

ASIAN DEVELOPMENT BANK

TAR: NEP 35349

TECHNICAL ASSISTANCE
(Financed by the Japan Special Fund)

TO THE

KINGDOM OF NEPAL

FOR PREPARING THE

RURAL ELECTRIFICATION AND RENEWABLE ENERGY PROJECT

December 2004

CURRENCY EQUIVALENTS

(as of 3 November 2004)

Currency Unit	–	Nepalese rupee/s (NRe/NRs)
NRe1.00	=	\$0.0135
\$1.00	=	NRs73.80

ABBREVIATIONS

ADB	–	Asian Development Bank
AEPC	–	Alternative Energy Promotion Center
EIRR	–	economic internal rate of return
FY	–	fiscal year
IEE	–	initial environment examination
MW	–	Megawatt
NEA	–	Nepal Electricity Authority
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	Targeted intervention
Sector	–	Energy
Subsector	–	Transmission and distribution
Theme	–	Sustainable economic growth
Subthemes	–	Fostering physical infrastructure development, developing rural areas

NOTES

- (i) The fiscal year (FY) of the Government and its agencies ends on 15 July. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2004 ends on 15 July 2004.
- (ii) In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. During the March 2004 Country Programming Mission, His Majesty's Government of Nepal reconfirmed its request to the Asian Development Bank (ADB) for project preparatory technical assistance (TA) for the proposed Rural Electrification and Renewable Energy Project. The TA is included in ADB's 2004 Country Strategy and Program.¹ The TA Fact-Finding Mission was fielded in Nepal 15–23 September 2004 and reached an understanding with the Nepal Electricity Authority (NEA), the Alternative Energy Promotion Center (AEPC), and the Government on the objectives, scope, costs, financing plan, implementation arrangements, and outline terms of reference for the TA.² The TA framework is presented in Appendix 1.

II. ISSUES

2. Nepal is one of the poorest countries in the world, with a per capita gross domestic product of around \$270 in fiscal year (FY) 2004 and an estimated overall poverty incidence of 38%. Poverty is more prevalent and severe in rural areas, where at 44%, the poverty incidence is almost double the 23% in urban areas.¹ The Government's Tenth Plan (FY2003–FY2007) aims to reduce the overall poverty ratio to 30% by FY2007 and promotes equitable and regionally balanced economic growth. Consistent with this plan, the Government has declared its commitment to rural electrification, which has become a high national priority because of its potential to improve living standards and accelerate economic growth, and thereby to reduce poverty and regional disparities. Appendix 2 presents an initial poverty and social analysis.

3. The total installed generating capacity in Nepal is only 610 megawatts (MW), and per capita electricity consumption of 93 kilowatt-hours per year is among the lowest in the world. The extent of electrification is also low: only about one third of the population currently has access to electricity, and in rural areas, where 80% of the nation's population resides, access is much lower. Despite the great potential for hydropower development, power sector development has been constrained mainly because of the relatively small size of Nepal's economy and the small size of modern industrial and commercial sectors. However, the demand for power has increased steadily, with an annual average growth rate of 8.5% over the past decade, and is forecast to grow at an annual rate of 7.6% until 2020. The Tenth Plan sets out the Government's goal of providing electricity to 55% of the population by FY2007. This requires continuing rapid expansion of electrification in the country.

4. The power sector is organized under the Ministry of Water Resources. The Government, through the ministry, wholly owns and supervises NEA, which is responsible for all transmission and most distribution and generation throughout the country. Various independent power producers also generate electricity, and small power companies and some nongovernment organizations account for a marginal portion of distribution. Because villages are widely dispersed across the country, a grid connection is not always economical, and in some cases, off-grid connection of remote rural villages through the use of renewable energy may be the most economical option. Hence AEPC, under the auspices of the Ministry of Science and Technology, is implementing off-grid electrification in remote rural areas using renewable energy technologies, mostly microhydro systems and a limited number of solar home systems.

5. NEA has been a key player in rural electrification and has undertaken a number of rural electrification projects to expand distribution in rural areas with financial support from the

¹ ADB. 2004. *Country Strategy and Program (2005–2009): Nepal*. Manila.

² The TA first appeared in the *ADB Business Opportunities* (Internet edition) on 5 August 2004.

