrification ratio from low level of 15%. Enable NEA's total sales to grow at 9% per year. Ensure regular annual tariff increases to achieve 6% rate of return and 23% self-financing ratio. Improve efficiency of power supply, and keep costs under control. 	<ul style="list-style-type: none"> Country economic reviews NEA annual reports 	
<p>2. Purpose</p> <ul style="list-style-type: none"> Improve NEA's management to make it more effective, responsive, and efficient. Ensure adequate autonomy for NEA, and a more commercial orientation. Restructure NEA's distribution to improve its efficiency and effectiveness, and to prepare for possible future privatization. Improve efficiency of power consumption and conservation, and improve project planning. 	<ul style="list-style-type: none"> Implement reforms and performance incentives for NEA management to achieve agreed performance targets, and to improve efficiency. Reduce total distribution losses to less than 20%. Make distribution staffing more efficient. Reduce total power demands and load growth in Nepal, and reduce average costs of power supply. 	<ul style="list-style-type: none"> Asian Development Bank (ADB) review missions 	<ul style="list-style-type: none"> The political will and support of the Government for any major reforms or distribution restructuring needs to be confirmed at the end of the Technical Assistance. Future privatization of distribution could be difficult, due to scarcity of private capital, and uncertainty about tariff regulation.
<p>3. Outputs</p> <ul style="list-style-type: none"> Specific program to reform NEA management, and with performance incentives for overall performance, and for performance on specific tasks. Feasibility study for restructuring and unbundling NEA's distribution system which 	<ul style="list-style-type: none"> Performance targets for management will be established in various accounts. These will include efficiencies, staffing ratios, implementing projects and programs effectively, and on schedule, etc. At a minimum, some pilot projects 	<ul style="list-style-type: none"> ADB staff to join initial inception mission, and review inception report Tripartite midterm TA review meeting and workshops in Nepal Tripartite review meeting in Manila to review outline of 	<ul style="list-style-type: none"> Need commitment by NEA and Government to implement agreed reforms in serious manner More ambitious models for restructuring may not be politically feasible,

Reference in text: page 1, para. 1)

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
<p>includes various options for restructuring that will improve accountability and reduce costs.</p> <ul style="list-style-type: none"> Analysis of marginal costs of power supply in Nepal to improve design of bulk supply tariffs, and hydro project planning Demand-side management (DSM) program to improve efficiency of electricity consumption, and to reduce peak loads and improve system load factors. 	<p>for improved distribution models should be agreed to. At most, general plans will be prepared to unbundle NEA's distribution into several independent regional companies, with provision for eventual privatization.</p> <ul style="list-style-type: none"> Determine long-run monthly marginal costs of energy generation and dependable capacity in Nepal. Reduce peak power loads on the NEA system, and increase system load factor by at least 3%. 	<p>proposed reforms</p> <ul style="list-style-type: none"> Tripartite review meeting in Nepal to review draft final TA reports 	<p>and may overload institutional capacity in Nepal.</p> <ul style="list-style-type: none"> More complex models for restructuring will probably require another TA for detailed planning and design. Plans for financing of distribution development after restructuring may be problematic. NEA staff may not have experience or strong incentive to implement the DSM program.
<p>4. Activities</p> <ul style="list-style-type: none"> Appointment of consultants Diagnostic studies and workshops Identify issues and options Discuss these in workshops and reach general consensus on required reforms Prepare detailed plans for reforms Prepare required reports, review these and reach final agreement 			<ul style="list-style-type: none"> If commitment to reform is weak, program will be delayed and only partially implemented. Performance incentives need to be balanced with determination to identify and remove nonperformers.
<p>5. Inputs</p> <ul style="list-style-type: none"> Consulting services for 4 tasks, with 18 person-months of international consulting and 15 of domestic consulting. Total \$800,000 for TA budget Substantial inputs from NEA staff, government officials, and ADB staff throughout TA 			

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The consulting assistance required will be divided into four major components, which are described in outline form in the following sections.

