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Report No: PAD 1011

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 88 MILLION
(US\$ 130 MILLION EQUIVALENT)

TO

NEPAL

FOR A

GRID SOLAR AND ENERGY EFFICIENCY PROJECT

November 24, 2014

Energy and Extractives Global Practice
South Asia Region
Nepal Country Management Unit

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CURRENCY EQUIVALENTS

(Exchange Rate Effective October 31, 2014)

USD 1 = NRP 98.68
SDR 1 = USD 1.47833

FISCAL YEAR
July 16 – July 15

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
BP	Bank Policy
CA	Constituent Assembly
DA	Designated Account
DDC	District Development Committee
DLRMP	Distribution Loss Reduction Master Plan
DMP	Distribution Master Plan
EIRR	Economic Internal Rate of Return
EMP	Environmental management Plans
EPC	Engineering, Procurement, and Construction
ESA	Environment and Social Assessment
ESMF	Environmental and Social Management Framework
ESMU	Environmental and Social Management Unit
ESSD	Environmental and Social Studies Department
ESSF	Environmental and Social Safeguard Policy Framework
FIRR	Financial Internal Rate of Return
FM	Financial Management
FMIS	Financial Management Information System
FY	Fiscal Year
GEF	Global Environment Facility
GSEEP	Grid Solar and Energy Efficiency Project
GIS	Geographic Information System
GON	Government of Nepal
GPN	General Procurement Notice
GRC	Grievance Review Committee
GWh	GigaWatt-hour
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IPPs	Independent Power Producers
IUFR	Interim Unaudited Financial Reports
JICA	Japan International Cooperation Agency
KHPRP	Kali Gandaki A Hydropower Plant Rehabilitation Project
KTP	Kabeli Transmission Project
kV	KiloVolt
kWh	KiloWatt-hour

M&E	Monitoring and Evaluation
MIGA	Multilateral Investment Guarantee Agency
MOE	Ministry of Energy
MV	Medium Voltage
MW	MegaWatt
MWp	MegaWatt Peak
NCB	National Competitive Bidding
NEA	Nepal Electricity Authority
NIETTP	Nepal India Electricity Transmission and Trade Project
NPR	Nepali Rupee
OAG	Office of Auditor General
O&M	Operation and Maintenance
OE	Owner's Engineer
OP	Operational Policy
ORAF	Operational Risk Assessment Framework
PCB	Poly Chlorinated Biphenyl
PCC	Project Coordination Committee
PDA	Project Development Agreements
PDOs	Project Development Objectives
PDP	Power Development Project
PEP	Procurement Evaluation Panel
PMU	Project Management Unit
PPA	Power Purchase Agreement
PR	Performance Ratio
PTC	Power Trading Corporation of India
PV	Photovoltaic
RAP	Resettlement Action Plan
RFP	Request for Proposal
SOE	Statement of Expenditures
SWERA	Solar and Wind Energy Resource Assessment in Nepal
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
US\$	US Dollar
VAT	Value Added Tax
VCDF	Vulnerable Community Development Framework
VDCs	Village Development Committees
WBG	World Bank Group

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NEPAL
GRID SOLAR AND ENERGY EFFICIENCY PROJECT

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PAD DATA SHEET*Nepal**Nepal: Grid Solar and Energy Efficiency (P146344)***PROJECT APPRAISAL DOCUMENT***SOUTH ASIA**GEEDR*

Report No.: PAD1011

Basic Information			
Project ID: P146344	EA Category: B - Partial Assessment		Team Leader: Rabin Shrestha
Lending Instrument	Fragile and/or Capacity Constraints [No]		
Investment Project Financing	Financial Intermediaries [No]		
	Series of Projects [No]		
Project Implementation Start Date	Project Implementation End Date		
01-Jan-2015	30-Oct-2020		
Expected Effectiveness Date	Expected Closing Date		
01-Mar-2015	31-Dec-2020		
Joint IFC: No			
Practice Manager	Senior Director	Country Director	Regional Vice President
Julia Bucknall	Anita M. George	Johannes C.M. Zutt	Philippe H. Le Houerou
Borrower: Government of Nepal			
Responsible Agency: Nepal Electricity Authority			
Contact:	Mukesh R. Kafle	Title:	Managing Director
Telephone No.:	+977 1 4153007	Email:	neamd@nea.org.np
Project Financing Data (in US\$ Million)			
<input type="checkbox"/> Loan	<input type="checkbox"/> Grant	<input type="checkbox"/> Guarantee	
<input checked="" type="checkbox"/> Credit	<input type="checkbox"/> IDA Grant	<input type="checkbox"/> Other	
Total Project Cost:	138.0	Total Bank Financing: US\$ 130.0 million in Credit	
Financing Gap:	0.0		
Financing Source		Amount	
BORROWER/RECIPIENT		8.0	
International Development Association (IDA)		130.0	
Total		138.0	

Expected Disbursements (in US\$ Million)							
Fiscal Year	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Annual	20.0	35.0	25.0	25.0	15.0	5.0	5.0
Cumulative	20.0	55.0	80.0	105.0	120.0	125.0	130.0
Proposed Development Objective(s)							
The project development objectives (PDOs) are to: (i) increase the solar photovoltaic generated electricity to supply to the NEA grid; and (ii) reduce NEA's distribution losses in selected distribution centers.							
Components							
Component Name						Cost (USD Millions)	
Component 1: Grid-connected Solar PV Farms Development						54.0	
Component 2: Distribution System Planning and Loss Reduction						84.0	
Institutional Data							
Sector Board							
Energy and Mining							
Sectors / Climate Change							
Sector (Maximum 5 and total % must equal 100)							
Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %			
Energy and mining	Other Renewable Energy	60					
Energy and mining	Energy efficiency in Heat and Power	30					
Energy and mining	Transmission and Distribution of Electricity	10					
Total		100					
<input type="checkbox"/> I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.							
Themes							
Theme (Maximum 5 and total % must equal 100)							
Major theme	Theme	%					

Financial and private sector development	Infrastructure services for private sector development	100	
Total		100	
Compliance			
Policy			
Does the project depart from the CAS in content or in other significant respects?	Yes []	No [X]	
Does the project require any waivers of Bank policies?	Yes []	No [X]	
Have these been approved by Bank management?	Yes []	No [X]	
Is approval for any policy waiver sought from the Board?	Yes []	No [X]	
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No []	
Safeguard Policies Triggered by the Project			
	Yes	No	
Environmental Assessment OP/BP 4.01	X		
Natural Habitats OP/BP 4.04		X	
Forests OP/BP 4.36	X		
Pest Management OP 4.09		X	
Physical Cultural Resources OP/BP 4.11	X		
Indigenous Peoples OP/BP 4.10	X		
Involuntary Resettlement OP/BP 4.12	X		
Safety of Dams OP/BP 4.37		X	
Projects on International Waterways OP/BP 7.50		X	
Projects in Disputed Areas OP/BP 7.60		X	
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Establishment of Project Coordination Committee (Section I.A.1, Schedule of the Project Agreement)		January 31, 2015	
Description of Covenant			
NEA to establish and thereafter maintain the Project Coordination Committee ("PCC") to provide oversight and coordination on the implementation of the Project.			
Name	Recurrent	Due Date	Frequency
Establishment of the Procurement Evaluation Panel (Section III.E of the		Prior to the evaluation of the	

Schedule to the Project Agreement)		bidding/selection process of certain contracts specified in the Procurement Plan and of any other contracts as requested by the Association.	
Description of Covenant			
NEA to establish, and thereafter maintain, the Procurement Evaluation Panel for the purpose of carrying out, independently from the PMU, an evaluation of the bidding/selection process of selected contracts.			
Name	Recurrent	Due Date	Frequency
Engineer, Procurement and Construction Contract (Section I.A.3, Schedule of the Project Agreement)		March 15, 2015	
Description of Covenant			
NEA to engage and thereafter retain, under terms of reference satisfactory to the Association, a duly qualified and experienced design, construction and supervision consulting firm, acceptable to the Association to assist the PMU with the management and supervision of the solar farms under Part 1 (a) of the Project.			
Name	Recurrent	Due Date	Frequency
Adoption of Grievance Redress Mechanism (Section I.C.3.d, Schedule of Project Agreement)		March 31, 2015	
Description of Covenant			
NEA to develop, adopt and make operational a grievance redress mechanism, in accordance with the ESMF and in a manner acceptable to the Association.			
Name	Recurrent	Due Date	Frequency
Establishment of Dedicated Units for Safeguards Monitoring (Section I.C.3.e, Schedule of Project Agreement)		March 31, 2015	
Description of Covenant			
NEA to establish dedicated units for the purpose of monitoring implementation of the Safeguards Instruments at each sites of the solar farms under Part 1 (a) of the Project, and provide such units with the staff, funds, facilities, services, and other resources required to discharge its assigned responsibilities.			
Name	Recurrent	Due Date	Frequency
Annual Work Plans (Section I.D, Schedule to the Project Agreement)	Every April 15		Annually
Description of Covenant			
NEA to prepare not later than April 15 of each year, an annual work plan (the “Annual Work Plan”) for the following Fiscal Year in a manner and substance satisfactory to the Association and thereafter implement the activities under the Project during the relevant Fiscal Year in accordance such plan as so			

discussed with, and agreed with the Association.

Name	Recurrent	Due Date	Frequency
Internal audits of operations, resources, and expenditures (Section II.B.4(a) of the Schedule to the Project Agreement)	Two (2) months after the end of each fiscal trimester		Annually

Description of Covenant

NEA to conduct trimester internal audits of operations, resources and expenditures related to the Project and prepare and furnish to the Association the internal audit reports covering the fiscal trimester, in form and substance satisfactory to the Association.

Name	Recurrent	Due Date	Frequency
Physical verification and reconciliation report (Section II.B.4(b) of the Schedule to the Project Agreement)	Six (6) months following the first procurement of goods or works (for the physical verification and conciliation) and two (2) months after the end of the six-months period (for the reconciliation report)		Semi-annually

Description of Covenant

NEA to conduct physical verification and reconciliation of goods and works procured in accordance with the Procurement Plan against the records maintained and to prepare and furnish to the Association a reconciliation report, in form and substance satisfactory to the Association

Name	Recurrent	Due Date	Frequency
FM Improvement Action Plan		September 30, 2016	

Description of Covenant

NEA to carry out all the actions of the FM Improvement Action Plan, in a manner acceptable to the Association.

Name	Recurrent	Due Date	Frequency
Preparation of mid-term review report (Section II.A.2 of the Schedule to the Project Agreement)		June 30, 2017	

Description of Covenant

NEA to prepare and furnish to the Association a mid-term review report for the Project, summarizing the result of the monitoring and evaluation activities and setting out the measures recommended to ensure the efficient completion of the Project and the achievement of the objectives thereof during the period following such date.

Conditions					
Name			Type		
Subsidiary Agreement (Article 5.01, Financing Agreement)			Effectiveness		
Description of Condition					
The Additional Condition of Effectiveness consists of the following, namely that the Subsidiary Agreement has been executed on behalf of the Recipient and NEA.					
Team Composition					
Bank Staff					
Name	Title	Specialization	Unit		
Jie Tang	Lead Energy Specialist	Sector Policy	SACBN		
Tomoyuki Yamashita	Senior Energy Specialist	Co-Team Leader	GEEDR		
Rabin Shrestha	Senior Energy Specialist	Team Lead	GEEDR		
Barsha Pandey	Consultant	Renewable Energy	GEEDR		
Shaukat Javed	Program Assistant	Program Assistant	GEEDR		
Parthapriya Ghosh	Senior Social Development Specialist	Social Development	GURDR		
Drona Raj Ghimire	Environmental Specialist	Environment	GENDR		
Shambhu Prasad Uprety	Procurement Specialist	Procurement	GGODR		
Timila Shrestha	Financial Management Specialist	Financial Management	GGODR		
Giovanni Bo	Counsel	Legal	LEGES		
Junxue Chu	Senior Financial Officer	Loan Operations	CTRLN		
Satish Kumar Shivakumar	Financial Officer	Loan Operations	CTRLN		
Sunita Gurung	Program Assistant	Team Support	SACNP		
Non Bank Staff					
Name	Title	Office Phone	City		
Locations					
Country	First Administrative Division	Location	Planned	Actual	Comments
Nepal	Nuwakot District	Devighat Hydro Power Plant	X		Power station area and staff quarter area
Nepal	Nuwakot District	Trishuli Hydro Power Plant	X		Power station area
Nepal	Pharping District	Pharping Hydro Power Plant	X		Power station area
Nepal	Makwanpur District	Kulekhani 1	X		Staff quarter and guest house area
Nepal	Makwanpur District	Kulekhani 2	X		Lakeside of the reservoir

I. STRATEGIC CONTEXT

A. Country Context

1. Nepal has a population of 27.5 million and a per capita income of US\$ 717. About 24.8 percent of the Nepali population lives on less than US\$ 1.25 per day, and 82 percent live in rural areas. Poverty is much more severe in rural areas (27 percent) compared to urban areas (15 percent) and particularly severe in mountainous areas (42 percent). In 2012, Nepal ranked 157 in the world in the Human Development Index. Despite a decade-long armed insurgency and protracted political transition, Nepal has made exemplary progress in poverty reduction and human development. Nepal has halved extreme poverty, and thus attained the first Millennium Development Goal ahead of time. In addition, Nepal has achieved gender parity in education and sharp reductions in infant and maternal mortality. To maintain the momentum, Nepal will need to exploit its demographic opportunity, helping its reasonably-educated youth to raise agriculture productivity and incomes and transition to non-farm employment in the urban areas.