Government and various external development agencies. ADB is playing a lead role in supporting NEA's rural electrification and has approved several loans to NEA, including a recent loan for electrification in rural districts of the Eastern, Central, and Western regions of Nepal.³ Other development agencies, such as the World Bank, the Danish International Development Agency, and the Swedish International Development Agency, have also supported NEA with on-grid rural electrification in the country's Far-Western and Mid-Western regions. In parallel, in 2003 NEA embarked on a community-based electrification program with an annual budget of about \$6 million to provide technical support and subsidies to selected rural communities. NEA is also responsible for constructing and operating isolated, small hydroelectric schemes with a capacity of 1 MW and above and associated rural electrification. In view of the vast demand for on-grid rural electrification and in line with its Country Strategy and Program, ADB will continue to assist rural electrification, primarily through extensions of service from NEA's integrated grid.

6. Many external development agencies, such as the Danish International Development Agency, the Norwegian Agency for International Development, the World Bank, the United Nations Development Programme, and Deutsche Gesellschaft für Technische Zusammenarbeit (the German Agency for Technical Cooperation) are providing financial and technical support to AEPC in undertaking rural electrification in isolated areas—which the national grid will not reach in the next 5 years—on an off-grid basis. With this assistance, AEPC is promoting microhydro generation by providing technical support for different steps in project development and subsidies through its separate body, the Interim Rural Energy Fund.⁴ The European Union is expected to join this effort in the near future.

7. With the aim of improving the efficiency of the power sector, the Government's 2001 hydropower development policy highlights various goals, strategies, and policies, and among other things addresses (i) reforming the sector by advocating a new institutional structure and establishing an enabling environment for greater private sector participation in power development, (ii) accelerating rural electrification by setting up a rural electrification fund, and (iii) strengthening the linkage between electrification and economic activities. To prepare a roadmap and reform plans for the power sector to address item (i), ADB provided TA focusing on reforms of NEA,⁵ which will be supplemented by a follow-on TA to implement the proposed reform plans. The United States Agency for International Development is also providing TA for the reform of regulatory functions. Addressing item (iii) entails exploring ways to link rural electrification projects to other livelihood improvement and rural development projects.

8. To address the need for efficient and accelerated rural electrification as highlighted in the hydropower development policy, a series of meetings of the Energy Thematic Group, which coordinates rural electrification among concerned partners, including the Government, multilateral and bilateral development agencies, and embassies, resulted in the preparation of the draft Code of Conduct for Development Partners Involved in Rural Electrification in Nepal. The code's purpose is to facilitate the shift from a project approach to a sectorwide approach by (i) assisting the Government to formulate and enhance institutional means of promoting a sectorwide approach, (ii) streamlining operations to decrease transaction costs and maximize

³ ADB. 1999. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for the Rural Electrification, Distribution, and Transmission Project*. Manila. (Loan 1732-NEP[SF], for \$50 million, approved on 21 December 1999).

⁴ According to its mandate, AEPC may develop hydropower generation plants of up to 1 MW per unit; however, it is undertaking the development of microhydro generation units with capacities of 100 kilowatts or less because of technical difficulties in identifying feasible projects above 100 kilowatts.

⁵ ADB. 2000. *Technical Assistance to the Kingdom of Nepal for Power Sector Reforms in Nepal*. Manila. (TA No. 3552-NEP. \$800,000, approved on 27 November 2000.)

the cost-effectiveness of interventions, and (iii) increasing collaboration between partners to promote more effective use of human and financial resources in the sector. As this initiative is still in a conceptual stage, it will take a few years before it is ready to be implemented. Until then, traditional financial support to the Government for implementing rural electrification programs is essential, while at the same time adhering to the principles outlined under the initiative.

9. The Project Performance Audit Report for ADB's Seventh Power Project identified various issues pertaining to future ADB operations in the power sector in Nepal,⁶ including the following: (i) inadequate tariff adjustments affect NEA's financial performance, (ii) NEA's system losses are excessive, (iii) current tariff structures and operating conditions impose a significant financial burden on NEA, and (iv) many poor households cannot afford the high initial connection costs. The Project Performance Audit Report for a previous ADB minihydro project rated it as unsuccessful because of long delays in implementing subprojects, cost overruns, high operating and maintenance costs, and insufficient energy sales leading to unsatisfactory rates of return.⁷ One of the key lessons learned was that if feasible, such small, numerous, and scattered projects are best implemented and operated by end users and local private companies rather than by a large and centrally managed public utility. ADB's ongoing Rural Electrification, Distribution, and Transmission Project (footnote 3) has a component to finance the development of electricity distribution systems for small, isolated power supply projects off the integrated NEA distribution grid, but virtually no progress has been made because of the difficulties of finding suitable subprojects, especially under the prevailing subsidy policy for off-grid connections. In addition, the insurgency, which has now spread to most parts of the country with varying degrees of intensity, calls for a conflict assessment of the proposed project areas and the development of effective implementation strategies, even though the insurgency has not had a significant impact on rural electrification in the past. This, as well as the lessons learned during the execution of previous projects, has been taken into account in preparing the terms of reference for this TA.