A. Management Reforms within the Nepal Electricity Authority (NEA)

2. Consultants will be engaged to carry out the following work:

- (i) Conduct a diagnostic study to describe the organization and operations, and to evaluate the effectiveness of NEA's current management system.
- (ii) Interview NEA staff, and retired senior NEA staff, as well as NEA board members and other government officials, to seek their views on how effective NEA's current management systems and procedures are, its strengths and weaknesses.
- (iii) Conduct workshops with representatives from NEA, government agencies, and public stakeholders, to seek their views on how effective NEA management is and how it could be improved and reformed.
- (iv) Compare NEA's performance and efficiency with that of other similar electric utilities on various accounts.
- (v) Prepare proposals for improvement of NEA's management. The improvements should consider the following measures:
 - (a) establish an overall performance contract between NEA's senior management and the Government to ensure that overall performance targets are met, including satisfactory financial performance of NEA, satisfactory efficiency improvements such as loss reduction, timely development and completion of new projects, compliance with Asian Development Bank (ADB) loan covenants on various accounts, etc.
 - (b) Establish specific sets of performance targets for all NEA managers, and systems for regular monitoring, measurement, and evaluation of performance. Performance evaluation can be implemented for most activities, including operation and maintenance, construction management, customer billing and collections, financial accounting, etc.
 - (c) Establish effective performance incentives, including special bonuses, salary raises, etc. for satisfactory and excellent performance.
 - (d) Implement procedures to ensure that promotion is based on performance, merit, ability, and relevant experience, and that decisions on promotion are made in a fair and transparent manner.
 - (e) Implement procedures to ensure that managers with weak performance records are replaced.
 - (f) Increase salary and benefit scales for professional staff at NEA to match comparable benefits in the private sector in Nepal.
 - (g) Recommend appropriate total staff levels for NEA, and number of staff required in various professions and subsector operations, based on staff ratios for other well-managed utilities. Recommend procedures and criteria for selection and appointment of new staff.
- (vi) Prepare proposals for making NEA more autonomous, while retaining satisfactory accountability to Government for its overall performance. The improvements should consider the following:
 - (a) Review the present process of selecting directors for NEA's board, and the contributions of various directors and effectiveness of the board.

Suggest ways and means to improve the selection of directors and the effectiveness of the board. Propose guidelines for the selection of directors to ensure that all directors are professionally qualified, with adequate diversity; and that public interests are adequately represented. Propose measures to ensure that the board is independent of political interference.

- (b) Convert NEA to a government-owned corporation, or register it under the Company's Act, which will facilitate eventual divestiture.
- (vii) Organize workshops to discuss the findings of this study, and the various options for reform and improvement, and to seek consensus on the best plans for improvements. These should include stakeholders from many fields, including the public.
- (viii) Prepare a detailed plan of recommended reforms of NEA that will be effective, feasible, and acceptable to the Government and ADB. Include time-bound action plans to implement the reforms.
- (ix) If the remaining time and budget under this TA is not adequate to complete all detailed plans, then prepare detailed terms of reference for consultants who will assist with detailed planning and implementation of the reforms.

B. Feasibility of Restructuring NEA's Distribution System

3. Consultants will be engaged to carry out the following work:

- (i) Conduct a detailed review of the efficiency of NEA's current distribution system operations, including the following accounts: average capital costs (based on revalued assets) in urban and rural areas; average operating costs and staffing levels, and losses. Compare these with international norms for other electric utilities of similar size, in similar geographic and economic conditions. Conduct field trips to inspect distribution systems and operations, and review statistical data.
- (ii) Recommend measures and plans to improve the planning, design, operation, and management of NEA's distribution system, short of restructuring. Estimate how much improvement could be expected if the distribution system continues to be controlled primarily by NEA.
- (iii) Provide assistance to NEA in establishing distribution district profit centers within NEA, with internal cost accounting systems, performance targets, and performance incentives for staff to improve efficiency, reduce losses, and improve net annual earnings.
- (iv) Evaluate the feasibility of plans for NEA to sell bulk power supply to local community cooperatives in rural areas, and to municipalities in larger urban areas. Develop plans for the organization and management of such sales, including plans for ownership or leasing of such distribution and financing of capital improvements, policies for establishing bulk supply tariffs and retail tariffs, etc. Review and describe the experiences with such models for distribution in Nepal to the extent that they have already been practiced, and in other countries.
- (v) Evaluate the feasibility and public acceptability of plans for NEA to sell bulk power supply to local private distribution companies. These companies may be responsible only for operation and management of distribution systems owned by NEA, at agreed retail tariffs; or they may lease the distribution systems from NEA; or they may be responsible for operation and maintenance, and ownership and financing of expansion.

- (vi) Evaluate the feasibility of separating NEA's distribution system operations from its other operations, and establishing three or more separate distribution companies. These new companies could serve, for example, the Eastern Region, the Central-Terai region, the Central-Bagmati region, and the Western Region. Describe the expected advantages and benefits of such restructuring, as well as the expected disadvantages and costs. Prepare preliminary plans for such restructuring, including descriptions of how assets should be evaluated and transferred, how bulk supply and retail tariffs could be established, and how commercial interactions would be established between these new companies and the remaining transmission and generation controlled by NEA.
- (vii) Evaluate the feasibility of the privatization of some or all of NEA's distribution operations, in the near term and in the long term. Evaluate different models for public-private ownership.
- (viii) Determine the extent of regulation by a Government-appointed regulatory agency that would be required for the above models for restructuring of distribution.
- (ix) Assist NEA and the Government in making presentations and conducting workshops to discuss the above options for restructuring of distribution system operations, and in reaching a consensus on what form of restructuring or development is best.
- (x) Prepare more detailed plans for the agreed model for restructuring NEA's distribution. If the remaining time and budget under this TA is not adequate to complete all detailed plans, then prepare detailed terms of reference for consultants who will assist with detailed planning and implementation of the restructuring.