2. In the process of transition from conflict to peace, a Constituent Assembly (CA) was established to formulate a new constitution by May 2012, but reached the end of its mandate without coming to an agreement on a constitution. In March 2013, after almost a year of political turbulence, and significant delays in public spending, the four largest political parties agreed to formation of an interim government mandated to undertake elections for a new CA. Elections were held on November 19, 2013 and after protracted negotiations by the two largest parties in the new CA, effectively the de facto Parliament, a Nepali Congress led government has been established in February 2014. The topmost priority of the CA is to draft and approve a new constitution.

3. Economic growth was at 3.7 percent in FY13, significantly below the 4.7 percent achieved on average during 2008-12. This moderation in growth can be attributed to reduce public spending, particularly for infrastructure; low levels of private investment due to power outages, labor issues, policy inconsistency, and political uncertainty; as well as an unfavorable monsoon season and depressed agricultural growth.

B. Sectoral and Institutional Context

4. ***Access to Electricity.*** While 75 percent of the population of Nepal is estimated to have access to electricity (grid and off-grid) according to the 2013 Census, service is not necessarily available due to shortage of supply, with load shedding of up to 14 hours per day in grid-covered areas in the dry season. A significant disparity in access to electricity exists between urban (90 percent) and rural areas (30 percent). Average annual consumption remains very low at about 70 kWh per capita, compared to 733 kWh for India and 2,600 kWh for China.

5. ***Supply and Demand Gap and Load Shedding.*** While the country is endowed with a huge theoretical hydropower potential of about 84,000 MW and economically viable potential of 43,000 MW, the installed hydropower generation capacity as of July 2014 was merely 771 MW, of which 729 MW was grid-connected (see Table 1).

Table 1: Total Installed Capacity by Resources, July 2014

	On-grid (MW)	Off-grid (MW)	Total (MW)	Percentage (%)
Hydro	729.4	41.3	770.7	92.6
Solar	0.7	7.5	8.2	1.0
Thermal	53.4	not available *	53.4	6.4
Total	783.5	48.8	832.3	100.0

* Captive diesel gen-sets are estimated to be about 400 MW.

Sources: Nepal Electricity Authority Annual Report 2014, Alternative energy Promotion Center Data Book 2012

6. The peak load in the year 2013 reached 1,201 MW in the winter months. Due to seasonality of hydroelectricity generation and lack of storage facilities, hydropower generation capacity during the winter months reduces to about one-third of installed capacity. Therefore, even with import of electricity from India (about 200 MW), the gap between demand and supply has reached about 500 MW in the winter months of 2013, resulting in load shedding of up to 14 hours a day. It is also a binding constraint to economic and human development in Nepal.

7. **Lack of Public and Private Investment.** The country suffers from chronic underinvestment in the power sector. Since 2002, almost no transmission lines have been built and only 92 MW of generation capacity has been added to the system. Given the poor financial performance of the public sector, large scale private investments in hydropower development are necessary. The Ministry of Energy (MOE) has issued survey licenses for about 13,000 MW of new hydropower projects to Independent Power Producers (IPPs), and five large-sized hydropower projects (about 3,800 MW) are under negotiations. But most IPPs are struggling to raise financing. Table 2 shows the share of installed generation capacity between Nepal Electricity Authority (NEA) and IPPs.

Table 2: Share of NEA and IPPs in Total Installed Capacity

	NEA	IPP	Total
Hydro (MW)	478.3	292.4	770.7
Solar (MW)	0.1	8.1 ^a	8.2
Thermal (MW)	53.4	n.a.	53.4
Total (MW)	531.8	300.5	832.3
Percentage (%)	63.9	36.1	100.0

Sources: NEA Annual Report 2014, Alternative Energy Promotion Center 2012.

^a This refers to privately owned solar home system household in rural areas and one grid-connected solar farm owned by Kathmandu valley drinking water utility.

8. Since most hydropower projects, operational or under construction, are run-of-river, the seasonality of river flows mean that the system will generate much more in the summer months than in the winter months (dry period). Relying on hydropower alone would put the country at risk of winter shortfalls.

9. **Financial Performance of the Power Sector.** NEA's financial position has been deteriorating sharply in recent years due to high system losses (26.4 percent), high costs of supply, and insufficient increases in retail tariffs, among other factors. As a result, NEA is making losses and heavily indebted. Under the prevailing conditions, NEA is neither able to generate the financing required to invest in generation, transmission, and distribution infrastructures nor to service its debts. It is important to observe that NEA is supported by the Government of Nepal (GON) and therefore has not had a single default to IPPs.

10. **Government's Vision and Strategy for the Power Sector.** The Government's vision for the Nepal power sector is (a) to eliminate the energy crises and eventually achieve reliable, affordable and sustainable electricity supply in Nepal; and (b) to export hydropower to earn revenues and sustain economic growth. To reach this vision, its strategy is to: (a) reduce load shedding by adding generation capacity that can be quickly installed in the short term and by reducing system losses; (b) reach supply-demand balance in the medium term through the commissioning of hydropower and importing power from India; and (c) develop more of its hydropower resources and integrate into the regional power market to earn export revenues and sustain domestic growth in the long term.

11. **World Bank Group Support.** In line with the Government vision and strategy for the power sector, the World Bank Group (WBG) has both on-going projects to deal with the immediate needs of the power sector and a Hydropower Transformation Engagement Program to reach the vision of the power sector.

12. To eliminate load shedding and achieve the medium term target for the power sector, the Bank is supporting: (a) the proposed Grid-connected Solar and Energy Efficiency Project (GSEEP, P146344), to generate additional 25 MWp by September 2015, and to support NEA's distribution loss reduction (to recover 80-120 MW¹) by June 2020; (b) the IDA-supported Nepal India Electricity Transmission and Trade Project (P115767), for import of power up to 500 MW from India by 2016 to close the gap between supply and demand in the country (can be easily upgraded to 1,000 MW when needed in the future); (c) rehabilitation of Kali Gandaki Hydropower Plant (P132289) to ensure continued power generation and increase energy output; and (d) expansion of access to electricity through grid extension and development of off-grid renewable energy under Kabeli Transmission Line Project (P112893). Given the seasonality for hydropower, the GSEEP would provide complementary energy supply in dry seasons while the demand is at the highest level and supply at the lowest level in Nepal.

13. To achieve the long term vision for the power sector, the WBG is supporting the development of the rich hydropower resources in Nepal to eliminate electricity deficits in the country, while making hydroelectricity exports the engine of Nepal's economic growth, through the Hydropower Transformation Engagement Program. The WBG engagement under this transformational program are at two levels: (a) at the sector level with key policy and reform efforts to address key barriers and challenges to the power sector development, through a power sector technical assistance project (Power Sector Reform and Sustainable Hydropower Development Project, P150066), which is under preparation, and a follow up development policy lending operation, which is under consideration; and (b) at the project level to prepare projects in line with international standards to facilitating both public and private investments and to finance some of the projects. Projects under preparation or consideration include about 500 MW hydro for domestic use, 3,000 MW for exporting to India and Bangladesh, and associated high voltage transmission lines for domestic power evacuation and regional integration.

14. **Solar Energy Resources in Nepal.** In Nepal, the average solar radiation varies from 3.6 to 6.2 kWh/m² per day and the sun shines for about 300 days per year. According to "Solar and Wind Energy Resource Assessment in Nepal (SWERA)" of July 2008, supported by United Nations Environment Program (UNEP) and Global Environment Facility (GEF), the commercial potential of solar power for grid connection is about 2,100 MW (based on the modeled solar resources from satellite data). Solar electricity generation systems are easy and quick to install in locations close to load centers, and thus

¹ Given the total installed power generation capacity of 800 MW connected to NEA grid, 10% loss reduction will recover power supply capacity of the grid by 80 MW and 15 % by 120 MW.

could be a very attractive option for Nepal to cut the load shedding in short terms. In Nepal, solar radiation is strongest in winters (or dry seasons) when the electricity demand is at the highest and hydropower-based generation at the lowest levels due to low availability of water. By using solar generated electricity during the daytime, water can be stored in Kulekhani Hydropower Plant (the only storage type hydropower plant in Nepal) and in existing peaking run-of-river hydropower plants which can be used for power generation during the evening peak hours. Therefore, solar power is one of the ideal power generation sources to complement the hydropower dominated electricity generation in Nepal. Grid-connected solar power generation is technically proven worldwide and 640 kW Photovoltaic (PV) plant is already in operation in Nepal.

15. ***Feasibility of Grid-connected Solar Power.*** Large scale grid-connected solar power generation is technically proven across the world. International experience indicates that the cost for solar power generation is high compared to conventional hydro and thermal power generation; and unless the incremental cost is paid, either through capital subsidy or sufficient feed-in tariff, it will be difficult to attract private investments.

Rationale for the Bank's involvement

16. The proposed GSEEP is consistent with the GON's strategy to deal with the current energy crisis and to achieve the long-term objective of providing reliable, affordable, and sustainable electricity supply to the Nepali people. It is also consistent with the joint IDA/IFC Country Partnership Strategy for Nepal (FY14-16²), which stresses the importance of increased supply of electricity and improved access to reliable and affordable electricity to increasing economic growth and competitiveness (Pillar 1 and Outcome 1.1).

17. The GSEEP is one of the first-step activities of WBG transformation engagement in Nepal power sector to address the current load shedding crisis in Nepal. Augmentation of solar power generation capacity and reduction of power systems losses are the best alternatives for reducing the load shedding in Nepal. There is, however, limited capacity for building large scale solar farms for power generation and improving the operational efficiency of distribution networks in a coherent approach. The Bank is ideally placed to help the Government manage the technical and economic issues associated with grid connected solar, and help the Government phase investment and reforms. To help manage technical issues, the Bank will bring global experience from its engagement in similar projects across the world. The Project is economically well justified by taking into account economic benefits of the Project. Cost of electricity from solar power generation is much higher than the prevailing average electricity tariff charged to consumers in Nepal and viable feed-in-tariff is not yet adopted in Nepal. However, the proposed solar farms will replace more expensive diesel power generation and is the least cost option for reducing load shedding in the short terms. Given the relatively limited share of the solar power generation in NEA's power generation mix (0.4 percent), the impact on NEA financial performance would be negligible. The Bank is also supporting the GON in its tariff reform efforts.

C. Higher Level Objectives to which the Project Contributes

18. Electricity is a core component of modern economic infrastructure. In the experience of countries worldwide, economic growth has correlated highly with growth in electricity consumption. Inadequate electricity supply is a major constraint for economic growth Nepal. By augmenting

² Report No. 83148-NP discussed by the Board of Executive Director on May 29, 2014.

infrastructure and improving operational efficiency in the power sector, the Project contributes to enhancing connectivity and productivity for growth in Nepal, and to developing the project area.

II. PROJECT DEVELOPMENT OBJECTIVES (PDOS)

A. PDO

19. The project development objectives (PDOs) are to: (i) increase solar photovoltaic generated electricity to supply to the NEA grid; and (ii) reduce NEA's distribution losses in selected distribution centers.

B. Project Beneficiaries

20. The project beneficiaries are grid-connected electricity consumers throughout the country, who will benefit from increased power supply to the grid. The NEA is also expected to benefit from the Project mainly with improved operational efficiency and gained experience in large-sized grid-connected solar farms.

C. PDO Level Results Indicators

21. Performance indicators for this project are summarized in Annex 1: Results Framework and Monitoring.

(a) Indicators to measure achievement of PDOs are:

- Average annual solar PV generated electricity supplied to the NEA grid (GWh)
- Distribution loss reduced in selected Distribution Centers (%)

(b) Indicators to measure intermediate results are:

- Solar power generation capacity commissioned (MWp)
- Distribution Master Plan developed (DMP completed)
- Distribution Loss Reduction Master Plan developed (DLRMP completed)
- Distribution lines rehabilitated/constructed (km)

III. PROJECT DESCRIPTION

A. Project Components

22. The proposed project consists of two components: (a) Grid-connected Solar PV Farms Development; and (b) Distribution System Planning and Loss Reduction. The total cost estimated for the proposed Project is US\$ 138.0 million, including interest during construction, physical and price contingencies.

23. **Grid-connected Solar PV Farms Development** (US\$ 54.0 million). This component will support: (a) Design, supply, construction, commissioning, and operation and maintenance of grid connected solar farms to supply electricity directly to NEA's distribution network, (b) Provision of technical advisory services to assist NEA with, *inter alia*, the procurement and supervision of the engineering, procurement, and construction contract for the solar farms, and (c) Provision of capacity building activities to assist NEA with, *inter alia*, independent bid evaluation, Project management, contract execution, and operation and maintenance of the solar farms.

24. **Distribution System Planning and Loss Reduction** (US\$ 84.0 million). This component will support: (a) preparation of a distribution master plan, (b) preparation of a system loss reduction master plan, (c) carrying out a set of activities in system loss reduction in selected NEA’s distribution centers, including: (i) replacing conductors of distribution feeders or building distributions lines to reduce line losses; (ii) adding or replacing distribution transformers to maintain voltage levels and reduce transformer losses; and (iii) adding capacitor banks to compensate reactive power to manage voltage levels, and (d) building the capacity of NEA in distribution system planning and management, including: (i) provision of equipment, software, and training for distribution system loss identification and reduction planning; and (ii) development of a geographic information system database.

