



Report and Recommendation of the President to the Board of Directors

Project Number: 50059-002
June 2017

Proposed Loan and Administration of Technical Assistance Grant Nepal: Power Transmission and Distribution Efficiency Enhancement Project

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Asian Development Bank

CURRENCY EQUIVALENTS

(as of 22 May 2017)

Currency unit	=	Nepalese rupee/s (NRe/NRs)
NRe1.00	=	\$0.0096659
\$1.00	=	NRs103.4560

ABBREVIATIONS

ADB	–	Asian Development Bank
EMP	–	environmental management plan
ESSD	–	Environment and Social Studies Department
GESI	–	gender equality and social inclusion
kV	–	kilovolt
MW	–	megawatt
NEA	–	Nepal Electricity Authority
PAM	–	project administration manual
PMD	–	Project Management Directorate
TA	–	technical assistance

NOTES

- (i) The fiscal year (FY) of the Government of Nepal and its agencies ends on 15 July. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2015 ends on 15 July 2015.
- (ii) In this report, "\$" refers to US dollars.

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CONTENTS

	Page
PROJECT AT A GLANCE	
I. THE PROPOSAL	1
II. THE PROJECT	1
A. Rationale	1
B. Impact and Outcome	3
C. Outputs	3
D. Investment and Financing Plans	4
E. Implementation Arrangements	4
III. TECHNICAL ASSISTANCE	5
IV. DUE DILIGENCE	6
A. Technical	6
B. Economic and Financial	7
C. Governance	7
D. Poverty and Social	8
E. Safeguards	8
F. Risks and Mitigating Measures	9
V. ASSURANCES	10
VI. RECOMMENDATION	10
APPENDIXES	
1. Design and Monitoring Framework	11
2. List of Linked Documents	14

PROJECT AT A GLANCE

1. Basic Data		Project Number: 50059-002	
Project Name	Power Transmission and Distribution Efficiency Enhancement Project	Department /Division	SARD/SAEN
Country	Nepal	Executing Agency	Nepal Electricity Authority (NEA)
Borrower	Government of Nepal		
2. Sector		ADB Financing (\$ million)	
✓ Energy	Subsector(s)		
	Electricity transmission and distribution		98.00
	Energy efficiency and conservation		52.00
		Total	150.00
3. Strategic Agenda		Climate Change Information	
Inclusive economic growth (IEG)	Subcomponents	Mitigation (\$ million)	150.00
	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	CO ₂ reduction (tons per annum)	54,400
Environmentally sustainable growth (ESG)	Global and regional transboundary environmental concerns	Climate Change impact on the Project	Low
	Urban environmental improvement		
4. Drivers of Change		Gender Equity and Mainstreaming	
Governance and capacity development (GCD)	Components	Effective gender mainstreaming (EGM)	✓
	Client relations, network, and partnership development to partnership driver of change		
Knowledge solutions (KNS)	Institutional systems and political economy		
	Application and use of new knowledge solutions in key operational areas		
Partnerships (PAR)	Implementation		
	Private Sector		
Private sector development (PSD)	Public sector goods and services essential for private sector development		
5. Poverty and SDG Targeting		Location Impact	
Geographic Targeting	No	Urban	High
Household Targeting	No		
SDG Targeting	Yes		
SDG Goals	SDG5, SDG7		
6. Risk Categorization:		Complex	
7. Safeguard Categorization		Environment: B Involuntary Resettlement: A Indigenous Peoples: C	
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		150.00	
Sovereign Project (Concessional Loan): Ordinary capital resources		150.00	
Cofinancing		0.00	
None		0.00	
Counterpart		39.00	
Government		39.00	
Total		189.00	
Note: An attached technical assistance will be financed on a grant basis by the Japan Fund for Poverty Reduction in the amount of \$2,000,000.			

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to Nepal for the Power Transmission and Distribution Efficiency Enhancement Project. The report also describes the proposed administration of technical assistance (TA) to be provided by the Japan Fund for Poverty Reduction for Strengthening the Capacity of Nepal's Energy Sector to Deliver Gender Equality and Social Inclusion (GESI) Results, and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the TA.¹

2. The project will enhance the distribution capacity and improve reliability and quality of electricity supply in the Kathmandu Valley by reducing distribution system overloads and technical and commercial losses, and strengthen associated transmission lines through the Nepal Electricity Authority (NEA). The project will also support the implementation of other system efficiency upgrades and energy efficiency measures, such as advanced grid operations software, distribution system automation, and smart metering.²