III. THE TECHNICAL ASSISTANCE

A. Purpose and Output

10. The TA will help the Government identify a technically, financially, and economically viable on-grid rural electrification project to provide an affordable electricity supply to selected rural areas. This will contribute to raising their standards of living and facilitate the establishment of physical and social infrastructure and income generating opportunities to support sustainable economic growth in those areas, and thereby reduce disparities between rural and urban standards of living. If justified, the Project will include the reinforcement and development of associated transmission and distribution systems in existing service areas. Where feasible, it will also support the development of off-grid renewable energy subprojects in remote rural areas.

11. The TA will include (i) the preparation of plans to provide rural electrification by extending the integrated national grid, (ii) the preparation of plans to strengthen NEA's

⁶ ADB. 1990. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for Seventh Power Project*. Manila. (Loan 1011-NEP[SF], for \$51 million, approved on 11 January 1990.)

⁷ ADB. 1981. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for Mini-Hydropower Project*. Manila. (Loan 512-NEP[SF], for \$8.1 million, approved on 21 April 1981.)

transmission and distribution network, and (iii) a study on feasible ways to deliver the Project following the principles outlined under the sectorwide approach. The TA will also incorporate a feasibility study of the best method for ADB to assist AEPC in developing a least-cost renewable energy supply for remote, off-grid communities.

B. Methodology and Key Activities

12. The TA will be undertaken in two parts, Part A: On-Grid Rural Electrification, and Part B: Off-Grid Rural Electrification. Part A will examine the capital expansion plans of grid-connected rural electrification and NEA's reinforcement of associated transmission and distribution systems from 2007 to 2010 to identify subprojects suitable for ADB financing. To this end, NEA will use internal resources for the initial technical preparation of projects, including developing preliminary selection criteria for rural electrification schemes and identifying all candidate schemes based on their technical, financial, economical, environmental, and social justifications. The TA consultants, in conjunction with NEA staff, will then (i) review all relevant previous studies of and reports on rural electrification and distribution planning in Nepal, (ii) identify and screen potential rural electrification schemes based on the established selection criteria and on requirements for land acquisition and involuntary resettlement impacts, (iii) review the power supply capacity in the areas to be electrified to identify ways to strengthen associated transmission and distribution systems; (iv) undertake economic and financial analysis of the subprojects, (v) conduct a social analysis of the benefits and poverty reduction impacts of the subprojects and undertake an initial environmental examination, (vi) determine the most appropriate and effective arrangements for implementing the Project, and (vii) determine the best procedures for procuring materials and constructing subprojects and identify major procurement packages. The consultants will also review the Government's policies related to rural electrification, the final report on Rural Electrification in Nepal and Possibilities for a Sectorwide Approach funded by the Norwegian Agency for International Development, the Code of Conduct for Development Partners Involved in Rural Electrification in Nepal, and experiences with a sectorwide approach in the education and health sectors in Nepal.

13. Part B will involve a feasibility study for ADB involvement in off-grid rural electrification in close association with AEPC. The study will review experience with off-grid electricity supply projects in Nepal and assess their technical, economic, and financial sustainability. It will also review the demand for off-grid rural electrification during 2007–2010 and the activities and plans of the Government and of multilateral and bilateral development agencies. Based on this review, and taking the country's absorptive capacity into account, the consultants will recommend an optimum modality and scope for ADB financing. Only those types of renewable energy subprojects that are practical, sustainable, and cost-effective and have high poverty reduction impacts will be considered for financing under the Project.

C. Cost and Financing

14. The total cost of the TA is estimated at \$740,000 equivalent, consisting of \$490,000 in foreign exchange and \$250,000 equivalent in local currency. ADB will finance \$600,000 equivalent, covering the entire foreign exchange cost and \$110,000 equivalent of the local currency cost. The TA will be financed on a grant basis from the Japan Special Fund funded by the Government of Japan. The Government will contribute the balance of the local currency cost, equivalent to \$140,000, in kind as office space and facilities, counterpart staff, local transportation, and administrative and secretarial support. The cost estimates and financing plan are in Appendix 3. The Government has been informed that approval of the TA does not commit ADB to finance any ensuing Project.