B. Project Cost and Financing

25. The cost of the Project is estimated at US\$ 138.0 million. The proposed financing plan includes: (a) IDA financing of US\$ 130.0 million in credit; and (b) NEA/GON counterpart financing of US\$ 8.0 million which will be used for site clearance and interest during construction. See Table 3 and 4 for details of cost estimations and financing plan.

Table 3: Project Cost Estimations

Project Components	US\$ million
Component 1: Grid-connected Solar PV Farms Development	
a) Engineering, Procurement, and Construction (EPC) Contract	
(i) Site Clearance*	0.5
(ii) Design, Supply, Installation and Commissioning	37.5
(iii) Buildings	1.0
(iv) Distribution Lines	2.5
(v) Operation & Maintenance for 5 years	2.5
b) Owner’s Engineers	1.0
c) Incremental operating cost and capacity building	1.0
Sub-Total	46.0
Component 2: Distribution System Planning and Loss Reduction	
a) Distribution Business Management	
<i>Distribution Master Planning</i>	
(i) GIS-based Database	
a. Design, Procurement and Commissioning	0.5
b. Hardware & Software	1.5
(ii) Software for Distribution System Planning	0.5
(iii) Preparation of DMP and Capacity Building in Distr. Management	0.5
<i>Distribution Loss Reduction Master Planning</i>	
(i) Preparation of DLRMP & Investment Projects	0.5
(ii) Software and Instruments for Loss Reduction	0.5
b) Implementation of Loss Reduction and Distribution System Rehabilitation Project	
(i) Contract(s) for supply and installation	75.5
c) Capacity Development	0.5
Sub-total	80.0
Total Base Cost	126.0
Contingency for Component 1(9.78%)**	4.5

Interest During Construction*	7.5
Total Cost	138.0
Total Financing Required	138.0

Note: * NEA financing for (a) solar farm site clearance; and (b) Interest During Construction;

** For Component 1 only. Contingencies for Component 2 are included in the cost estimations, as the scope of the projects will be refined after completion of the DLRMP.

Table 4: Financing Plan

Financing Plan	US\$ Million	Percentage (%)
a) IDA Credit	130.0	94.2
b) NEA/GON	8.0	5.8
Total Financing	138.0	100.0

C. Lessons Learned and Reflected in the Project Design

26. Lessons and experiences from both donor-funded power projects in Nepal and successful large scale solar farm project in the world were considered in the project design.

27. ***Prolonged Process of Land Acquisition and Tree-cutting Clearance.*** Some donor-funded transmission line projects in Nepal suffered significant implementation delays because land acquisition took years to reach negotiated deals with private land owners, or became stranded assets due to failure of the negotiations. Clearance for tree cutting for transmission line right-of-way (ROW) going through forestry land also took a prolonged process. To avoid the needs of land acquisition and forestry clearance for transmission ROW under the Project, all solar farm candidate sites identified are within the existing hydropower plants owned by the NEA, and the power will be evacuated through medium voltage lines to existing substations. In case the existing substations needs to be expanded and new medium voltage lines erected, the expansion will be limited on land owned by NEA and new medium voltage lines will be routed following the road's ROW to avoid impacts on private land to the extent possible.

28. ***Weak Procurement and Implementation Capacity.*** Since this is the first large scale grid connected solar farm project in Nepal, and NEA has very limited capacity for project preparation, implementation, and O&M. To build capacity and mitigate risks, the project will be implemented through an EPC contract, including five years of O&M and training for NEA staff on O&M. For procurement of the EPC Contract, international experts will be hired for reviewing the draft bidding documents and providing training on solar farm projects. For project implementation and O&M, the OE will be hired to assist the NEA in technical evaluation of bids for the EPC contract, contract execution (especially for design drawings / design changes approval and for project quality, cost and schedule control), supervision of the project implementation, and review and confirmation of the O&M Manual before commissioning.

29. ***Weak Governance.*** To mitigate the governance risk, a Procurement Evaluation Panel (PEP) will be formed by hiring necessary professionals to carry out independent evaluations of bids for major contracts and international OE will also be hired to assist / supervise the contract execution. Specifically, OE will support in procurement and contract management and construction supervision, commissioning, and acceptance tests of the equipment. Furthermore, use of an independent third-party monitoring will be discussed during project implementation.

30. ***Difficult Performance Guarantee for Energy Outputs of Solar Farms.*** International standard performance for electricity production is expected for the large scale solar farms under the Project. The

energy output depends upon the Performance Ratio (PR) of the solar panels, which is the ratio of the performance under real operational conditions and under laboratory conditions, typically between 75 to 85 percent, and the efficiency of other elements for power conversion, mainly the convertors and transformers. It is difficult for a contractor to guarantee the annual energy outputs while the actual solar radiation and whether conditions for the candidate sites are not available at this stage. Based on international experience, reference data on solar radiation and weather condition will be provided in the bidding documents for all the bidders to offer guaranteed energy outputs for bid evaluation purposes; and contractual energy outputs guaranteed will be based on measured radiation and weather data and installation of instruments for measurement of the data is part of the scope of the EPC contract.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

31. NEA will be the implementation agency for this project. NEA is a government-owned power utility, which has worked extensively on Bank-supported projects. NEA is managed by a Managing Director appointed by a Board of Directors chaired by the Energy Minister. A Project Coordination Committee (PCC) will be established to provide oversight and coordination at the top level of NEA. It will consist of the Managing Director, Deputy Managing Director for Finance and Deputy Managing Director for Distribution and staffed with technical experts.

32. A Project Management Unit (PMU), headed by a Project Manager (director level), has been established under the General Manager for Distribution, and is responsible for project preparation, implementation, procurement, and liaison with the Bank. It consists of staff from 6 units including: (i) Project Administration and Financial Management Unit, (ii) Engineering Unit, (iii) Project Contract Management and Reporting Unit, (iv) Safeguards Monitoring Unit, (v) Communications and Public Relations Unit, and (vi) Monitoring and Evaluation (M&E) Units.

33. An OE consisting of experienced international consultants will be hired to support the PMU in project implementation. The OE will help in selection (bid evaluation) of the EPC Contractor, construction supervision, contract management, environmental and social safeguard management, and review of O&M manual for the solar farms.

34. An independent PEP will be established for independent bid evaluation, in parallel to the evaluation by the PMU/NEA, for major contracts as agreed in the Procurement Plan, such as the EPC Contract and contracts for material supply for selected loss reduction projects. The PEP will directly report to the PCC and the Bank. Whenever the evaluation results are different between the NEA (submitted from the PMU to the PCC) and the PEP, the PCC will coordinate the bid evaluations to ensure consensus in a transparent way.

B. Results Monitoring and Evaluation

35. NEA is responsible for regular monitoring and reporting of the implementation of the Project. The contractors to be hired will be responsible for providing data inputs to the NEA. In addition to the semi-annual review and supervision, the Bank will conduct a mid-term review of the Project by June 30, 2017.

36. NEA will prepare project progress report on a trimester basis. The monitoring and reporting will focus on (a) procurement preparation and management following the Procurement Plan; (b) construction progress and scheduling, and quality and cost control; and (c) preparation and

implementation of specific action plans, as needed, following the Environmental and Social Safeguard Policy Framework (ESSF) after sites for solar farms are selected from the candidate sites. An environment and social monitoring plan will be finalized following the ESSF.

37. NEA will also prepare annual reports by GoN fiscal years. The report will cover: (a) the status and issues; (b) disbursement and financial statements; (c) status of key performance indicators and intermediate result indicators; and (d) updated the implementation schedule (including key milestones), Procurement Plan and disbursement projections, and planned action plans for major project issues. A Project Completion Report will be prepared and submitted to GoN no later than three months after the closing date.

C. Sustainability

38. *The technical sustainability* of the Project is expected to be high. The project design and arrangement for implementation have followed proven technologies and international practices and standards, and have incorporated both local and international experiences. In addition, it has a strong focus on mitigation of land acquisition/social impact risks and governance risks.

39. The likelihood of relying on the project output for supplying the demand in Nepal is high. The power generated by the Project is likely to be fully dispatched, given the acute shortage of energy supply in the short and medium terms and the strong complementary advantages of solar power to run-of-river hydropower that is dominating in Nepal.

40. *The financial sustainability* of the Project is considered to be acceptable from NEA's perspective provided that: (a) the solar farms will replace NEA's diesel power generation and is the least cost option for reduction of load shedding in the short terms. Given the relatively limited share of the solar power generation in NEA's power generation mix (0.4%), the impact on NEA financial performance would be negligible although the cost of solar power generation is high compared to NEA's retail tariff, and the Bank is supporting NEA to ensure its financial sustainability through system loss reduction and tariff reform; (b) the cost estimation is based on prevailing international market prices for solar farms of similar sizes; (c) changes of scope and cost escalation of the 25 MWp solar farms will be limited with the EPC contract arrangement; and (c) costs of the first five years of O&M and associated training of NEA engineers are covered in the EPC contract to ensure smooth transition of O&M from the EPC contractor to NEA by the end of contract period. Adequate contingencies are provided for the Project to cover uncertainties related to cost estimate and time over-run. Land acquisition is avoided and international EPC Contractors and OE will be hired to ensure timely commissioning of the solar farm power generation facilities. For loss reductions, financial returns on investment in rehabilitation of distribution network are generally very high, and in new distribution lines are generally very low. The projects will be prepared and implemented only after financial viability is justified. For these reasons, the Project financial vulnerability is considered to be moderate.

41. *The benefits of adaptation and mitigation to climate change* were considered in the project design. The Project is designed to ensure its safety even under extreme earthquake conditions. It is also expected to reduce CO₂ emissions up to approximately 26,400 tons per year over the plant operation period considering the potential displacement of an alternative diesel power plant to generate the same amount of electricity to the NEA grid.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary

Table 5: Risk Rating Summary Table

Risk Category	Rating
Stakeholder Risk	Moderate
Implementing Agency Risk	
- Capacity	High
- Governance	Substantial
Project Risk	
- Design	Moderate
- Social and Environmental	Low
- Program and Donor	Low
- Delivery Monitoring and Sustainability	Substantial
Overall Implementation Risk	Substantial

B. Overall Risk Rating Explanation

42. The overall implementation risk is “Substantial”. Project risks were identified based on the limited capacity of NEA for implementation of the first major solar power generation and loss reduction projects, the country and sector context and conditions in Nepal. Risk mitigation measures were identified based on lessons learned from the previous/on-going donor funded energy projects; the successful experiences in other countries to address similar specific governance issues in the power sector, and extensive consultations with local and national concerned groups and experts. See Annex 4 for the Operational Risk Assessment Framework.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

43. Economic and financial analysis is carried out for the solar farm component only. The average annual electricity generation from the 25 MWp solar farms is expected to be 33 GWh based on annual average solar radiation of 1650 kW/m² on horizontal plane and performance ratio of 0.8.

44. Economic Analysis. The economic analysis is based on alternatives, that is, comparison with and without the project. Without the proposed project, it is assumed that a diesel plant of equivalent capacity, sufficient to generate same amount of energy to that of the grid connected solar farms would be installed. Compared to an alternative diesel power plant of equivalent effective capacity, the investment in the solar farm power generation facilities shows an economic internal rate of return (EIRR) of 50.7 percent.

45. Financial Analysis. Since the financial cost of electricity generation is much higher than the current tariff charged to consumers, the project financial internal rate of return (FIRR) is found to be negative. However, the proposed solar farms will replace much more expensive diesel power generation (at about US\$0.32 /kWh) and is the least cost option for reduction of load shedding in the short terms. Given the relatively small share of the solar power generation in NEA's power generation mix (0.4 percent), the impact on NEA financial performance would be negligible.

B. Technical

46. The choice of technologies and associated bidding documents prepared by NEA have been reviewed and confirmed by international experts from USA, Germany and China. The technologies selected, such as conventional solar PV system using the crystalline silicon modules, are widely used for large scale solar farms in the world on a commercial basis and are expected to generate sufficient competition among suppliers across the world. Detail designs, civil works, equipment supply and installations, and commissioning of the solar farms will be carried out by an international EPC Contractor. This would result in scale economy to not only lower the cost, but also attract competent international contractors. The evacuation of solar power to be generated through MV lines and the distribution system planning and loss reduction will be based on widely used conventional technologies, with little technical risk.

C. Financial Management

47. NEA has a long working relationship with the Bank in implementing power projects, including the ongoing Kabeli Transmission Project (KTP, P112893), Kali Gandaki Hydropower Project (KGHP, P132289), Nepal India Electricity Transmission and Trade Project (NIETTP, P115767) and recently closed Power Development Project (PDP, P043311). The overall financial management of NEA at the entity level is less than satisfactory due to limitation in the institutional capability as well as the lack of adequate controls as pointed out in the qualifications and observations repeatedly raised by the external auditors in the entity audit reports. There are delays in submission of audit reports, particularly for NEA financial statements. To avoid such delays in the future, NEA needs to proactively plan the audit process closely with the auditors, prepare the financial reports on time and put substantial efforts towards convening timely Board meeting. To address the audit qualifications and observations, an updated FM Improvement Action Plan (dated September 18, 2014) has been submitted to the Bank. The progress of the Action Plan will be monitored on monthly basis by the Project Coordination Committee, which will consist of Managing Director and DMD Finance. In addition, an FM Strengthening Committee is already formed under the chairmanship of DMD Finance to review and implement the FM improvement recommendations provided by the consulting firm hired under PDP.