II. THE PROJECT

A. Rationale

3. Reliable electricity service is a necessary requirement for accelerating economic development of a country and is also considered an important input in improving the quality of life. Energy development in Nepal has been slow largely because of a history of weak and inconsistent policies, absence of an independent electricity regulator, lack of comprehensive planning, public sector financing limits, NEA's credit and offtake risks, and difficulty in land acquisition and transmission line right-of-way issues. Nepal's overall electricity demand has far outgrown the supply: estimated peak demand in FY2016 was around 1,385 megawatt (MW) versus installed generation capacity of 835 MW, resulting in a deficit of about 550 MW. As a consequence, Nepal has been suffering from a severe shortage of power with frequent load shedding. The quality of electricity supply in Nepal is among the poorest in the world, ranking 137th out of 147 countries.³

4. As a government corporation responsible for generation, transmission, and distribution, NEA has dominated Nepal's electricity subsector. It has recorded poor operational and financial performance, and at the end of FY2015, its accumulated losses had reached NRs26.8 billion. In FY2015 alone, NEA incurred losses of NRs6.5 billion.⁴ The financial position of NEA is further deteriorating because of factors such as (i) lack of cost-based tariff adjustments; (ii) high cost of service arising from an elevated internal purchase price at generation point, the annual escalation of costs in purchasing power from independent producers, operation of thermal plants, import of relatively high-cost seasonal energy from India, and increased operation and maintenance costs; (iii) high system losses at over 24%; and (iv) increased arrears largely from the public sector, including municipalities.

5. The Government of Nepal endorsed an action plan in February 2016 to end the energy crisis within 2 years. The Ministry of Energy prepared a concrete action plan to reduce power shortages within 1 year and eliminate them altogether within 2 years. The government has also

¹ The design and monitoring framework is in Appendix 1.

² The Asian Development Bank (ADB) provided project preparatory technical assistance for the Power Transmission and Distribution Efficiency Enhancement Project (TA 9144-NEP).

³ ADB. 2015. *Asian Development Outlook*. Manila.

⁴ NEA. 2015. *Annual Report*. Kathmandu.

declared the National Energy Crisis Reduction and Electricity Development Decades, an action plan comprising 99 specific activities that are relevant to sector operations, including that of improving service delivery by modernizing the electricity distribution system. Some visible developments are noticed recently in terms of NEA's operational performance through significant reduction in load shedding in Kathmandu Valley and other major cities of Nepal together with electricity theft control measures. Ultimately, the reform program will be successful only if energy and electricity pricing is rationalized and the sector shifts to a fully commercial basis, since government budgets have not been sufficient to cover energy subsidies.

6. Electricity supplies are expected to increase rapidly during the next several years via (i) imports from India through the first 400 kilovolt (kV) cross-border line,⁵ (ii) commissioning of the 456 MW Upper Tamakoshi hydropower project in 2019, and (iii) an additional 1,635 MW from multiple hydropower projects with planned commissioning by 2022. Therefore, existing transmission and distribution systems need to be immediately rehabilitated and upgraded for the network to be able to deliver the additional electricity supplies to consumers. Given this, electricity network enhancement has been a priority and is included in the government's action plan to end the power crisis and provide reliable and affordable electricity, and universal access for all by 2030. This effort is consistent with achieving Sustainable Development Goal #7 (Sustainable Energy for All) as well as Nepal's Nationally Determined Contributions to the United Nations Framework Convention on Climate Change.

7. The Kathmandu Valley accounts for approximately 400,000 consumers or about 16% of NEA's total consumers in the country, and contributes to about 27% of the total revenue generated from the sale of electricity. There are 11 distribution centers which operate distribution networks comprising 11.0 kV primary feeders and 0.4 kV lines. Power made available in the Kathmandu Valley is about 400 MW, and the existing distribution network cannot handle more than this amount without rehabilitation. This became clear in 2015, when liquefied petroleum gas was lacking and households were forced to use electricity for cooking, which meant an additional load of 200 MW. The distribution network could not handle the resulting overload, and numerous distribution transformers were damaged. Moreover, energy consumption in the Kathmandu Valley (1,038 gigawatt-hours in FY2016) is rising more than 10% per year, which will lead to a doubling of demand every 7 years.

8. The maintenance and reinforcement of the Kathmandu Valley electricity network have not kept pace with growth in electricity demand and the number of consumers added to the network.⁶ It is imperative to enhance the distribution capacity and improve the reliability and quality of electricity supply by reducing system overloads as well as technical and commercial losses (currently about 15%). In addition, the existing substation capacity needs to be augmented so that additionally incoming power can be accommodated. Also, implementation of other system efficiency upgrades and efficiency measures—such as advanced grid operation software, distribution system automation, and smart metering that will provide consumers with more information about their own electricity use and greater flexibility in managing their own accounts—will modernize the distribution system and bring it technologically up to date. Further, system efficiency improvements and loss reductions to about 10% will improve NEA's financial health, while customers will benefit from more reliable and better electricity supply and less dependence on diesel generators. Operational upgrades will also aid the integration of new generation capacity

⁵ This line has a capacity of at least 1,000 MW.