D. Implementation Arrangements

15. NEA will be the executing agency for Part A of the TA and AEPC will be the executing agency for Part B. NEA's deputy managing director for planning, monitoring, and information technology and AEPC's executive director will be responsible for supervising the studies to be carried out under the TA. To achieve an optimum project design, at least three workshops will be held in Kathmandu to review the inception report, interim report, and draft final report prepared by the consultants. Participants will consist of representatives of various stakeholder groups, including senior Government officials. At least 3 weeks prior to the workshops, the consultants will submit each of the reports to NEA, which will, distribute them to relevant stakeholders for comment and discussions at the workshops. The list of invitees for the workshops will include senior Government officials at least at the joint secretary level representing the Ministry of Finance, the National Planning Commission, the Ministry of Water Resources, the Ministry of Science and Technology, and the Ministry of Local Development; senior NEA and AEPC staff; and representatives from private sector companies and cooperatives involved in rural electrification. Comments received from various stakeholders will be duly reflected in the design of the Project. NEA will provide counterpart engineering staff to work with the consultants, office facilities in Kathmandu, and vehicles for field trips. AEPC will also provide counterpart engineering staff.

16. The TA will be implemented over a period of 8 months, starting in March 2005 and ending in October 2005. ADB will select and engage a consulting firm, supported by associated domestic consultants, with relevant experience in all aspects of the specified scope of work, in accordance with the *Guidelines on the Use of Consultants by the Asian Development Bank and Its Borrowers* and other arrangements satisfactory to ADB for the engagement of domestic consultants. The simplified technical proposal and quality- and cost-based selection will be used in selecting the consulting firm. The TA will require 12 person-months of international consulting services and 24 person-months of domestic consulting services, of which 1 person-month of international and 2 person-months of domestic consulting services will be allocated for Part B of the TA. The outline terms of reference are given in Appendix 4.

17. The consultants will submit various reports simultaneously to NEA, AEPC, and ADB, combining Part A and Part B. An inception report will be submitted within 1 month from the mobilization of the consultants and will detail initial findings and the consultants' proposed action plan for conducting the study. Within 3 weeks of the receipt of the inception report, a tripartite meeting and workshop will be convened in Kathmandu to discuss the report. An interim report will be submitted within 4 months of the mobilization of the consultants and a draft final report within 6 months of the mobilization of the consultants. These reports will also be reviewed at a tripartite meeting and workshop in Kathmandu. A final report will be submitted within 4 weeks after the consultants have received comments from NEA, AEPC, and ADB.

IV. THE PRESIDENT'S DECISION

18. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$600,000 on a grant basis to the Government of Nepal for preparing the Rural Electrification and Renewable Energy Project, and hereby reports this action to the Board.

PRELIMINARY PROJECT FRAMEWORK

Design Summary	Performance Indicators and Targets	Monitoring Mechanisms	Assumptions and Risks
Goal Poverty reduction through increased access to electricity	Reduction of overall poverty to 30% by 2007.	National poverty statistics	
Purpose Assist in accelerating rural electrification	Increase coverage of rural population connected to electricity to 46% by 2007 and 53% by 2017.	Socioeconomic and household surveys Country economic and power sector statistics	Assumption Government's will and commitment Risks Political instability Heightened security threat

INITIAL POVERTY AND SOCIAL ANALYSIS

A. Linkages to the Country Poverty Analysis

Is the sector identified as a national priority in country poverty analysis?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the sector identified as a national priority in country poverty partnership agreement?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>Contribution of the sector or subsector to reduce poverty in Nepal:</p> <p>Nepal, with a population of 23 million, is among the world's poorest countries. Its average per capita annual income is \$270, and poverty incidence is estimated at 38%. The poverty incidence varies widely from region to region. The rural poverty incidence is around 44%, which is almost double the 23% in urban areas. Even though social indicators improved in the 5 years to fiscal year (FY) 2002, much remains to be done. In FY2002, the literacy rate remained low at 49%, compared with the Ninth Plan target of 70%, the infant mortality rate remained at 64.2 per 1,000 births, and the maternal mortality rate was estimated at 415 per 1,000 births.</p> <p>Poverty alleviation is the overriding goal of the Government's Tenth Plan (FY2002–FY2007).¹ The Tenth Plan aims to reduce the incidence of poverty to 30% by 2007 and 10% by 2017. Central to the national strategy for poverty reduction is the provision of basic economic and physical infrastructure such as electricity. Given the Nepal's stage of development, the provision of basic energy needs will not only provide poor households with a much needed catalyst to stimulate their economic activities, but will also catalyze improvements in literacy and mortality rates.</p> <p>Under the Tenth Plan, the Government aims at an electrification ratio (the ratio of the number of people connected to electricity to the total population) of 55% in 2007, up from the current 40%. This would mean that some 650,000 additional households were connected to electricity. This will be achieved in part by electrifying the rural areas, where 80% of Nepalese live. International experience suggests that the provision of electricity will considerably improve the quality of life of the poor both indirectly and directly, by stimulating economic activities that would otherwise be impossible, such as agribusinesses; permitting productive activities to be carried out for longer each day; and in some cases even allowing farmers to switch to higher-yield crops. Rural electrification can also potentially increase the multiplier effect of ongoing rural development initiatives. Direct effects on the poor include longer study hours for school-age children and improved health standards. In addition, electrification facilitates social advocacy and health campaigns using electronic media.</p>			