48. At the project level, based on the lessons learned from the IDA financed projects implemented by the NEA, the project FM arrangements with enhanced controls will be adopted to mitigate the identified risks. The project level FM will be managed by the PMU with oversight and assistance of NEA's Finance Department. A qualified Finance Officer with adequate experience in FM along with a Finance Assistant will be assigned full time for the Project to ensure effective financial management, especially on the areas of internal controls, accounting and financial reporting. For further strengthening the project's FM aspects, the other mitigation / control measures such as regular physical verification of assets, trimester internal audits, assigning of separate staff for bank reconciliation etc.

have also been recommended for the project. The details of assessment and the recommended mitigation / control measures are provided in Annex 3. Intensive supervision of FM will be undertaken by the Bank, which will include follow-up on the implementation of the agreed Action Plan for FM improvement. Based on the assessment, the overall FM risk for the project is “High” and the residual risk is “Substantial”.

49. The disbursement methods applicable to IDA funding for the Project include Direct Payment, Advance, Reimbursement, and Special Commitment. The disbursements from the Bank will be based on a Statement of Expenditures (SOE). A Designated Account (DA) will be established at the Nepal Rastra Bank. The IDA funds will be advanced into the DA.

D. Procurement

50. An assessment of NEA’s procurement capacity for implementation of Bank-funded projects was carried out by the Bank in March 2014. On the basis of overall assessment of the NEA in general and the project specific procurement arrangement, the overall procurement risk for the Project has been rated “High” and the residual risk is “Substantial”.

51. The PMU established under the Project will perform the project procurement, under the oversight of the PCC. The PMU is responsible for preparing procurement documents, including the procurement plans, bidding documents, bid evaluation reports, and overall project implementation reports. The PCC will oversee the procurement with support of technical experts who have extensive experience in managing procurement under Bank-funded projects.

52. The OE, to be hired from experienced international consultant(s), will support the PMU in contract management and construction supervision, etc for the EPC Contract for the solar PV farms. Likewise, as discussed above, an independent PEP will be established for independent bid evaluation, in parallel to the evaluation by the PMU, for major contracts as agreed in the Procurement Plan as discussed above.

53. A Procurement Plan for the first 18 months was prepared by NEA and agreed to by the Bank (see Annex 3).

E. Social (including Safeguards)

54. **Social Impacts.** While the Project is expected to benefit local communities, the implementation of certain subprojects could lead to some adverse social impacts. An environmental and social screening conducted for the potential project area suggests that there is no likelihood of private land acquisition for solar farms as all installations will be on land already owned by NEA. However, some portion of these land plots is encroached. The screening result shows that encroachers are largely cultivators and few houses. There could also be potential adverse impact though limited if any approach road needs to be widened or if roads right-of-way is not enough to erect or rehabilitate the 11 kV distribution lines for loss reduction purposes. Potential adverse impacts may include loss of (i) land (temporary or permanent), (ii) livelihood, (iii) access to private or community property, etc. Site selection could be locally controversial among directly affected people and other stakeholders. The Environmental and Social Management Framework (ESMF) prepared for the Project acknowledges these issues and integrates the measures for addressing them in the project implementation process.

55. **Land Acquisition.** According to the environmental and social assessment, private land acquisition is not required for solar farms and rehabilitation / installation of distribution lines under both components. However, since the Project will support a large number of investments, there may be private land acquisition for the project related activities not yet envisaged and assessed. Therefore, the project has prepared ESMF that includes an entitlement framework for loss of land and other immovable properties. The ESMF also specifies the procedures, eligibility, grievance redressing and other measures to be followed in the event that resettlement or land acquisition is required for any sub-project. In order to avoid and minimize adverse impacts, the Project will ensure that following criteria will be followed to select sub-project sites:

- a) Wherever possible, the Project will consider the sites that avoid private land taking and minimize adverse social impacts. Solar farms will be developed on existing NEA land. The road's ROW will be used to install distribution lines if new one is required;
- b) The Project will avoid displacement and resettlement; and
- c) The Project, to the extent possible, will avoid the use of encroached NEA land.

56. **Indigenous Peoples.** The screening of candidate sites shows presence of indigenous community in the periphery of potential project sites owned by NEA. As part of the ESMF, an Indigenous People and Vulnerable Community Development Framework (VCDF) has been prepared, with the objective of including vulnerable communities including indigenous, dalit, and other socially marginalized groups to achieve the highest possible positive impact of the interventions to improve their quality of life.

57. **Gender.** Most of women's status indicators pertaining to health, literacy, work force participation, spousal abuse etc. show that gender equity and empowerment remain serious issues in the project area. As part of the ESMF, a framework to develop a Gender Action Plan has been designed, which will help to analyze gender issues during the preparation stages of the sub-projects, and to design interventions to address women's needs. Gender analysis will be part of the social assessment at the sub-project level.

58. **Social Accountability and Communications.** A social accountability mechanism has been developed for implementation and monitoring of the sub-projects, using effective tools for transparency, participation and redressing. The Project will ensure proactive disclosure and sharing of information. A communications plan will be prepared for dissemination of project information through suitable local media. Communities will be engaged through stakeholder consultations in planning and implementation of sub-projects. Additionally, social audits of the project implementation will be ensured through civic oversight. The Project will also have a dedicated grievance-redress mechanism.

59. **Social Intermediation and Stakeholder Engagement.** Sustainability of the Project will depend substantially on meaningful participation and support of key stakeholders, especially local communities. A rapid assessment of stakeholder perceptions indicates a high-level of demand at the grassroots level for greater transparency and for active involvement in the proposed operations. Therefore, in addition to the overall strategic communication efforts, all major sub-projects will have tailor-made interventions to engage with local communities and key stakeholders to ensure inclusion and participation in the planning, implementation and subsequent operation of the sub-projects. These interventions will include: (i) information, education, and communications campaigns; (ii) mobilization of local communities, particularly women; (iii) transparent consultations; and (iv) dissemination of project information.

F. Environment (including Safeguards)

60. The Project is classified category B due to limited adverse environmental and social impacts, which are site specific, largely reversible and can be readily addressed through good engineering practices and mitigation measures. The environmental screening of the candidate sites as part of the ESMF preparation indicates that the project candidate sites are not located in a sensitive ecosystem. The criteria for site selection under the Project avoid critical natural habitat and nationally / internationally recognized heritage sites and make sites of significant environment risks ineligible. All the candidate sites identified for the solar farm installation are the unused lands owned by NEA. The location of the project sites coupled with the clean nature of solar power generation ensures that the Project will not cause significant adverse environmental and social impacts during construction and operation. The main project impacts are associated with clearing of shrub vegetation, waste management, and management of labor camps at the site. Moreover, most of the associated impacts are limited to the construction phase and are temporary in nature. Except for the visual quality, operational phase impact of the Project has negligible footprint.

61. ***Environmental Impacts.*** The specific interventions planned for GSEEP may have some limited adverse environmental impacts in the short term. The proposed grid-connected solar farms (Component 1) and loss reduction (Component 2) contributes to the long term objective of meeting the power demand in Nepal with clean energy supply options. With this objective, the long-term environmental impacts of the Project are expected to be positive. The potential adverse issues / impacts are associated with site clearing (shrub vegetation removal) & excavation, waste management, and management of labor camps. Most of the impacts are limited to the construction phase and are temporary in nature. The construction period impacts vary depend on site and activity, and may include localized soil erosion, pollution of water & land, dust & air pollution, noise, occupational health & safety, and loss of vegetation. These impacts could be caused by a variety of reasons, including: (i) improper site selection of physical investments; (ii) absence of waste disposal and management facilities in the proposed sites; (iii) inadequate management of environmental issues during the construction phase; and (iv) inadequate maintenance of construction equipment & facilities, leading to deterioration of air and water quality and other environmental issues. Except for the visual quality, the foot print of operational phase impacts of the Project is negligible. Potential environmental concerns of the solar farms during the operational stage are related to wastes that may contain glasses, chips, and photo-voltaic cells. The ESMF prepared for the Project acknowledges these issues and includes measures for addressing these issues in the project implementation process. Specific issues related to Component 2 are PCB in the transformer and dismantling of the existing conductors. PCB based transformer and capacitor banks will not be used under the Project. The ESMF have provision for safe management of the existing conductors and transformers that will be removed / dismantled.

62. ***Environmental and Social Management Framework.*** Given the distributed nature of the proposed interventions and the adoption of an overall framework approach since specific sub-project investments are not defined in advance, an ESMF has been developed, based on the social and environmental screening conducted for the Project. The ESMF is a technical guideline describing procedures and institutional responsibilities for assessing and managing potential environmental and social risks and impacts that may come up throughout the project cycle. The objectives of the ESMF are to ensure: (i) the social and environmental sustainability of the Project; (ii) compliance with national environmental and social legislation; and (iii) compliance with the Bank's Environmental and Social Safeguards Policies. The ESMF excludes the following activities under the Project:

- a) Any activity within the protected area and UNESCO declared heritage site;
- b) Any activity that requires the physical relocation of households through involuntary acquisition of land and property, excluding the land and property owned by NEA but encroached by local communities;
- c) Any activity that requires dismantling cultural resources such as temples, shrines, historical and archeological objects; and
- d) New Transformers and capacitor banks based on PCBs.

63. **Sub-project Categories.** The ESMF provides criteria for the screening of sub-projects according to their likely environment and social impacts, and determines whether the sub-projects require a specific Environment and Social Assessment (ESA) to be conducted aiming to identify any adverse impacts. Category I sub-projects require detailed ESA while Category II sub-projects only require preparation of generic safeguard management plans. The ESMF provides detailed guidance, sample Terms of Reference and reporting structures for compliance with the ESA requirements. The ESA will determine the risk mitigation measures needed for the sub-projects, including the preparation of detailed Environmental Management Plans (EMP), Social Impact Assessment and/or Resettlement Action Plan (RAP) and Indigenous Peoples and Vulnerable Community Development Plan (VCPD) as applicable.

64. **Safeguard Compliance Monitoring.** Both internal and external monitoring on a regular basis is proposed to ensure ESMF implementation. During the project implementation, routine environmental and social supervision and monitoring will be done by the Site Management Office, which will submit status / progress report to PMU of NEA once in a month. The environmental and social expert of the PMU deputed from Environmental and Social Studies Division (ESSD) will carry out bi-monthly internal monitoring for safeguard compliance, verify reports submitted by the Site Management Office and submit its own report to the PMU, which will share the report with the Bank. NEA will also engage an external agency for mid-term and end-term evaluation of the ESMF application and compliance with relevant social and environmental safeguard requirements.

65. **Information disclosure and dissemination.** The ESMF will be made available in Nepali language in candidate sites for GSEEP components 1 and 2. Copies of these documents will be provided to the stakeholders upon their request and payment of minimum charge for producing the document. The ESMF has been disclosed both in country on June 13, 2014 on NEA’s website and in Bank’s InfoShop on July 7, 2014. A copy of ESMF has been made available to concerned District Development Committee (DDC) / Village Development Committees (VDCs) / Municipality. Information dissemination and consultation will continue throughout project implementation.

G. Other Safeguards Policies Triggered (if required)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36	X	
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11	X	

Indigenous Peoples OP/BP 4.10	X	
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37		X
Projects on International Waterways OP/BP 7.50		X
Projects in Disputed Areas OP/BP 7.60		X

Annex 1: Results Framework and Monitoring

Nepal: Grid Solar and Energy Efficiency Project (P146344)

November 19, 2014

Project Development Objective (PDO):														
(i) to increase the solar PV generated electricity to supply to the NEA grid and (ii) to reduce NEA's distribution losses in selected distribution centers.														
PDO Level Results Indicators	Core	D=Dropped C=Continue N= New R=Revised	Unit of Measure	Baseline	Target Values (FY)							Frequency	Data Source/ Methodology	Responsibility for Data Collection
					2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21			
Average solar PV generated electricity supplied to the NEA grid (annual)	<input type="checkbox"/>	N	GWh/yr*	0	0	20.0	33.0	32.7	32.3	32.0	31.7	Annual	Operation Monitoring Report	NEA
Distribution loss reduced in the Selected Distribution Centers (annual)	<input type="checkbox"/>	N	% (cumulative)	0	0 (0.0)	0 (0.0)	2.0 (2.0)	5.0 (7.0)	8.0 (15.0)	0.0 (15.0)	0.0 (15.0)	Annual	Operation Monitoring Report	NEA

INTERMEDIATE RESULTS

Intermediate Result (Component One): Grid-connected Solar Farms Development

Solar power generation capacity commissioned	<input checked="" type="checkbox"/>	N	MWp (Cumulative)	0	15 (15)	10 (25)	- (25)	- (25)	- (25)	- (25)	- (25)	Quarterly	Supervision Report	NEA
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Intermediate Result (Component Two): Distribution System Loss Reduction

DMP developed ⁺	<input type="checkbox"/>	N		0	DMP Initiated	DMP completed	-	-	-	-	-	Quarterly	Progress Report	NEA
DLRMP developed	<input type="checkbox"/>	N		0	DLRMP Initiated	DLRMP completed	-	-	-	-	-	Quarterly	Progress Report	NEA
Distribution lines rehabilitated/ constructed	<input checked="" type="checkbox"/>	N	km/yr (Cumulative)	0	To be confirmed by the DLRMP (the DLRMP including the preparation of loss reduction investment projects)#							Quarterly	Supervision Report	NEA

* The target value of average electricity generation is based on average annual solar irradiance on horizontal plane and performance ratio of 0.8. As there is no site specific data on solar irradiance a reference value of 1650 kWh/m²/year is assumed. The target electricity generation will change if the actual (measured) solar irradiance at site is different to this assumed

value. The target electricity generation will be derived using the formula, electricity generation (GWh) = measured average annual measured irradiance (kWh/m²) x 0.8 x 25 MWp. The electricity generation target is reduced annually taking in account the efficiency deterioration of solar panels by 1% per year.