⁶ The last planned systematic reinforcement was carried out about 15 years ago with the assistance from the Japan International Cooperation Agency.

scheduled to come on line in the next 3–4 years. A project that covers these specific areas can easily be replicated in other cities in the country.

9. The Asian Development Bank (ADB) has been the leading partner in Nepal's energy sector, supporting a broad spectrum of interventions in generation, transmission, distribution, and access to energy. Since 2014, ADB's overall investment strategy has followed a logical sequence: (i) improve reliability and quality of grid-supplied electricity through network expansion, efficiency improvements, and expanded imports; (ii) rationalize tariffs, with eventual elimination of non-lifeline subsidies; (iii) mobilize TA to develop large-scale hydropower generation; (iv) provide additional financing for national grid connected utility-sale solar power development; and (v) continue financing for access to energy via renewable energy mini grids, supply-side efficiency, and other "last mile" interventions. ADB's country partnership strategy, 2013–2017 for Nepal supports the government's development objective of accelerated and inclusive economic growth, and tackles infrastructure bottlenecks in key areas such as energy services in order to create an enabling environment for increased business and employment opportunities.⁷ This project will be ADB's first investment in Nepal that specifically focuses on energy efficiency by improving the distribution system.⁸

B. Impact and Outcome

10. The impact will be reliable and efficient electricity supply for all achieved, aligned with the Government of Nepal's action plan to overcome the country's energy crisis.⁹ The outcome will be improved access to efficient, adequate, and high-quality power supply in the Kathmandu Valley.

C. Outputs

11. The main outputs of this project will be:
- (i) **Transmission grid capacity to feed the primary distribution networks for the Kathmandu Valley strengthened.** Six new grid gas-insulated substations will be included under this component. A 220/132 kV 160 MVA substation each at Barhabise and Laphsiphedi and a 132/11 kV 45 MVA substation at Changunarayan are necessary to help complete the Tamakoshi–Kathmandu 220/400 kV transmission line project, which will then provide vital power supply to Kathmandu from the power-generating stations that are being constructed in the Khimti (Tamakoshi) and Barhabise areas. Another three 132/11 kV 45 MVA each substations in Chapagaun, Mulpani, and Phutung will feed in necessary power to the Kathmandu Valley.
 - (ii) **Kathmandu Valley distribution network rehabilitated and capacity increased.** This covers distribution system automation and the rehabilitation of low-voltage and medium-voltage networks, initially in the central and northern distribution centers of the Kathmandu Valley. The majority of the new and existing construction will be underground, since overhead distribution is impractical in densely populated areas where access roads are very narrow.
 - (iii) **Operational and financial performance of NEA distribution centers enhanced.** Single-phase and three-phase smart meters with associated communication

⁷ ADB. 2013. *Country Partnership Strategy: Nepal, 2013–2017*. Manila.

⁸ An earlier project included components for more efficient lighting (compact fluorescent lamp promotion) and demonstration of rooftop solar systems.

⁹ Government of Nepal. 2016. *National Energy Crisis Reduction and Electricity Development*. Kathmandu. http://www.moen.gov.np/pdf_files/Rastriya-Urja-Sankat-Niwaran-2072.pdf; and National Planning Commission. 2015. *Sustainable Development Goals 2016–2030*. National Preliminary Report. Kathmandu.

facilities that are aligned with modern international practice will be introduced to automate customer metering and reduce nontechnical losses.

- (iv) **NEA's capacity to operate and manage an advanced distribution system and intelligent network (smart grid) technology with GESI aspects in electricity access and end-user awareness programs developed.** Training and other capacity-building activities will be conducted to help NEA staff to plan and execute advanced distribution efficiency projects with special emphasis on gender.

D. Investment and Financing Plans

12. The project is estimated to cost \$189 million (Table 1).

Table 1: Project Investment Plan
(\$ million)

Item	Amount
A. Base Cost^a	
1. Transmission system augmentation and reinforcement	77.7
2. Distribution system augmentation and reinforcement	85.8
3. Project supervision and capacity development	7.2
Subtotal (A)	170.7
B. Contingencies^b	16.1
C. Financing Charges During Implementation^c	2.2
Total (A+B+C)	189.0

^a In fourth quarter 2016 prices. Includes taxes and duties of \$7.1 million.

^b Physical contingencies computed at 5% of base costs. Price contingencies computed using the Asian Development Bank's forecasts of international and domestic inflation. Includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

^c For the loan, interest during implementation has been computed using a base rate of 1%.

Sources: Nepal Electricity Authority and Asian Development Bank estimates.