¹ The Tenth Plan's poverty reduction strategy has been guided by a few key considerations, in particular, the need for any poverty reduction strategy to be oriented toward rural areas. The strategy is built on four pillars: (i) broadly based economic growth; (ii) social sector development, including human development; (iii) targeted programs for bringing the poor and marginalized groups into the mainstream; and (iv) good governance.

B. Poverty Analysis**Proposed Classification: Targeted Intervention****What type of poverty analysis is needed?**

To maximize the poverty reduction impact of rural electrification projects, the project preparatory technical assistance (TA) would (i) map rural areas unserved and underserved in relation to electricity, (ii) analyze the profile and characteristics of poverty in those areas, (iii) categorize areas where on-grid and off-grid electricity would have the biggest impacts on poverty reduction given the underlying socioeconomic potential of those areas, and (iv) assess the potential development impact of linking projects with ongoing rural development and improvement initiatives in order to extend the impacts well beyond the original project areas.

The TA also needs to assess how the institutional and implementation arrangements of the subprojects and the design and components of the subprojects would disproportionately benefit poor households in the project areas.

C. Participation Process

Is there a stakeholder analysis? Yes No

The Energy Thematic Group, which coordinates rural electrification among concerned stakeholders, including the Government and external development agencies, has elaborated the Code of Conduct for Development Partners Involved in Rural Electrification in Nepal based on a series of meetings.

Is there a participation strategy? Yes No

To efficiently coordinate all ongoing and planned activities in the sector, the Government and external development agencies have suggested adopting a sectorwide approach. If implemented, this will provide a consistent roadmap for the sector to which all concerned parties can agree. This integrated approach will require a detailed sector assessment, including a forecast of the level of investment required to facilitate the achievement of poverty reduction goals, as well as a focused participation strategy that involves significant consultation with and feedback from stakeholders in relation to priorities, constraints, programs, projects, etc. in the rural electrification subsector.

D. Gender Development**Strategy to maximize impacts on women:**

There is no specific strategy for maximizing the impact on women.

Has an output been prepared? Yes No

E. Social Safeguards and Other Social Risks

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Resettlement	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	No significant adverse issues are anticipated at the project preparatory TA stage; but as soon as sites for the development of rural electrification are identified, a resettlement plan can be devised.	<input type="checkbox"/> Full <input type="checkbox"/> Short <input checked="" type="checkbox"/> None
Affordability	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	An assessment of affordability is to be incorporated into the proposed Project. The Government should establish an appropriate tariff structure if the Nepal Electricity Authority is to be financially sustainable and devise a targeted subsidy level for the development and expansion of rural electrification.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Labor	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	A positive impact is expected as a result of rural electrification. The TA will study the feasibility of and the lessons learned from continuing and expanding community-based development of rural electrification and its impact on employment generation.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	A negative impact is not anticipated. Indigenous peoples may benefit from the expansion of rural electrification.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Other Risks and/or Vulnerabilities	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	No other risks are anticipated.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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 ^b	300.0	0.0	300.0
ii. Domestic Consultants ^c	0.0	72.0	72.0
b. International and Local Travel	70.0	15.0	85.0
c. Reports and Communications	20.0	0.0	20.0
2. Workshops, Seminars, and Tripartite Meetings	20.0	0.0	20.0
3. Miscellaneous Administration and Support Costs for Consultants	7.0	5.0	12.0
4. Representative for Contract Negotiations	3.0	0.0	3.0
5. Contingencies	70.0	18.0	88.0
Subtotal (A)	490.0	110.0	600.0
B. Government Financing			
1. Office Accommodation ^d and Transport	0.0	50.0	50.0
2. Counterpart Staff	0.0	70.0	70.0
3. Others	0.0	20.0	20.0
Subtotal (B)	0.0	140.0	140.0
Total	490.0	250.0	740.0

^a Financed by the Japan Special Fund funded by the Government of Japan.

^b Assuming 12 person-months of international consultants at \$25,000 per month.