C. Analyze Monthly Marginal Costs of Power

4. Consultants will be engaged to carry out the following work:

- (i) Review the previous work on this subject in Nepal (Power System Master Plan, including the Generation Expansion Plan and the Long-Run Marginal Cost (LRMC) Study, completed September 1998). This study calculated LRMCs for energy and capacity on an annual basis. However, the attempt to split this into seasonal values for wet and dry seasons was too simple, and no attempt was made to determine monthly values.
- (ii) Review the power system planning models available at NEA (POWSIM program for power system simulation, and WASP III program for generation expansion), and determine whether they are suitable for the analysis required. NEA has already conducted studies with POWSIM to determine the monthly LRMC of energy generation. Preference should be given to using computer planning models already available at NEA if they are suitable, rather than introducing new proprietary models of the consultants. NEA staff will assist with the operation of their models.
- (iii) Prepare a detailed methodology and work plan to determine monthly values of power generation, including values of dependable peaking capacity, firm energy generation, and secondary or nonfirm energy. Review this work plan with ADB and NEA staff. This work plan will require establishing a model to estimate loss-of-load probability (LOLP) and energy not served (ENS) for power supply on a monthly basis for the NEA system. NEA currently lacks such an LOLP model.
- (iv) Conduct the studies according to the agreed plan.

- (v) Recommend an appropriate monthly tariff structure for power purchase agreements.
- (vi) Review the results with ADB and NEA staff, and make any revisions required.

D. Demand-Side Management (DSM) Study

5. Consultants will be engaged to carry out the following work:

- (i) Review the previous studies and work on this subject in Nepal (Electricite de France prepared a DSM study for NEA in 1989), and summarize the lessons learned (were DSM programs attempted, were they successful, and if not then what were the problems and obstacles).
- (ii) Design and conduct surveys to assess the patterns of electricity end use by NEA's main customer categories (domestic, commercial, industrial, municipal lighting, etc.).
- (iii) Determine the efficiency of use for various purposes; and determine what opportunities exist for significant and economic improvements in efficiency of electricity use in Nepal, and for reductions in peak loads.
- (iv) Evaluate the total potential for peak load reduction and for efficiency improvements under realistic conditions. Evaluate the expected benefits, the expected costs and implementation arrangements, and the overall feasibility of NEA establishing programs for DSM and efficiency improvements in various subsectors. In evaluating various options, the consultants will assess the expected constraints, both institutional and operation, to effective implementation of each option.
- (v) Determine the most promising DSM programs, from the viewpoint of cost-effectiveness, likely public acceptance, and effort of implementation; and prepare detailed action plans for implementing the recommended DSM programs. The cost estimates for implementing each proposed action and related expected financial and economic benefits should also be described.
- (vi) Refinements in tariff structure and introduction of time-of-day tariffs will be one of the options to consider for larger commercial and industrial consumers.
- (vii) Evaluate programs to promote more off-peak electricity use.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing^a			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	490.0	0.0	490.0
ii. Domestic Consultants	0.0	45.0	45.0
b. International and Local Travel	80.0	10.0	90.0
c. Reports and Communications	10.0	5.0	15.0
2. Equipment ^b	5.0	0.0	5.0
3. Study Tour for Distribution Restructuring	15.0	0.0	15.0
4. Midterm Review Meeting in Manila	15.0	0.0	15.0
5. Miscellaneous Administration and Support Costs including Workshops	6.0	10.0	16.0
6. Representative for Contract Negotiations ^c	4.0	0.0	4.0
7. Contingencies	95.0	10.0	105.0
Subtotal (A)	720.0	80.0	800.0
B. Government Financing			
1. Office Accommodation and Transport	0.0	25.0	25.0
2. Local Communications ^d	0.0	10.0	10.0
3. Remuneration of Counterpart Staff ^e	0.0	140.0	140.0
Subtotal (B)	0.0	175.0	175.0
Total	720.0	255.0	975.0

^a From the Japan Special Fund.

^b Computer and office equipment.

^c Cost of travel and per diem for Government observer invited by Asian Development Bank for contract negotiations at headquarters in Manila, and for consultations during implementation.

^d Includes local telephone, fax service, and photocopy facilities.

^e Also includes local office support staff and drivers for consultants.

Source: Staff estimates