+ This target will be achieved in coordination/consultation with Asian Development Bank's work in the energy sector, however ADB is not co-financing this activity.

#Target value will be established by the end of FY 15/16

Annex 2: Detailed Project Description

Nepal: Grid Solar and Energy Efficiency Project (P146344)

1. The proposed Project consists of two components: (a) Grid-connected Solar PV Farms Development; and (b) Distribution System Planning and Loss Reduction. The total cost of the proposed project is estimated at US\$ 138.0 million, including interest during construction, physical and price contingencies.

2. **Grid-connected Solar PV Farms Development** (US\$ 54.0 million). This component will support (a) design, supply, construction, commissioning, O&M of grid connected solar farms 25 MWp capacity, using EPC contract to supply electricity directly to NEA's distribution network; (b) provision of technical advisory services, through the hiring of an OE, to support NEA to procure the EPC contract and supervise its execution; and (c) provision of capacity building activities, including through the financing of incremental operating costs. The solar farms will be installed nearby the Kathmandu valley using conventional solar photovoltaic technology. Electricity generated will be supplied directly without electricity storage facilities, at 11kV medium voltage level, to the existing substations of the NEA. A number of candidate sites, (Markhu I, Markhu II, Pharping, Devighat and Trishuli) owned by the NEA, are identified with sufficient areas for installation of the solar farms through a screening process based on criteria such as land ownership by NEA, size of areas, intensity of solar radiations, daily sunshine durations, shadows, and topographic and geological conditions. Bid documents for the EPC contract is scheduled for issuance in December 2014 and signing of the contract is expected in February 2015 and the commission of the solar plant is September 2015. O&M services for 5 years from the date of commission will also be included in the EPC contract. The O&M services include supply of spare parts, preparation of an O&M manual and training of the NEA's engineers for O&M. An OE (or individual consultants) will be hired to assist NEA in bid evaluation, construction supervision, acceptance test, commissioning, and reviewing the O&M Manuals. The capacity building program includes hiring of consultants for independent bid evaluations, and training of NEA staff on project management and O&M of solar farms.

Candidate Sites for Solar Farms

3. *Devighat Hydropower Plant Site.* Devighat Hydropower Plant, located at Devighat in Nuwakot district, with an installed capacity of 14.1 MW and annual design energy output of 144 GWh, was commissioned in 1984 and rehabilitated and upgraded to 15 MW in 2011. It lies on the right bank of Trishuli River and is approximately 10 km downstream of Trishuli hydropower station. In this hydropower plant, there are 4 areas suitable for installation of solar panels: i) Raatmatay Area (25,115 m²), ii) Keraghari Area (16,242 m²), iii) Staff Quarter Area (139,390 m²), and iv) Forebay Ground Area (28,199 m²). All these areas have good sunshine hours from 7:30 AM to 5:30 PM and have the potential for installation of solar farms in a total capacity of about 14 MWp. All these areas are less than 1.5 km away from the tapping point – a substation in the power plant area with an 11kV MV line to evacuate electricity to be generated by the solar farms. These areas are owned by NEA and are free of land ownership issues.

4. In the Staff Quarter Area, there are 35 households of NEA plant operation staff members residing in houses owned by NEA and 25 army households. NEA plans to fully prepare this priority candidate site, including i) conducting topographic and geographical survey; ii) preparing a Resettlement Action Plan to relocate the 60 households following the ESMF. If this candidate site is selected during the pre-bid meeting, which is expected in December 31, 2014, NEA plans to complete

the new staff residences construction to evacuate the Staff Quarter Area and resettle the 25 army household before the EPC contractor mobilization in April 2015 as scheduled.

5. Trishuli Hydropower Plant Site. Trishuli Hydropower Plant, located approximately 10 km upstream from Devighat Hydropower Plant, was commissioned in 1967, with an installed capacity of 25 MW and annual design energy output of 163 GWh. In this hydropower plant, there are 3 areas suitable for installation of solar panels: i) Trishuli 2 Area 2 (15,224 m²), ii) Trishuli 5 Area (112,826 m²), and iii) Reservoir Pond Area (163,928 m²). All these areas have good sunshine hours from 7:00AM to 4:30PM, and are less than 3.3 km away from the tapping point – a switchyard in the power plant area with an 11kV MV line to evacuate electricity to be generated by the proposed solar farms.

6. There are land ownership problems for several land plots in Trishuli 5 Area. The latest land ownership survey was executed in 1995 and land ownership of 5 land plots has remained to be settled between occupants (with house or cultivation) and NEA. In this area, there are another 5 land plots owned by NEA but occupied by local families for living and cultivating. Contour and geological survey carried out recently by NEA has identified the actual land use in this area. Based on the land use investigation results, NEA will identify areas for the solar panel installation by avoiding the land plots under ownership dispute and use of local people in Trishuli 5 Area.

7. Pharping Site. This is the first hydropower plant developed in Nepal, which has been declared as a National Heritage. Recently, centenary year was celebrated. The power plant (106 years after construction) has not been generating electricity for a few years due to decrepitude. The candidate site is in steep slope and facing the south direction, near the power house. There is an 11kV transmission line, which evacuates electricity generated by the power plant to the nearest substation. The monument (a triangular tower) on the top of another hill, on the west side in front of the candidate site, may cause shadow on significantly large areas and make the suitable areas for the solar panel installation narrower.

8. Kulekhani 1 (Markhu 1). Land was legally acquired and transferred in the name of NEA. There are quite old residences and a guest house. The site is located at lakeside of the reservoir of Kulekhani hydropower plant (60MW storage type). Sun light is available from 8:00 to 16:00 during winters and 8:00 to 17:30 during summer seasons. The land is quite flat, but narrow (it could be good for 1 to 2 MW). Houses on the site need to be demolished. The nearest substation at Kulekhani 2 hydropower station, which is about 15 km away.

9. Kulekhani 2 (Markhu 2). This site is located a few hundreds meter away from Markhu 1 site. Although the boundary of NEA's land was unclear at the site, the land seems to be suitable for the solar system installation facing the South direction. The site is located at lakeside of the reservoir of Kulekhani hydropower plant. The land consists of the slope to reservoir and flat land facing the south direction. The site could be enough for 5 MW solar panel installations, if NEA owns all of the area. NEA needs to identify exact size of the site on a topographic map

10. **Distribution System Planning and Loss Reduction** (US\$ 84.0 million). This component will support: (a) preparing the DMP; (b) preparing the DLRMP; (c) preparation and implementation of loss reduction projects in selected distribution areas of NEA; and (d) capacity building for distribution system planning at both NEA's distribution center and corporate levels. The component will help redress the high system losses in the country and enhancing NEA's capacity in distribution system planning and management.

11. Following recommendations of the DLRMP, investment for system loss reduction will be carried out in 2016 onwards in a number of distribution centers of the NEA, which may include: (i) replacing conductors of distribution feeders or build new distributions lines to reduce line losses; (ii) adding or replacing distribution transformers to maintain voltage levels and reduce transformer losses; and (iii) adding capacitor banks to compensate reactive power to manage voltage levels.

12. The capacity building programs may include: (i) provision of instruments and proven software and training for distribution system loss identification and reduction planning; and (ii) development of a GIS database with information/data of locations and details regarding the NEA’s existing generation, transmission, and distribution facilities (including specifications); grid connected customers (households, industries, commercials, institutional customers, etc.); potential customers in grid-covered areas; potential demands in areas not covered by national grid; among others, for distribution system planning. The GIS database is critical for on- and off-grid rural electrification planning, loss reduction planning, and distribution system and customer management.

13. The cost of the project is estimated at US\$ 138.0 million. The proposed financing plan includes: (a) IDA financing of US\$ 130.0 million in credit; and (b) NEA/GON counterpart financing of US\$ 8.0 million. The detail cost estimate and financing plan is presented in Tables 2.1 and 2.2.

Table 2.1: Project Cost Estimations

Project Components	US\$ million
Component 1: Grid-connected Solar PV Farms Development	
a) EPC Contract	
(i) Site clearance*	0.5
(i) Design, supply, installation and commissioning	37.5
(ii) Buildings	1.0
(iii) Distribution Lines	2.5
(iv) Operation & Maintenance for 5 years	2.5
b) Owner’s Engineers	1.0
c) Incremental operating cost and capacity building	1.0
Sub Total	46.0
Component 2: Distribution System Planning and Loss Reduction	
a) Distribution Business Management	
<i>Distribution Master Planning</i>	
(i) GIS-based Database	
a. Design, Procurement and Commissioning	0.5
b. Hardware & Software	1.5
(ii) Software for Distribution System Planning	0.5
(iii) Preparation of DMP and Capacity Building in Distr. Management	0.5
<i>Distribution Loss Reduction Master Planning</i>	
(i) Preparation of DLRMP & Investment Projects	0.5
(ii) Software and Instruments for Loss Reduction	0.5
b) Implementation of Loss Reduction Distribution System Rehabilitation Project	
(i) Contract(s) for Supply and Installation	75.5
c) Capacity Development	0.5
Sub-total	80.0
Total Base Cost	126.0

Contingency for Component 1 (6.5%)**	4.5
Interest During Construction*	7.5
Total Cost	138.0
Total Financing Required	138.0

Note: * NEA financing for (a) solar farm site clearance; and (b) Interest During Construction;

** For Component 1 only. Contingencies for Component 2 are included in the cost estimations, as the scope of the projects will be refined after completion of the DLRMP

Table 2.2: Project Financing Plan

Financing Plan	US\$ Million	Percentage (%)
a) IDA Credit	130.0	94.2
b) NEA/GON	8.0	5.8
Total Financing	138.0	100

Annex 3: Implementation Arrangements, Financial Management and Procurement Nepal: Grid Solar and Energy Efficiency Project (P146344)

Project Institutional and Implementation Arrangements

1. **The NEA** is the implementing agency for the Project. It is a government owned, vertically integrated power utility operating about 473 MW of generation capacity and building an additional 300 MW. The NEA was created on August 16, 1985, under the Nepal Electricity Authority Act 1984, through the merger of the Department of Electricity of Ministry of Water Resources, Nepal Electricity Corporation and related Development Boards. It generates approximately 60 percent of the total electricity output in Nepal, owns the transmission grid and most of distribution network in Nepal, and is responsible for system operation. The NEA is also the single off-taker of electricity from IPPs. The company is entirely owned by the State of Nepal. Its Board of Directors is chaired by the Minister of Energy and otherwise consists of one representative from the MOE, one from the MOF, one consumer representative, two power sector experts from non-government sector, and three representatives from industry, commerce and financial sector. All eight members of the Board of Director including the Managing Director are nominated by the GON. NEA's primary mission is to generate, transmit and distribute adequate, reliable and affordable power by planning, constructing, operating and maintaining all generation, transmission and distribution facilities in Nepal's power system both interconnected and isolated. In addition to this, NEA's major responsibilities are: (a) to recommend to the GON, long- and short- term plans and policies in the power sector; (b) to recommend, determine and implement the tariff structure for electricity consumption with prior approval of the GON; and (c) to build manpower capacity in generation, transmission, distribution, and other sectors.

2. **Project Coordination Committee (PCC)**, PCC will be established to ensure oversight and coordination at the top level of NEA. It will consist of: (a) the Managing Director; (b) the Deputy Managing Director for Distribution; (c) the Deputy Managing Director for Finance, (d) Project Manager and (e) other technical experts as required.

3. **Project Management Unit (PMU)**, established under NEA's Distribution and Consumer Service Group headed by the Project Manager is responsible for preparation and implementation of the Project, manage the procurement work and liaison with the Bank. It consists of staff from 6 units including: (i) Project Administration and Financial Management Unit, (ii) Engineering Unit, (iii) Project Contract Management and Reporting Unit, (iv) Safeguards Monitoring Unit, (v) Communications and Public Relations Unit, and (vi) Monitoring and Evaluation (M&E) Units.

4. **Owner's Engineer (OE)**, to be hired from experienced international consultants, will help in construction supervision, contract management, environmental and social safeguard management, and review of O&M manual.