^c Assuming 24 person-months of domestic consultants at \$3,000 per month.

^d Includes office facilities and local communication.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

1. The consultants' terms of reference will include, but will not be limited to, the following tasks and the preparation of relevant sections of the Asian Development Bank's (ADB's) report and recommendation of the President for the Project, including the project framework. All work will be done in conjunction with the Nepal Electricity Authority (NEA) and the Alternative Energy Promotion Center (AEPC). The consultants will likely include transmission and distribution power system planning and operations engineers (2–4 person-months of international and 5–8 months of domestic consulting services); economic analysts (2–3 person-months of international and 3–5 person months of domestic consulting services); financial analysts/financial management specialists (2–3 person-months of international and 3–5 person months of domestic consulting services); environmental specialists (2–3 person-months of international and 3–5 person-months of domestic consulting services); and poverty, social development, and resettlement specialists (2–4 person-months of international and 5–8 person-months of domestic consulting services). The consulting firm will propose a suitable combination of expertise and allocation of person-months taking the tasks to be undertaken into account.

2. The consulting firm will appoint a team leader from among the international consultants. The team leader will serve as a technical expert; will be responsible for the overall management of the technical assistance (TA); will coordinate the TA with all pertinent Government agencies, NEA, AEPC, and ADB and other development partners to ensure smooth implementation and nonduplication of work; and will ultimately be responsible for all the TA's deliverables.

A. Part A: On-Grid Rural Electrification

1. Review of Previous Studies, Projects, Policies, and Plans

3. The consultants will (i) review all relevant studies, reports, and policies related to strengthening rural electrification, transmission, and distribution; (ii) review NEA's plans for expanding rural electrification over the next 5 years; (iii) select a sample of rural electrification schemes that have been electrified in consultation with NEA; (iv) inspect power supply systems, collect data, and compare different electrification options in terms of their cost-effectiveness, efficiency, and sustainability; (v) review the experience of previous ADB-financed projects involving rural electrification and the development of distribution systems, including the Seventh Power Project,¹ and consider the lessons learned so as to improve the design of the Project; and (vi) review relevant sections of ADB's 2004 Country Assistance Program Evaluation for Nepal.²

2. Identification and Initial Screening of Potential Components

4. Using its own resources, NEA will develop general criteria and procedures for selecting rural electrification schemes and prepare candidate schemes for development under ADB financing. The consultants will review and refine the selection criteria and procedures and present them in the inception report for review by the Government, NEA, and ADB, and also at a workshop to be held in Kathmandu. The selection criteria should consider how schemes will enhance the poverty reduction impact of the Project and take ADB's policy on involuntary resettlement into account. The preparation of rural electrification schemes financed by ADB under the Project should involve consultations with potential beneficiaries. These should not be scattered across the country, but should be concentrated in a limited number of districts so as to achieve an intensified developmental impact. Districts that are currently covered or are to be covered by other development agencies will

¹ ADB. 1990. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for Seventh Power Project*. Manila. (Loan 1011-NEP[SF], for \$51 million, approved on 11 January 1990.)

² ADB. 2004. *Country Assistance Program Evaluation for Nepal*. Manila.

be excluded. The consultants should ensure that the subprojects selected will be an integral part of the country's least-cost development plan.

5. Upon endorsement of the selection criteria by ADB and the Government, the consultants will review NEA's initial technical project preparations, paying due attention to the established selection criteria. The consultants will work with NEA to identify rural electrification components and strengthen associated transmission and distribution systems to be considered for development under the Project. Rural electrification needs to be planned and carried out in line with the Government's long-term goals. These include plans to provide electricity to rural areas, improve agricultural outputs, increase the level of economic and commercial activities, and provide social amenities, all of which will improve living standards and help reduce poverty and regional disparities. With this in mind, the consultants will review previous sustainable development efforts in the areas to receive electrification under the Project and will analyze potential linkages between rural electrification and livelihood improvement and rural development projects, including those recently approved and to be approved by ADB, that is, the Community-Based Water Supply and Sanitation Project, the Community Livestock Development Project, and the Decentralized Rural Infrastructure and Livelihood Project.³

3. Economic Analysis

6. In accordance with ADB's *Guidelines for the Economic Analysis of Projects*, the consultants will undertake the following tasks:

- (i) Conduct an economic and distribution evaluation of the proposed Project by comparing with and without Project cases and prepare economic evaluation assumptions, economic cost-benefits estimates, and economic internal rate of return (EIRR) calculations.
- (ii) Analyze the extent of subsidies in the current tariff structure and the level of cross-subsidization between major consumer groups, identify the implications of differences in the EIRR and financial internal rate of return, review the appropriateness of the existing lifeline tariff block, and propose a feasible electricity pricing policy.
- (iii) Design cost-recovery and/or tariff structures taking affordability into account.
- (iv) Identify risks and undertake appropriate risk and sensitivity analyses with respect to the EIRR in accordance with ADB's *Handbook for Integrating Risk Analysis in the Economic Analysis of Projects*.
- (v) Specify indicators to monitor the project benefits and establish procedures and provide cost estimates for benefit monitoring and evaluation in line with ADB's *Guidelines for Benefit Monitoring and Evaluation*.
- (vi) Prepare a project framework, in accordance with ADB standards, that clearly identifies the goals and objectives of the proposed Project, required inputs, targets or benchmarks, monitoring mechanism, potential risks, and assumptions.

4. Financial Analysis/Financial Management Assessment

7. In accordance with the 2001 *Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank*, the consultants will undertake

³ ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for the Community-Based Water Supply and Sanitation Project*. Manila. (Loan No. 2008-NEP.); ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for the Community Livestock Development Project*. Manila. (Loan No. 2071-NEP.); ADB. 2004. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for the Decentralized Rural Infrastructure and Livelihood Project*. Manila. (Loan 2092-NEP).

financial analyses of the proposed Project (and any defined subprojects) and assess NEA's financial management capability. Working in collaboration with the project economist to ensure the use of a consistent approach and assumptions across the financial and economic analyses, the consultants will carry out the following tasks:

- (i) Prepare a preliminary project cost estimate table for the proposed investments.
- (ii) Prepare a financing plan for the Project, including proposed ADB lending, any prospective cofinancing, and appropriate counterpart funds for local currency expenditures.
- (iii) Carry out in-depth financial analysis of the proposed investment, including preparing cash flows forecasts that identify specific sources and projecting revenues for the proposed Project that would ensure its financial viability.
- (iv) Carry out a financial evaluation of the proposed Project over the construction and operating periods by calculating the financial internal rate of return and comparing it with a weighted average cost of capital in accordance with the *Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank*.
- (v) Identify all risks to project revenues and costs, conduct relevant sensitivity analysis, and identify potential risk mitigation strategies and approaches.
- (vi) Undertake a financial management assessment of NEA, including a review of corporate planning and budgetary control, financial management accounting and reporting, internal control and audit systems, and data processing, to identify any financial issues that could affect project implementation and/or sustainable operations of project investments and suggest mitigation strategies.
- (vii) Review NEA's financial statements to assess its historical financial performance, retail tariff levels, and capital structure and ensure that it can generate sufficient internal funds to ensure the sustainability of ongoing operations.
- (viii) Prepare *pro forma* financial statements, including a balance sheet, income statement, and cash flow statement for NEA, and identify appropriate financial performance indicators.
- (ix) Study the proposed Project's financial impact on NEA and options for sharing the financial burden, recommend measures for improving NEA's financial performance, suggest appropriate financial covenants to monitor the Project's financial performance, and recommend ways to improve NEA's corporate governance in light of ADB's policy on governance.⁴
- (x) Design the Project's fund flow and disbursement mechanism, and where applicable, review lending and on-lending arrangements.

5. Social and Poverty Analysis

8. The consultants will analyze the development impact of the proposed project and its potential impact on poverty reduction in accordance with ADB's *Handbook on Poverty and Social Analysis* and *Handbook for Integrating Poverty Impact in Economic Analysis of Projects*. The consultants will undertake the following tasks:

- (i) Prepare a socioeconomic analysis, including a poverty profile and characteristics and determinants of primary project beneficiaries in the target areas based on a review of existing studies, data, and development plans. The analysis will include a review of poverty by gender and ethnic minority and propose specific actions to benefit vulnerable indigenous peoples and minorities.
- (ii) Analyze access to electricity, affordability, consumption levels, and consumer satisfaction across socioeconomic groups in target project areas; assess the

⁴ ADB. 1995. *Sound Development Management*. Manila.