13. The government has requested a concessional loan in various currencies equivalent to SDR109,229,000 (\$150 million equivalent)¹⁰ from ADB's ordinary capital resources to help finance the project. The loan will have a 32-year term, including a grace period of 8 years, an interest rate of 1.0% per year during the grace period and 1.5% per year thereafter, and such other terms and conditions set forth in the draft loan and project agreements. The financing plan is in Table 2.

Table 2: Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary Capital Resources (Concessional loan)	150.0	79.0
Nepal Electricity Authority/Government of Nepal	39.0	21.0
Total	189.0	100.0

Sources: Nepal Electricity Authority and Asian Development Bank estimates.

14. Climate mitigation is estimated to cost \$150 million. ADB will finance 100% of mitigation costs. Details are in the project administration manual.¹¹

E. Implementation Arrangements

15. The Ministry of Finance will relend the loan to NEA on the same ADB loan terms with an additional service charge of up to 0.25%. NEA will serve as the executing agency and will

¹⁰ \$1 = SDR0.724213 as of 19 May 2017.

¹¹ Project Administration Manual (accessible from the list of linked documents in Appendix 2).

implement all activities under the ADB loan through its Project Management Directorate (PMD). NEA will assign a dedicated team for this project headed by the project director. The establishment of a dedicated PMD for ADB projects and streamlined internal NEA management practices (such as having a managing director to make all procurement decisions) has improved NEA's performance in project implementation. Project supervision consultants will be recruited to support NEA in implementing the project. All consultants will be engaged in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). As requested by NEA, advance contracting and retroactive financing will be considered, subject to a ceiling of 20% and a time limit of not more than 12 months prior to the date of the loan agreement. ADB's Procurement Guidelines (2015, as amended from time to time) will be followed.

16. The project is expected to be completed by December 2021. With the exception of one supply contract, turnkey contracts will be tendered for project implementation. Construction activities will require 48 months to complete. The total time for project implementation after loan effectiveness is estimated at 4.5 years for detailed design, engineering, tender preparation, evaluation, contract award, construction, and commissioning. The government will set up a high-level coordination committee representing key government agencies and other stakeholders to ensure proper coordination between different agencies dealing with road, water supply, sewage, telecommunication office, and cable television operators during the implementation of this project.

17. The implementation arrangements are summarized in Table 3 and described in detail in the project administration manual.¹²

Table 3: Implementation Arrangements

Aspects	Arrangements		
Implementation period	July 2017–December 2021		
Estimated completion date	31 December 2021		
Estimated loan closing date	30 June 2022		
Management			
(i) Oversight body	Steering committee chaired by Secretary, Ministry of Energy		
(ii) Executing agency	Nepal Electricity Authority		
(iii) Key implementing agencies	Project Management Directorate, Nepal Electricity Authority		
(iv) Implementation unit	Project Management Directorate (Matatirtha office)		
Procurement	International competitive bidding	7 contracts	\$143.7 million
Consulting services	Quality- and cost-based selection	1 contract 329 person-months (125 international and 204 national)	\$6.3 million
Retroactive financing and/or advance contracting	Advance contracting for goods, works and consulting services, and retroactive financing for works up to a maximum of 20% of loan amount.		
Disbursement	The loan and grant proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2015, as amended from time to time), <i>Technical Assistance Disbursement Handbook</i> (2010, as amended from time to time), and detailed arrangements agreed upon between the government and ADB.		

ADB = Asian Development Bank, JFPR = Japan Fund for Poverty Reduction.

Sources: Asian Development Bank and Nepal Electricity Authority.

III. TECHNICAL ASSISTANCE

18. Capacity development TA is attached to the loan and supported by the Japan Fund for Poverty Reduction. The TA is titled Strengthening the Capacity of Nepal's Energy Sector to

¹² Project Administration Manual (accessible from the list of linked documents in Appendix 2).

Deliver Gender Equality and Social Inclusion Results and aims to support NEA and its Environment and Social Studies Department (ESSD) in capacity development of staff on GESI, and in developing a GESI strategy and operational guidelines, a social safeguards guide,¹³ and a manual for NEA. The TA helps fill the gaps in NEA's capacity for mainstreaming GESI in its operations to ensure energy access and its benefits for all. The TA will also support training of NEA staff in managing new energy technologies, in particular the smart grid functions and efficiency improvements that will be introduced by the project. In addition, the TA will support the National Association of Community Electricity Users Nepal and 15 electricity user committees to develop their capacity for social inclusion in access to electricity, and to create energy-based livelihoods targeting 500 women. The TA will be implemented over 2 years, and will be administered by ADB in close coordination with NEA and ESSD. The TA implementation unit, with a team of experts and NEA officials, will be based at the ESSD and work under the PMD's supervision. An international consultancy firm, in partnership with a national nongovernment organization or a firm, will provide technical support for TA implementation. Consultants will be recruited using ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). A GESI action plan of the project includes all activities under the TA support. Necessary consultations were held with NEA and ESSD officials, and the National Association of Community Electricity Users Nepal, and the TA concept and its implementation modality were agreed upon. Details are included in the attached TA.¹⁴