5. **Procurement Evaluation Panel (PEP)** will be formulated for independent bid evaluation, in parallel to the evaluation by the PMU, for major contracts as agreed in the Procurement Plan, such as the EPC Contract and contracts for supply and installation contract(s) under the loss reduction projects. The PEP will directly report to the PCC and the Bank. Whenever the evaluation results are different between the NEA and the PEP, the PCC will coordinate the bid evaluations to ensure consensus in a transparent way.

6. **Project Implementation.** Responsibility within NEA shall rest with the Managing Director at the corporate level, and the PCC. The PCC will liaise between the Bank and the NEA. It will coordinate the project activities between the NEA headquarters in Kathmandu and the project site. The

PMU based at site will be headed by the project manager. The key units of the PMU and their functions and responsibilities are:

- a) Project Administration and Financial Management Unit will be responsible for all management and operation of all project-related accounts including financial management, disbursement and financial reporting. This unit will also be responsible for general administration of the PMU;
- b) Engineering Unit will be responsible for design and construction supervision matters. Further, the unit will be responsible for the overall management of project construction;
- c) Procurement Contract Management and Reporting Unit will oversee the entire procurement process, monitor and evaluate project progress and performance. Through the PCC, it will liaise with the Bank and be responsible for preparing annual programs and implementation reporting. For civil works contracts, the project manager will serve as the Employer, and the consulting firm will serve as the Engineer for construction supervision;
- d) Safeguards (Environmental and Social) Monitoring Unit in the Grid-connected Solar Farms project will supervise compliance with the safeguard instruments (EA including the EMP, RAP, and VCDP). The implementation of social and environmental safeguard measures will be the responsibility of NEA through its Environmental and Social Studies Department (ESSD). An Environmental and Social Management Unit (ESMU) will be established within the Grid-connected Solar Farms Project site office under the technical supervision of ESSD. ESMU will carry out regular/ day-to-day monitoring and data recording and prepare monthly briefs for joint review at site by the project management, contractor and ESMU. ESSD/ environmental and social expert of PMU will visit the project site every two-month period for internal periodic monitoring and reporting. Apart from day to day and periodic internal monitoring, the NEA will also engage an external agency for external evaluation twice during the project implementation (during mid-term and at the end of the project implementation). The ESMU will immediately report to the project management and the NEA ESSD, if there are any issues that need immediate attention or intervention.

Information disclosure and dissemination. The ESMF will be made available in Nepali language to candidate sites for GSEEP components 1 and 2. Copies of these documents will be provided to the stakeholders upon their request and payment of minimum charge for producing the document. The ESMF has been disclosed both in country on June 13, 2014 on NEA's website and in Bank's InfoShop on July 7, 2014. A copy of the ESMF has been made available to concerned District Development Committee (DDC) / Village Development Committees (VDCs) / Municipality. Information dissemination and consultation will continue throughout program implementation. For components 1 and 2 GSEEP investments, information will be disseminated to local candidate sites at various stages. In the initial stage, the NEA will be responsible for informing potential candidate sites and the general public of the project about the components of the project through leaflets and publication in local media outlets and newspapers. The PMU will conduct consultations and disseminate information to all stakeholders during these initial stages to create awareness of the project.

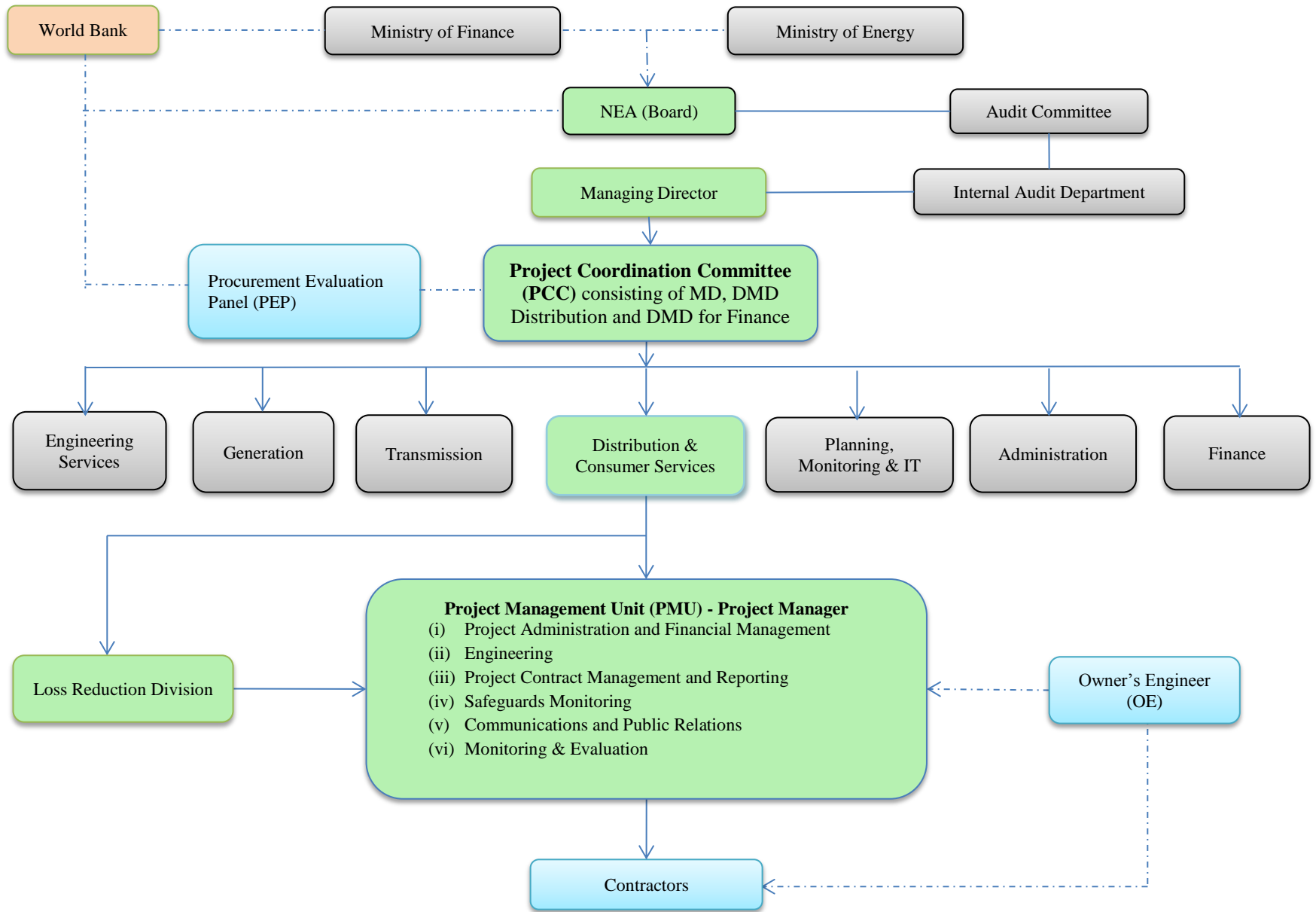
Grievance Handling. The Grievance Review Committee (GRC) will be established as soon as the Project is effective. A complaint cell will be established under the site management office and at central PMU office to collect complaints and transmit them to the GRC. The affected

persons/communities can register their grievances through multiple ways including locked complaint boxes at the site project office or at central PMU office that can only be opened by a designated person, an email address, a designated telephone number, and submission of complaints in the VDCs etc. Any affected family or person can approach the GRC directly regarding environmental and social issues including temporary impacts and impacts during construction. Handouts providing details of grievance filing and redressing mechanism will be distributed through the candidate project office. All cases will be registered, categorized and prioritized by the complaint cell. The GRC will meet in a monthly basis to discuss the petitions submitted by the people/community. If any member (including PMU manager) is concerned, then the grievances will be forwarded to the NEA Managing Director for needed action. The GRC will be regularly supervised by the project, including reviews of documentation;

- e) Communications and Public Relations Unit will be responsible for implementing the communications strategy and managing relations with the public and media; and
- f) Monitoring and Evaluation Unit will monitor the activities of the Project throughout its duration and evaluate the achievement of Project Development Objectives, Results Framework and Implementation Progress. In addition, an OE, which will be a reputable international firm, will also support the PMU in M&E.

7. **Project Implementation Period.** The Project is expected to be implemented during the period January 2015 to October 2020. The target date for commissioning of the grid-connected solar farms facilities for power generation is October, 2015. As loss reduction project covers wide distribution areas and needs monitoring to assess whether the targets are achieved, completion of the distribution system loss reduction project will take time and is expected in June 2019. To maintain a low level of system losses, loss reduction activities shall become a routine business of NEA even after the completion of the project. The project closing date will be December 31, 2020.

Figure 3.1 Organizational Chart



Financial Management Assessment of NEA

1. The NEA has a long working relationship with the Bank in implementing power projects, including the ongoing KTP, NIETTP, KGHP and recently closed PDP.

2. The overall project financial management (FM) risk is rated as High with Substantial residual risk based on the capacity of NEA and the lessons learned and experience from the implementation of the IDA financed projects. The overall financial management of the NEA at the entity level is less than satisfactory due to limitation in the institutional capability as well as the lack of adequate controls as pointed out in the qualifications and observations repeatedly raised by the external auditors in the entity audit reports. Most of the financial covenants under PDP were complied with except for the ones related to NEA's financial performance, i.e. Debt Service Coverage Ratio, Rate of Return on Fixed Assets, the level of Accounts Receivables and Payables. An Action Plan was previously agreed with the Bank to address the auditors' qualifications and observations at the entity level on asset management, contract management, accounting, internal controls etc. Some examples of the auditors' qualifications and observations are: i) the none existence of an asset registers and the none performance of physical verification of assets and inventories, ii) inadequate internal control system iii) not reconciling of inter-unit transactions and accounts/balances, iv) poor management of the long term receivables and payables, and v) ineffective internal audit function etc. Due to delay in implementation of this previously agreed Action Plan, it was revised on May 6, 2013 aiming to address most of the issues by July 2015. NEA has reported some progress in the implementation of the Action Plan and has updated the Action Plan (dated September 18, 2014) based on audit qualifications and observations raised in FY 2012/13 NEA audit report. The Action Plan will be implemented as per the timelines for various activities but no later than September 30, 2016. To make sure that the updated Action Plan is implemented; its progress will be monitored on monthly basis by the Project Coordination Committee, which will consist of Managing Director and DMD Finance. In addition, a FM Strengthening Committee is already formed under the chairmanship of DMD Finance to review and implement the FM improvement recommendations provided by the consulting firm hired under PDP. The implementation and monitoring of the Action Plan will be regularly followed up by the Bank team. This will also be followed up during supervision mission of other Bank-funded energy projects.

3. At the project level, the project FM arrangements will be based on the NEA systems with enhanced controls to mitigate the identified risks. These controls will be based on the lessons learned from the ongoing IDA financed projects being implemented by the NEA. The mitigation/control measures such as assigning a Finance Officer and a Finance Assistant dedicated for the project, regular physical verification of the assets, trimester internal audits, assigning of a separate staff for bank reconciliation etc. are recommended to ensure effective financial management of the project. The details of the mitigation/control measures are provided below.

4. Under the institutional development component of the PDP, an international consulting firm was recruited to help the NEA to: (a) introduce reform in accounting framework of the NEA; (b) develop and implement new Financial Accounting System; (c) revise the accounting policy and manual based on International Financial Reporting Standards (IFRS); (d) provide training to NEA staff; (e) assist in clearing backlog of irregularities pointed out in the auditors' reports; (f) preparation of job description of Finance and Accounts staff; and, (g) computerize FM system in the NEA. The consulting firm has prepared Accounting Policy Manual and Chart of Account based on IFRS, Roadmap for IFRS implementation, Internal Control Policies, Internal Audit Manual, Job Descriptions for Key Positions in Finance and Accounts Department as well as Training and Capacity Building Plan. For assisting in clearing backlog of audit observations, Action Plan for Strengthening Finance &

Accounts Housekeeping has also been prepared by the consulting firm. Regarding computerization of FM system, System Requirement Study Report and Enterprise Resource Planning (ERP) Strategy have also been prepared. The consulting firm has also provided basic training on IFRS to the staff of the NEA. An FM Strengthening Committee formed under chairmanship of DMD Finance is reviewing the recommendations provided by the consulting firm. NEA needs to expedite the implementation process with Board approval. Regarding the Financial Management Information System (FMIS), NEA has short listed the potential firms for working on the System Integrator. A Request for Proposal (RFP) has been issued to the short-list firms under NIETTP Additional Financing.