- determinants and elasticity of the demand for power by different socioeconomic groups; categorize areas where electrification would have the largest growth and poverty reduction impacts given the underlying socioeconomic potential of those areas; and assess the implications on employment generation for poor.
- (iii) Define groups that would benefit from the proposed Project, prepare an estimate of the distribution of the Project's financial and economic benefits, and summarize the likely net benefits for each group in accordance with ADB's *Handbook for Integrating Poverty Impact in Economic Analysis for Projects*. Given the available dataset, assess the direct, indirect, and distributional impacts of the Project under different growth scenarios with and without the Project, summarize the distributional impacts in a matrix, calculate the poverty impact ratio, and carry out appropriate risk and sensitivity analyses with respect to the poverty impact ratio.
 - (iv) Assess the ex-ante outcome of linking the Project with existing and recently completed rural development and improvement initiatives in order to maximize the Project's development impacts.
 - (v) Assess how the institutional and implementation arrangements and the design of the Project will disproportionately benefit the poor in the project areas.
 - (vi) Assess and recommend ways to improve gender equity.
 - (vii) Undertake a conflict assessment of the project areas and propose effective implementation plans.

6. Environmental Assessment

9. In accordance with relevant guidelines and policies for environmental assessment, the consultants will undertake the following tasks:
- (i) Conduct an initial environmental examination (IEE) for the proposed Project.
 - (ii) Recommend appropriate environmental mitigation measures for identified significant impacts and monitoring plans to address these impacts. Assess the environmental benefits of the proposed activities and any capacity strengthening measures that may be needed to implement environmental management and monitoring plans.
 - (iii) Prepare an IEE report and a summary IEE report based on the environmental assessment requirements of ADB's *Environmental Policy (2002)* and *Environmental Assessment Guidelines* and any applicable procedures or guidelines for environmental assessment required by the Government.
 - (iv) Prepare an environmental impact assessment and summary environmental impact assessment if the IEE reveals that the transmission strengthening component of the Project is likely to have significant adverse environmental impacts.

7. Procurement Packages

10. The consultants will recommend the best procedures for procuring materials and equipment and for constructing the subprojects. Turnkey construction of some facilities, such as those needed to strengthen transmission systems and augment distribution substations, should also be considered. The procurement of bulk materials required for rural electrification and for distribution reinforcement may be combined to achieve economies of scale and minimize administration. The consultants will determine, on a preliminary basis, the various procurement packages and the total quantities and estimated costs of each. The consultants will prepare cost estimates for foreign exchange and local currency components, showing taxes and duties separately. They will also include adequate provision for items such as vehicles, construction

tools, and communications equipment to allow efficient implementation of the Project. Suitable equipment for maintenance of the distribution networks may also be considered.

8. Sectorwide Approach

11. The consultants will gather and review the Government's policies and various documents related to rural electrification, including the Tenth Plan, the hydropower development policy, the rural energy policy, the final report on Rural Electrification in Nepal and Possibilities for a Sectorwide Approach funded by the Norwegian Agency for International Development, and the Code of Conduct for Development Partners Involved in Rural Electrification in Nepal. They will also review experiences with the sectorwide approach adopted in the education and health sectors in Nepal. Based on this review, the consultants will propose the best options for implementing the Project within the framework of a sectorwide approach.

9. Implementation Arrangements

12. The consultants will review the implementation arrangements for previous power projects in Nepal, recommendations made under ADB's Power Sector Reforms in Nepal⁵ and Nepal Country Strategy and Program (footnote 2) and determine whether project implementation can be improved and whether NEA should continue to be the executing agency for on-grid rural electrification and community-based rural electrification. Based on the review, the consultants will recommend organizational and management procedures for implementing the Project.

B. Part B: Off-Grid Rural Electrification

13. The consultants will review experience with off-grid electricity supply projects in Nepal and their sustainability from technical, financial, economic, and operational viewpoints. This review will include ADB's experience with the Mini-Hydropower Project.⁶ The consultants will then estimate the demand for off-grid rural electrification using various renewable energy technologies for 2007–2010 and review the absorptive and implementation capacity of AEPC and the country for off-grid rural electrification.

14. The consultants will also review the capacity of remote rural villages to make use of renewable energy options, including operations and maintenance, especially community capacity to maintain the systems and the reliability of operation. In addition, they will review past and current activities of various development agencies involved in off-grid rural electrification in Nepal and their future investment plans. Based on these studies, the consultants will review the scope for ADB's involvement, taking into account demand, absorptive capacity, plans for involvement by other external funding agencies, and criteria for ADB financing. If ADB's involvement in off-grid rural electrification is found to be feasible, the consultants will propose a subproject, and its size and selection criteria for possible ADB financing and mechanisms for ensuring compliance with ADB requirements.

⁵ ADB. 2000. *Technical Assistance to the Kingdom of Nepal for Power Sector Reforms in Nepal*. Manila. (TA3552-NEP), for \$800,000, approved on 27 November 2000.

⁶ ADB. 1981. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Mini-Hydropower Project*. Manila. (Loan 512-NEP[SF], for \$8.1 million, approved on 21 April 1981.)