19. The TA will provide much-needed capacity development support to ensure that under NEA's operations, the energy needs of poor and disadvantaged communities are addressed; social safeguard risks minimized; and GESI results and impacts maximized, documented, and reported upon. The TA, estimated to cost \$2 million, will be financed on a grant basis by the Japan Fund for Poverty Reduction. The government will provide counterpart support in the form of staff, office space and supplies, and other in-kind contributions.

IV. DUE DILIGENCE

A. Technical

20. The project aims to enhance the quantity and quality of power supplied to NEA's customers in Kathmandu Valley which would require (i) augmentation of transmission substation for supply to Kathmandu Valley; (ii) reconstruction and upgrading of medium voltage and low voltage distribution networks in Kathmandu Valley; and (iii) introduction of smart grid elements in Kathmandu Valley. With this objective and due to the inherent interconnectedness of each of these areas, technical due diligence was undertaken on all outputs and confirmed that the cost estimates are reasonable and unit costs compare favorably with similar recent projects in India and Nepal. The work program provides for grid substations to complete the 400 kV transmission link (initially operated at 220 kV) from Tamakoshi to Kathmandu and to bring much-needed transmission capacity to the Kathmandu Valley. In addition, new grid substations will interconnect with the 400 kV transmission line to the medium-voltage system inside the Kathmandu Valley. This will ensure reliable and secure electricity services to NEA's customers.

21. The distribution components include, in a first phase, the rehabilitation of low-voltage and medium-voltage networks in NEA's central and northern distribution centers, which supply electricity to more than 90,000 existing customers in Kathmandu's central city area, including

¹³ The firm engaged will also help NEA in ensuring the implementation and monitoring of resettlement and rehabilitation efforts of people affected by the project.

¹⁴ Attached Technical Assistance (accessible from the list of linked documents in Appendix 2).

government offices and many hotels, restaurants, and establishments critical to the local economy and the tourism industry. The project will introduce single-phase and three-phase smart meters in keeping with modern international practice. This will allow automated remote customer metering with the ability for both prepayment and post-payment, enhance the consumer interface, eliminate manual meter reading with its inherent errors, and contribute significantly to the reduction in nontechnical losses.

22. The proposed transmission facilities follow planning and design practices already being implemented by NEA in other projects. The proposed distribution system investment will introduce new planning and design practices and innovative technology to NEA and Nepal, reflecting international best practice. Overall, the proposed works are in keeping with international good practice and are considered technically acceptable.

B. Economic and Financial

23. Financial analysis of the project was carried out in accordance with ADB's Guidelines on Financial Management and Analysis of Projects.¹⁵ All financial costs and benefits are expressed in constant 2016 prices. NEA's weighted average cost of capital was estimated at 0.5% (in pretax real terms). On the basis that the average retail electricity does not decline further in real terms, the project is forecast to deliver a financial internal rate of return of 7.9%.

24. The project was analyzed for economic viability in accordance with ADB's Guidelines for Economic Analysis.¹⁶ A "with project" and "without project" framework was adopted. The economic internal rate of return of the project is 14.1%, above the economic hurdle rate of 9%. Sensitivity analysis demonstrates that the project's expected economic performance is somewhat sensitive to demand growth. However, the analysis considers that the benefits of the project are not expected to be fully realized until further investments are made to improve the distribution system in Kathmandu Valley.

C. Governance

25. The assessment of NEA's financial management, prepared in 2014, was updated in accordance with ADB guidelines.¹⁷ Key financial management risks include (i) the current spreadsheet-based accounting system, which is inflexible, prone to errors, and inadequate for an entity of NEA's size and complexity; (ii) inflated assets and liabilities requiring write-down; and (iii) inadequate resolution of audit issues, among others. A further concern arises from the foreign exchange risk on development partner loans, including those of ADB, being transferred to NEA. A time-bound financial management action plan has been developed and agreed upon with the government and NEA, and will be implemented in close consultation with ADB.¹⁸ Based on the above, NEA's overall pre-mitigation financial management risk is substantial.

26. A procurement capacity assessment of NEA was conducted as part of the due diligence. NEA has sufficient capacity and experience in local and foreign procurement, including ADB standard bidding procedures, under domestic projects and external assistance from international

¹⁵ ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

¹⁶ <http://www.adb.org/documents/guidelines-economic-analysis-projects>; and <http://www.adb.org/documents/cost-benefit-analysis-development-practical-guide>.