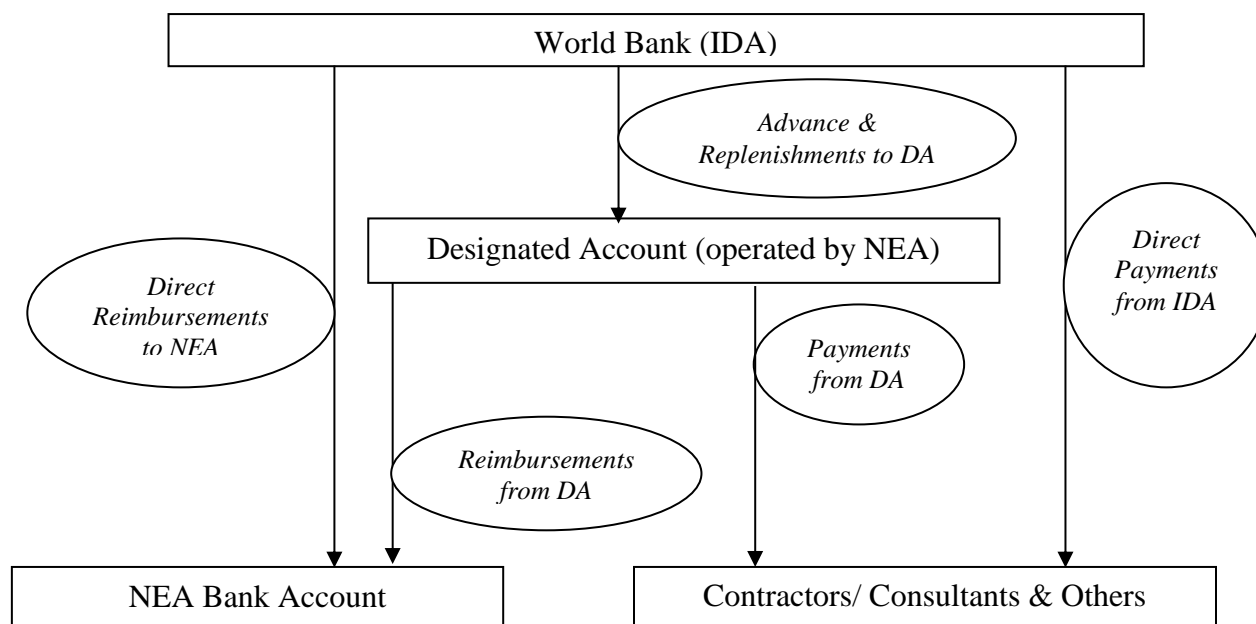
5. **FM Staffing.** With implementation of Bank-funded projects, NEA staff have gained experience in Bank's guidelines and procedures. The FM of the Project will be managed by the Finance Division of the Distribution and Consumer Services Directorate, which is staffed with 14 Finance Officers and 6 Finance Assistants. Similar to other Bank-financed projects, a dedicated full-time Finance Officer (preferably with experience with Bank-funded project) will be assigned to ensure effective financial management of the Project, especially in the areas of internal controls, accounting and financial reporting. In addition to the Finance Officer, a full time Finance Assistant is also recommended for the project for further strengthening the financial management aspects.

6. **Planning and Budgeting.** The proposed Project will follow NEA procedures. The project annual budget will be prepared and integrated within the entities annual budgeting program. The project budget will be monitored on a trimester basis and reported upon through the Interim Unaudited Financial Reports (IUFR).

7. A separate identifiable budget head will be defined for the Project in the Government's "Red Book" so that the program implementation could be tracked and monitored. However, as the project is planned to be effective from January 31, 2015 and if the commitment from the Bank for funding the project will be later than the budget finalization date for FY 2014/15, the required budget will be provided by the Government through budget requirement from any other existing budget heads in the Red Book to one of the budget heads designated for NEA. After obtaining commitment from the Bank for the project funding, immediate efforts are required towards obtaining approval of the budget and the annual work program for FY 2014/15 from the Ministry of Finance and the National Planning Commission respectively. The budget formulation process of NEA is considered as satisfactory as it is prepared based on the budget preparation guidelines and in coordination with the various NEA cost centers, concerned directorate's offices, and corporate planning and central finance division.

8. **Funds Flow Arrangement.** NEA has previous experience with the Bank's disbursement procedures. Similar to other IDA funded projects implemented by NEA, a Designated Account (DA) in US Dollars will be established, on terms and conditions satisfactory to IDA. An advance of specified amount will be provided in the DA. The NEA will have direct access to the use of the DA. The DA will be managed under the joint signatures of Project Coordinator and the Finance Officer as authorized by MOF. Based on the approved budget, most of the payments will be made from the DA. For large payments, direct payments and special commitments can be requested to IDA. For small expenditures, NEA will pre-finance and obtain reimbursement from DA or directly from IDA funds.

Figure 3.1: Funds-flow Arrangement



9. **Project Financial Accounting and Reporting.** NEA has two separate computerized systems for accounting and inventory management and these two systems are not integrated. NEA follows accrual basis accounting system and the project accounts will also be prepared based on the same. The reports (IUFRRs and Annual Project Financial Statements) required by the Banks cannot be generated from the computerized system, which will have to be prepared manually based on the information generated from the computerized system. NEA will submit IUFRRs of the Project to the Bank on a trimester basis within 45 days of the preceding trimester in the format and content agreed with the Bank. In the case of the on-going projects, it was found that all the required books of accounts were not maintained and not updated regularly which was also highlighted in the project audit reports. NEA needs to ensure that all the required books of accounts including the Loan Registers and Designated Account Ledger are maintained and regularly updated. This will be regularly monitored by the Bank and guidance will be provided to the PMU/NEA as required during implementation of the Project. To mitigate the risk of delayed and inaccurate accounting and financial reporting, a full time Finance Officer and a Finance Assistant assigned to the project are recommended.

10. **Project Internal Controls.** Internal control process of the NEA will be applied for the implementation of this Project in the applicable areas. In addition, based on the lessons learned from other IDA financed projects, required control measures are also recommended for this project. The physical verification of the assets was not being conducted for the Bank financed projects. This has also been pointed out in the audit reports. To mitigate the risk of misuse of assets and asset-impairment not accounted for in the proposed project, regular (once in 6 months) physical verification and reconciliation with the records needs to be carried out. The bank reconciliation is currently being done by the same staff handling cheques and deposits, which is a risk for potential misuse of funds. NEA needs to assign a separate staff for bank reconciliation. To ensure regular monitoring and oversight, internal audit of the project needs to be conducted on quarterly basis in line with the NEA policy. For other internal control deficiencies highlighted in the entity level audit reports, the entity level Action Plan for NEA's FM improvement needs to be implemented as per the timeline of the Action Plan. The implementation progress of the Action Plan will be closely monitored by the Bank. A full time Finance

Officer and a Finance Assistant assigned to the project prior to effectiveness will help ensure that the required internal control mechanisms are in place and that the FM deficiencies raised in the entity audit report are prevented at the project level.

11. **Internal Audit.** The Internal Audit Department of NEA will conduct internal audit of the Project. The Internal Audit Department reports directly to the Audit Committee with copy to the Managing Director. The Audit Committee recommends on the internal audit report to the Board of Directors. As highlighted in the external audit report, the internal audit function of NEA is not as effective as expected. Due to delays in conducting internal audit, the internal audit reports are not helpful in timely decision making by the Board of Directors and for external audit. Internal audit needs to be conducted quarterly and reports submitted on time as required by NEA’s policy to ensure regular monitoring and oversight. Accordingly, the Project, the Board of Directors, external auditors and other concerned stakeholders will be able to benefit from the timely internal audit reports.

12. **External Audit.** The Office of the Auditor General (OAG) is responsible for auditing the accounts of NEA. OAG has been appointing independent private auditor for the audit of NEA’s financial accounts and project accounts. Separate audit reports for the Project and the entity will be required to be submitted within 6 months of the fiscal year-end for each fiscal year of the project implementation, including for the year when the Project becomes effective. The Audit reports for FY2012/13 project accounts for the PDP, KTP and NIETTP were received within the grace period. The FY 2012/13 audit report for NEA’s entity financial statements was received after the grace period mainly due to difficulty in convening the Board meeting to endorse the audited financial statements. To avoid such delays, the appointment of independent, qualified and experienced private auditing firm by the OAG as acceptable to the Bank for the audit of this Project as well as for NEA entity level Financial Statements should be done within one month from the end of the fiscal year. Furthermore, it is recommended that NEA proactively plans the audit process closely with the auditors, prepares the financial reports on time and puts substantial efforts towards convening timely Board meeting. The following audit reports will be monitored in the Bank’s system:

Table 3.1: Audit report due date

Implementing Agency	Audit	Auditors	Audit Due Date
NEA	Project Financial Statements	Qualified and Experienced Audit Firm appointed by the OAG	6 months after the end of each fiscal year
NEA	NEA Entity Financial Statements	Qualified and Experienced Audit Firm appointed by the OAG	6 months after the end of each fiscal year

13. **Adequacy of FM Arrangements.** From the fiduciary perspective, based on current assessment as outlined above, the overall FM risk rating is *High* with *Substantial* residual risk.

14. **Allocation of Financing Proceeds.** Disbursement under proposed IDA financing will be made as indicated in the following Table, which indicates the percentage of financing for different categories of expenditures of the Project.

Table 3.2: Allocation of Financing Proceeds

Expenditure Category	Credit SDR million	Credit US\$ million	Financing Percentage
(1) Goods and works	83.55	123.5	100%
(2) Consultants' services and In-Country Training	4.10	6.0	100%
(3) Incremental Operating Costs	0.35	0.5	100%
Total IDA Financing	88.0	130	

15. **Disbursement Arrangements.** The applicable disbursement methods include: Advance, Reimbursement, Direct Payment and Special Commitment. The disbursements from the Bank will be done based on Statement of Expenditures (SOEs). To facilitate disbursement, an advance of specified amount will be provided in a separate Designated Account (DA) to be opened at Nepal Rastra Bank. The payments from the DA could be for reimbursement to NEA for incurred eligible expenses or for direct payment to suppliers / consultants. For small expenditures such as, small procurement, training and workshop, the NEA will pre-finance and once the accounts are consolidated and approved, the funds will be transferred from the DA to NEA's accounts. For large payments, without using the DA, the suppliers / consultants could also be directly paid from the IDA funds and the incurred eligible expenditures could also be directly reimbursed from IDA funds. Special Commitments may also be used for large value contracts. There will be a minimum application amount for requesting such direct payments, direct reimbursements or special commitments. For requests for direct reimbursement (without using DA) and for reporting eligible expenditures paid from the DA, the supporting documents should include: (a) List of payments against contracts that are subject to the Bank's prior review as per the Procurement Plan, together with records evidencing eligible expenditures (e.g., copies of receipts, supplier invoices); and (b) SOEs for all other expenditures (post-review expenditures). In addition, a DA reconciliation statement should be submitted for reporting eligible expenditures paid from the DA. The requests for Direct Payment to suppliers / consultants from IDA funds (without using DA) should be supported by the records evidencing eligible expenditures, e.g., copies of receipts, supplier invoices.

16. **Review of Statement of Expenditures.** During the project implementation, the Bank team will closely review SOE claims to ensure that funds are utilized for the intended purposes. Any ineligible expenditure identified during such reviews will need to be refunded to IDA.

17. **Designated Accounts.** The DA in US Dollars will be established on terms and conditions satisfactory to IDA. The authorized allocations for the DA will be US\$ 5,000,000.

18. **Action Plan.** The following Action Plan needs to be implemented by NEA to ensure effective financial management of the Project.

	Agreed Actions	Deadline
1	Obtain approval for annual work program and budget	April 15, 2015
2	Assign a Finance Officer and a Finance Assistant dedicated for the project	April 15, 2015
3	Assign separate staff for Bank reconciliation	April 15, 2015
4	Conduct Trimester Internal Audits of the project and submit internal audit reports on time	Three months from each trimester end
5	Conduct physical verification of project assets and	Six months from first procurement

	reconciliation with the records every six months	of project asset and every six months thereafter
6	Coordinate with OAG for timely appointment of auditor	Two months prior to the fiscal year end
7	Implement FM Improvement Action Plan to address NEA audit observations	September 30, 2016

Procurement Arrangements

19. Procurement for the Project will be carried out in accordance with the World Bank’s “Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers” published by the World Bank in January 2011, revised July 2014 (“Procurement Guidelines”), in the case of goods, works and non-consulting services; and “Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers” published by the World Bank in January 2011, revised July 2014 (“Consultant Guidelines”) in the case of consultants’ services, and the provisions stipulated in the Legal Agreement. For each contract to be financed under the Credit, procurement methods or consultant selection methods, the estimated costs, prior review requirements, and time frame will be agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

20. All expected procurement of goods, works and consultants’ services will be listed in the project’s General Procurement Notice (GPN). Overall procurement arrangements with tentative amounts are given in Table 3.3.

21. Assessment of Agency’s Capacity to Implement Procurement. The NEA has benefited from the on-going Bank-funded projects for capacity building in procurement following Bank’s procurement guidelines and procedures. The procurement function will be handled by the PMU established under the Project. An OE will be hired to assist the PMU in technical evaluation of bids for the EPC contract for the solar farms. The Bank will hold a procurement training session for procurement staff as soon as all the relevant staff is recruited.

22. The PCC established will oversee the procurement and reconcile the evaluation in a transparent way in case of discrepancies between the two bid evaluation results. The PCC will also oversee the contract execution process to be managed by the PMU

23. A procurement capacity assessment was carried out, as part of fiduciary assessment of NEA, by the Bank procurement staff in March 2014. On the basis of this assessment, the overall procurement risk for the project has been rated “High”, and the residual risk is “Substantial” after preparation and finalization of procurement plan and a OE is in place to support the project staff in procurement management and a PEP in place to carry out independent bid evaluations for major contracts agreed in the Procurement Plan. The report of procurement risk assessment for the Project including identified risks and suggested mitigation measures is available in the project files.

24. Procurement of Supply and Installation. The design, supply, installation and O&M for five years of the solar farm facilities under the Component 1 will be implemented by an EPC Contractor to be selected using International Competitive Bidding (ICB) procedure. The supply and installation of materials for rehabilitation /enhancement of distribution networks for loss reduction under the Component 2 will be implemented by contract(s) to be selected using ICB procedures.