¹⁷ ADB. 2015. *Technical Guidance Note – Financial Management Assessment*. Manila.

¹⁸ A summary of the Financial Management Action Plan is in Table 11 of the Project Administration Manual (accessible from the list of linked documents in Appendix 2).

development partners. The results of the integrity due diligence conducted for NEA were satisfactory.

27. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and NEA. The specific policy requirements and supplementary measures are described in the PAM.

D. Poverty and Social

28. Nepal's per capita gross domestic product is one of the lowest in the world at around \$766. Most of the country's population (about 80%) live in rural areas where poverty is more prevalent and severe. The Government of Nepal, through the Sustainable Development Goal #1, aims to further reduce poverty significantly by the end of 2030. However, limited access to modern energy resources and inefficient grid connectivity have been hindering development. The project aims to enhance the distribution capacity and improve the reliability and quality of electricity supply in the Kathmandu Valley. The project will also relieve the existing distribution system of overloading and help reduce technical losses in the project areas. This will improve the efficiency of energy use and grid connectivity, and control electricity leakage, as needed. Further, the project activities also create employment for the local poor and socially disadvantaged people during the implementation phase. People, including poor or vulnerable consumers and women, will benefit from the project thanks to jobs for skilled and unskilled labor during construction and beyond. Moreover, using cleaner energy will improve urban and rural air quality, people's health, living conditions, and the quality of life. The project includes a GESI action plan supported through the attached TA, which ensures participation in, access to, and benefits for women, the poor, and excluded groups from the project activities. The TA aims to boost community awareness of safe and efficient electricity use, and provide energy-based enterprise development training to poor women members of electricity user cooperatives, and GESI capacity building for members of the National Association of Community Electricity Users Nepal, which will help improve the livelihoods of poor communities. The project is classified as effective gender mainstreaming.

E. Safeguards

29. **Environment.** The project is classified as environment category B. An initial environmental examination was prepared following ADB's Safeguard Policy Statement (2009) and the government's environmental regulations, and disclosed on the ADB website on 8 May 2017. Public consultations were held in the project areas, and more consultations with a special focus on women and vulnerable groups will take place going forward. NEA will set up a grievance redress mechanism. The project is not expected to cause significant environmental impacts. Potential impacts may arise from earthmoving for new substations and from burying distribution lines. The potential impacts are temporary, predictable, and reversible and can be mitigated through adherence to national and international standards, design criteria, and implementation of environmental management plans (EMPs). The project is not located within or adjacent to cultural sites, national parks, sanctuaries, or protected areas. A 400 kV transmission line was identified as the associated facility of the project. Environmental and social assessments of the transmission line were prepared in accordance with Government of Nepal and ADB requirements, and no issues related to environmental management exist. The EMPs include budgets that are sufficient to ensure proper implementation of mitigation and monitoring measures. Environmental and social safeguard experts are included in the scope of implementation consulting services. NEA's PMD will supervise EMP implementation, and submit environmental monitoring reports to ADB semiannually during construction and annually during operation. Contractors will be required to comply with the EMPs during preconstruction and construction, closely monitored by a project

supervision consultant and NEA. EMPs will be updated as necessary if unanticipated impacts are identified during implementation. NEA has experience in implementing ADB projects, and sufficient capacity to implement the environment safeguards, using third-party services as necessary.

30. **Resettlement and indigenous peoples.** The project is categorized as A for involuntary resettlement and C for indigenous peoples. Six substations require the acquisition of private land, 22.62 hectares in total, which will affect an estimated 174 households with 997 people. Further, eight permanent and four temporary structures need to be relocated. Among the affected households, 142 are losing more than 10% of their land. Surface disturbance during the construction of underground distribution lines and overhead line restringing will have temporary impacts. Social surveys and consultations were undertaken in accordance with ADB's Safeguard Policy Statement. The project's social impacts were adequately assessed, and compensation will be paid to the affected people commensurate with the impacts. A resettlement plan covering all components was prepared and disclosed on the ADB website on 5 May 2017. Budgetary provisions are in place to compensate affected people, including non-titleholders, for their losses in a timely manner. The loan agreement will include a standard assurance related to the resettlement impacts and social matters. NEA has its own environment division, which also covers social aspects, and they have previous experience with land acquisition. The PMD to be established for the project will include a social specialist, and implementing consultants will be engaged to assist the PMD and strengthen its capacity. The implementation of the resettlement plan will be monitored and supervised by NEA and an external monitoring agency, and monitoring reports will be submitted to ADB semiannually. The resettlement plan covers due diligence for the indigenous peoples, and the project does not have any impacts on their dignity, human rights, livelihood system, culture territories, or natural resources.

F. Risks and Mitigating Measures

31. Major risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.¹⁹ The overall risk, after mitigation measures are put in place, is low to moderate. The integrated benefits and impacts are expected to outweigh the costs.

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Poor financial health of NEA	(i) NEA will submit a financial restructuring plan to the government to convert debt into equity, write down assets, and recover receivable arrears. (ii) A foreign exchange risk management policy will be established. (iii) The government will exempt NEA from all taxes and duties on project-related procurement, except for 1% customs levy on imported equipment and 13% value-added tax on construction. (iv) Annual inflation-linked tariff adjustments, with lifeline tariffs, will be in place for poor consumers.
Weak internal controls and corporate governance	NEA will disclose on the project website the audited project financial statements, project progress, procurement short lists, invitations for bid, and contract awards. A risk-based internal audit manual will be approved and put in place.
Regulatory function does not ensure cost-reflective tariffs (wholesale and retail)	(i) ETFC needs to evolve into an independent regulatory agency free from political interference. To do so successfully, ETFC should receive advisory services and capacity building. (ii) The government is pursuing various policy reforms where the issue of cost-effective tariffs will be addressed.

¹⁹ Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Risks	Mitigating Measures
Energy sector governance does not evolve, absence of effective coordination, and full project benefits not realized due to delay in other planned generation, transmission and distribution projects	NEA and the government will continue to implement reforms and obligations under prior commitments to ADB and other development partners, and respond positively to the continuing policy dialogue with ADB in this regard. The government will set up a high-level coordination committee to liaise with different agencies involved in urban infrastructure and service delivery. NEA and the government will also continue pushing for other generation, transmission and distribution projects implementation in parallel.

ADB = Asian Development Bank, ETFC = Electricity Tariff Fixation Commission, NEA = Nepal Electricity Authority.
Source: Asian Development Bank.

V. ASSURANCES

32. The government and NEA have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

33. The government and NEA have agreed with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

VI. RECOMMENDATION

34. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan in various currencies equivalent to SDR109,229,000 (\$150,000,000 equivalent)²⁰ to Nepal for the Power Transmission and Distribution Efficiency Enhancement Project, from ADB's ordinary capital resources in concessional terms, with an interest charge at the rate of 1.0% per year during the grace period and 1.5% per year thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board.

Takehiko Nakao
President

8 June 2017

²⁰ \$1 = SDR0.724213 as of 19 May 2017.

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with			
Reliable and efficient electricity supply for all achieved by 2030 (National Energy Crisis Reduction and Electricity Development) ^a			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
<p>Outcome Access to efficient, adequate, and high-quality power supply in the Kathmandu Valley improved</p>	<p>By 2022:</p> <p>a. Customer accounts with 24/7 electricity supply increased to 20% in Kathmandu Valley (2016 baseline: 0% with 24/7 electricity supply. Average duration of electricity supply is only 16 hours per day).</p> <p>b. Distribution losses in the Kathmandu Valley reduced to 10% resulting in energy savings of 0.0065 TWh/year (2015 baseline: 15% losses)</p> <p>c. Aggregate greenhouse gas emissions reduced by 54,400 tCO₂e per year^b (2015 baseline: 0)</p>	<p>a.–c. NEA reports</p>	<p>Full project benefits not realized due to delayed implementation of other planned generation, transmission and distribution projects.</p>
<p>Outputs</p> <p>1. Transmission grid capacity to feed the primary distribution networks for the Kathmandu Valley strengthened</p> <p>2. Kathmandu Valley distribution network rehabilitated and capacity increased</p>	<p>By 2020:</p> <p>1a. Two new 220/132 kV 160 MVA each and one 132/11 kV 45 MVA substations installed to complete the New Khimti–Kathmandu transmission link (2016 baseline: 0)</p> <p>1b. Three new 132/11 kV substations established in Kathmandu Valley each with 45 MVA capacity (2016 baseline: 0)</p> <p>By 2021:</p> <p>2a. 300 km of 11 kV feeders constructed and/or reinforced (2016 baseline: 0)</p> <p>2b. 600 km of 0.4 kV distribution lines constructed and/or reinforced (2016 baseline: 0)</p> <p>2c. 1,000 new distribution transformers installed with added capacity of 200 MVA (2016 baseline: 0)</p>	<p>1a.–b. NEA reports</p> <p>2a.–c. NEA reports</p>	<p>Implementation is significantly delayed due to political and security situation.</p>

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
3. Operational and financial performance of NEA distribution centers enhanced	<p>By 2021:</p> <p>3a. 90,000 smart meters and associated communications facilities deployed and installed (2016 baseline: 0)</p> <p>3b. 100 NEA staff (at least 30% women) and 20 senior NEA staff trained on new technologies, operational and financial management, and medium- to long-term distribution efficiency enhancement program (2016 baseline: 0)</p> <p>3c. 100 local stakeholders, including private sector, trained and oriented on various smart grid technologies and their roles (2016 baseline: 0)</p>	3a.–c. NEA reports	
4. NEA's capacity to operate and manage an advanced distribution system and intelligent network (smart grid) technology with GESI aspects in electricity access and end-user awareness programs developed	<p>By 2020:</p> <p>4a. At least 150 staff of NEA/ESSD trained on the use of NEA-approved GESI strategy, GESI operational guidelines, and effective GESI mainstreaming in social safeguards of energy projects (2016 baseline: 0)</p> <p>4b. At least 300 members of electricity user cooperatives (40% women) oriented on GESI mainstreaming and compliance with social safeguards' requirements in energy projects (2016 baseline: 0)</p> <p>4c. At least 500 women (covering different social groups and profiles) of electricity user cooperatives trained on energy-based enterprises(2016 baseline: 0)</p>	4a.–c. TA completion report	

Key Activities with Milestones**1. Transmission grid capacity to feed the primary distribution networks for Kathmandu Valley strengthened**

- 1.1 Two new 220/132 kV, 160 MVA substations each and one 132/11 kV, 45 MVA substation built to complete the New Khimti–Kathmandu transmission link by December 2020
- 1.2 Three new 132/11 kV substations in the Kathmandu Valley, each with 45 MVA capacity, built by December 2020

2. Kathmandu Valley distribution network rehabilitated and capacity increased

- 2.1 Construction of 300 km of 11 kV feeders constructed and/or reinforced by December 2021
- 2.2 Upgrade of 600 km of 0.4 kV distribution lines constructed and/or reinforced by December 2021.
- 2.3 Addition of 1,000 more efficient distribution transformers with total estimated capacity of 200 MVA by December 2021

3. Operational and financial performance of NEA distribution centers enhanced

- 3.1 Deploy 90,000 smart meters and other smart-grid elements in the distribution system by December 2021
- 3.2 Assess capacity and training needs by December 2019
- 3.3 Carry out training and capacity-building activities by December 2017

4. NEA's capacity to operate and manage an advanced distribution system and intelligent network (smart grid) technology with GESI aspects in electricity access and end-user awareness programs developed

- 4.1 Assess capacity and training needs by Q2 2017
- 4.2 Carry out training and capacity-building activities by Q3 2018
- 4.3 Prepare energy sector GESI strategy and GESI operational guidelines by Q3 2018

Inputs

Asian Development Bank Ordinary Capital Resources (Concessional loan): \$150 million
 Japan Fund for Poverty Reduction (grant): \$2 million
 Government: \$39 million

Assumptions for Partner Financing

Not applicable

ESSD = Environment and Social Studies Department, GESI = gender equality and social inclusion, km = kilometer, kV = kilovolt, MVA = megavolt-ampere, MWh = megawatt-hour, NEA = Nepal Electricity Authority, Q = quarter, tCO₂e = ton carbon dioxide equivalent, TWh = Terawatt-hour.

^a Government of Nepal. 2016. *National Energy Crisis Reduction and Electricity Development*.

http://www.moen.gov.np/pdf_files/Rastriya-Urja-Sankat-Niwaran-2072.pdf; and National Planning Commission. 2015. *Sustainable Development Goals 2016–2030*. National Preliminary Report.

http://www.npc.gov.np/images/download/23rd_Jan_final_for_print_Sustainable_Development_Goals.pdf.

^b Greenhouse gas reductions will accrue from less use of backup generators running on diesel or gasoline, which have an emission factor of 0.8 tCO₂e per MWh. Kathmandu Valley has 200 MW of diesel gensets, which produced 340,000 MWh in 2012–2013. Assuming that this is all displaced by a mix of hydropower and imports from India, the greenhouse gas reductions will be 340,000 MWh/y × 0.16 tCO₂e/MWh = 54,400 tCO₂e/y. The effective emission factor for Upper Tamakoshi plus India grid is calculated as: 1,997,280/7,008,000 × 0.82 = 0.64 tCO₂e/MWh. This is subtracted from the diesel emission factor to calculate net greenhouse gas reduction: 0.8 – 0.64 = 0.16 tCO₂e/MWh.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=50059-002-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Energy
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Attached Technical Assistance
8. Financial Analysis
9. Economic Analysis
10. Country Economic Indicators
11. Summary Poverty Reduction and Social Strategy
12. Gender Equality and Social Inclusion Action Plan
13. Initial Environmental Examination
14. Resettlement Plan
15. Risk Assessment and Risk Management Plan

Supplementary Documents

16. Detailed Technical Description
17. Technical and Economic Review of Distribution Voltage in Kathmandu Valley
18. Financial Management Assessment
19. Project Climate Risk Assessment and Management Report