25. Other minor works may be procured through appropriate methods as agreed in the Procurement Plan.
26. Procurement of Goods. Goods procured under this Project include: conductors, capacitor banks and transformers for distribution networks; instruments, testing tools, meters for loss reduction; computers and software for GIS database; and office equipment for project implementation. Depending upon the size of the contract, complexity, availability in the local/international market and local bidders' capacity, such goods will be procured adopting appropriate procurement methods including ICB, Limited International Bidding, National Competitive Bidding (NCB), Shopping, Direct Contracting and other methods as agreed in the procurement plan. Domestic Preference will be allowed to local manufacturers on ICB contracts. Goods may also be procured through NCB procedures in accordance with the Public Procurement Act (and Regulations made thereunder) with procedure acceptable to the Bank. Other goods including off-the-shelf goods/software, office equipment, etc. may be procured through appropriate methods as agreed in the procurement plan.
27. Procurement of Consulting Services. Contracts with consulting firms will be procured in accordance with Quality and Cost Based Selection procedures or other methods given in Section II of the Consultants' Guidelines. For contracts with consulting firms estimated to cost less than US\$300,000 equivalent per contract, the shortlist of consultants may comprise entirely of national consultants in accordance with the provisions of paragraphs 2.7 of the Consultant Guidelines. Other selection methods like Quality Based selection, Fixed Budget Selection, Selection based on Consultant Qualification, Least Cost Selection, Selection of Individual Consultants, and Selection through Single Source can be considered and will be agreed in the Procurement Plan.
28. Incremental Operating Costs. The Project will support operational costs such as for O&M of vehicles, vehicle and office rentals, rentals for information technology services such as internet connection, utilities, and office consumables required for the day-to-day running of the PMU.
29. In order to ensure economy, efficiency, transparency and broad consistency with the provisions of Section 1 of the Procurement Guidelines, the following exceptions shall apply in the case of NCB:
- (i) Only the model bidding documents for National Competitive Bidding agreed with the Association (as amended from time to time), including qualification criteria shall be used;
 - (ii) Bid documents shall be made available, by mail or in person, to all who are willing to pay the required fee;
 - (iii) Foreign bidders shall not be precluded from bidding and no preference of any kind shall be given to national bidders;
 - (iv) Bids shall be opened in public in one place, immediately after the deadline for submission of bids;
 - (v) Qualification criteria (in case pre-qualifications were not carried out) shall be stated in the bidding documents, and if a registration process is required, a foreign firm declared as the lowest evaluated bidder shall be given a reasonable opportunity of registering, without let or hindrance;
 - (vi) Evaluation of bids shall be made in strict adherence to the criteria disclosed in the bidding documents, in a format and specified period agreed with the Association and contracts shall be awarded to the lowest evaluated bidders;
 - (vii) Rebidding shall not be carried out without the prior concurrence of the Association;

(viii) Extension of bid validity shall not be allowed without the prior concurrence of the Association (A) for the first request for extension if it is longer than four (4) weeks and (B) for all subsequent requests for extension irrespective of the period; and

(ix) There shall not be any restrictions on the means of delivery of the bids.

30. Procurement Planning. The Procurement Plan for the key contracts for goods, works and consultants' services expected under the Project has been prepared by NEA and reviewed by the Bank. Whenever possible, procurement of works, goods and services would be packaged into large packages to attract good contractors. Bidding documents for the first year's procurement for major contracts have been prepared and submitted to the Bank. Procurement under the project will be carried out in accordance with the Procurement Plan. Procurement Plans will be closely monitored and updated as required. No procurement, regardless of the value, will be carried out if it is not included in the Procurement Plan cleared by the Bank. The Procurement Plan will also be available on NEA's website (www.nea.org.np) and in the Bank's external website.

31. Prior Review. The Procurement Plan shall set forth those contracts which shall be subject to Bank's prior review.

32. Post Review. All other contracts will be subject to Post Review by the Bank. The PMU will send a list of all contracts for Post Review as per the Bank's request. The Bank will select contracts in a sample of about 5-20 percent of the contracts based on the procurement capacity risk rating of the implementing agency.

Table 3.3: Procurement Packages for Goods with Methods and Time Schedule

Ref. No.	Contract (Description)	Estimated Cost (\$'m)	Procurement Method	P-Q	Domestic Preference (yes/no)	Review by IDA (Prior/Post)	Expected Bid-Opening Date	Comments
<i>Solar PV Farm Component</i>								
01	EPC Contract for Engineering, Procurement & Construction and 5-year O&M	49.0	ICB	No	No	Prior	January 2015	PEP Evaluation in Parallel
<i>Distribution Planning and Loss Reduction Component</i>								
01	Loss Reduction – projects (conductors, capacitor banks, transformers, meters)	75.5	ICB	No	No	Prior	July 2015	Multiple contracts PEP evaluation in parallel
02	Loss Reduction – Instruments, Software, Tools, etc.	0.50	ICB/NCB/Shopping	No	Yes	Post	July 2015	Multiple contracts
03	Planning – GIS Database Hardware & Software	1.5	ICB	No	No	Prior	July 2015	Multiple contracts

Table 3.4: Consultancy Assignments with Selection Methods and Time Schedule

Ref. No.	Description of Assignment	Estimated Cost (\$'m)	Selection Method	Review by IDA (Prior/Post)	Expected Proposals Submission Date	Comments
<i>Solar PV Farm Component</i>						
01	OE	1.0	QCBS	Prior	Dec 2014	
02	PEP	0.1	IC	Prior	Dec 2014	
<i>Distribution Planning and Loss Reduction Component</i>						
03	Service Contract <ul style="list-style-type: none"> • <u>DMP</u> and Distribution Planning, including GIS Database Design, Procurement, Commissioning • <u>DLRMP</u>, including preparation of projects for selected distribution centers • <u>Distribution business management</u>, including action plan and training 	2.0	QCBS	Prior	Jan 2015	

Notes:

ICB: International Competitive Bidding CQS: Selection Based on Consultant's Qualifications
NCB: National Competitive Bidding IC: Individual Consultants
DC: Direct Contracting IND: Individual
QCBS: Quality and Cost Based Selection SSS: Single Source Selection
QBS: Quality Based Selection

**Annex 4: Operational Risk Assessment Framework (ORAF)
Nepal: Grid Solar and Energy Efficiency Project (P146344)**

Risks			
1. Project Stakeholder Risks	Rating:	Moderate	
Description: 1. Some form of resistance may arise from the local communities, Government or some political parties if the project requires too much public financial participation or increased allocation of the country's IDA resources. 2. A counterpart funding required for the Project may be constrained by the current budget situation of Nepal and the financial weakness of the NEA.	Risk Management: 1. The Government is supportive of the Project since the GSEEP will increase the electricity supply capacity in the country in a short project period without causing significant environmental and social problems. Further, the Project will choose land owned by NEA for installation of the solar farm facilities to minimize potential impacts to local communities.		
	Resp: Client	Stage: Preparation and implementation	Due Date:
	Risk Management: 2. The actual amount of counterpart funding available is limited and this Project is critically important for the country both in the short and medium/long term. The team will closely follow up with the NEA and the Government to ensure that appropriate amount of counterpart funding is set aside to allow implementation.		
2. Implementing Agency Risks (including fiduciary)			
2.1 Capacity	Rating:	High	
Description: 1. The NEA is managed professionally. However, the utility has been facing significant challenges, with tariff charges below cost. This has created severe capacity constraints and delays in operational delivery, timely financial management issues, etc. There are several generation, transmission, and access projects in preparation. 2. The protracted decision-making process could delay implementation. In terms of Financial Management, there are deficiencies in institutional capacity and internal control system.	Risk Management: 1. The NEA needs to improve its financial performance and enhance its management capacity to face its growing operation and maintenance challenges. An Action Plan for the NEA Financial Restructuring will be prepared and implemented by a technical assistance project started in FY 2015 to improve the NEA's financial performance. On-going WB-funded projects, together with this project, further build the NEA's capacity in procurement, safeguard, financial management, contract management, and monitoring and evaluation.		
	Resp: Client	Stage: Preparation and Implementation	Due Date:
	Risk Management: 2. The project team will coordinate with other WB-funded projects to monitor the outcome of the TA and capacity-building support to streamline and implement best practices in the NEA's operations. Part of the on-going NIETTP will enhance the NEA's capacity through development of NEA-wide Enterprise Resource Planning (ERP) system which includes FMIS. Until completion of the implementation of the NEA entity level Action Plan for FM improvement, the mitigation/ control measures are recommended at the project level to ensure effective FM at the project level. Both the entity level and the project level, action plans will be intensively monitored by the Bank. The FM Officer and the Finance Assistant assigned for the Project will		

<p>3. Coordination and capacity issues within the NEA increase risks of delays in the implementation of the project.</p> <p>4. Unions are very active and influential in the NEA. Strikes are common and the political uncertainty in the country fuels union activism. Delays and disruption might happen.</p> <p>5. This project will be the NEA's first large scale solar power plant development, and thus there is no in-house experts in solar technology, design, construction, and operation and maintenance. The lack of capacity in the NEA may cause procurement delay, construction delay, shortening equipment life span, electricity supply system instability due to an operational fault, among others.</p>	<p>support effective FM of the Project and ensure that the project level actions are timely completed as required. An experienced procurement specialist was hired to assist the NEA and to help the NEA improve the procurement capacity through training.</p> <table border="1"> <tr> <td data-bbox="831 186 1192 256">Resp: Client</td> <td data-bbox="1192 186 1486 256">Stage: Preparation and Implementation</td> <td data-bbox="1486 186 1740 256">Due Date:</td> <td data-bbox="1740 186 1990 256">Status: In Progress</td> </tr> <tr> <td colspan="4" data-bbox="831 256 1990 391">Risk Management: 3. External consulting services are procured to increase capacity as needed in order to deliver efficiently. The WB team based in the country office will liaise with the counterparts and the client on a regular basis.</td> </tr> <tr> <td data-bbox="831 391 1192 461">Resp: Client & Bank</td> <td data-bbox="1192 391 1486 461">Stage: Preparation and Implementation</td> <td data-bbox="1486 391 1740 461">Due Date:</td> <td data-bbox="1740 391 1990 461">Status: In Progress</td> </tr> <tr> <td colspan="4" data-bbox="831 461 1990 630">Risk Management: 4. The NEA management maintains close communication with unions and both staff and management are aware of the importance of this project for the country. Further communication with the staff and union representatives about the project might be needed to ensure support of the unions to the success of the project.</td> </tr> <tr> <td data-bbox="831 630 1192 699">Resp: Client</td> <td data-bbox="1192 630 1486 699">Stage: Preparation and Implementation</td> <td data-bbox="1486 630 1740 699">Due Date:</td> <td data-bbox="1740 630 1990 699">Status: In Progress</td> </tr> <tr> <td colspan="4" data-bbox="831 699 1990 902">Risk Management: 5. Hiring Owners' Engineers, providing training programs to develop capacity on solar power plant, and including O&M services for 5 years from the date of commission in the full turnkey EPC Contract for the project could mitigate the potential risks caused by lack of the NEA's capacity for the solar power technology.</td> </tr> <tr> <td data-bbox="831 902 1192 998">Resp: Client & Bank</td> <td data-bbox="1192 902 1486 998">Stage: Implementation</td> <td data-bbox="1486 902 1740 998">Due Date:</td> <td data-bbox="1740 902 1990 998">Status: Not yet due</td> </tr> </table>	Resp: Client	Stage: Preparation and Implementation	Due Date:	Status: In Progress	Risk Management: 3. External consulting services are procured to increase capacity as needed in order to deliver efficiently. The WB team based in the country office will liaise with the counterparts and the client on a regular basis.				Resp: Client & Bank	Stage: Preparation and Implementation	Due Date:	Status: In Progress	Risk Management: 4. The NEA management maintains close communication with unions and both staff and management are aware of the importance of this project for the country. Further communication with the staff and union representatives about the project might be needed to ensure support of the unions to the success of the project.				Resp: Client	Stage: Preparation and Implementation	Due Date:	Status: In Progress	Risk Management: 5. Hiring Owners' Engineers, providing training programs to develop capacity on solar power plant, and including O&M services for 5 years from the date of commission in the full turnkey EPC Contract for the project could mitigate the potential risks caused by lack of the NEA's capacity for the solar power technology.				Resp: Client & Bank	Stage: Implementation	Due Date:	Status: Not yet due
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Resp: Client & Bank	Stage: Implementation	Due Date:	Status: Not yet due																										
2.2 Governance	Rating: Substantial																												
<p>Description:</p> <p>1. The NEA's Governance is weakened by political interference and uncertainty in the country that can trigger conflicts within the NEA. In this situation, the Board is strongly involved in the management decisions, which can delay or block important decisions and reduce the NEA's capacity to act independently.</p> <p>2. Political uncertainty, including constitutional process, may increase political interference and delay decisions, especially regarding counterpart funding.</p>	<p>Risk Management:</p> <p>1. WB will maintain close communication with the NEA's management to ensure good coordination and raise awareness about important issues to be decided on. Furthermore, use of an independent third-party monitoring will be discussed during project implementation.</p> <table border="1"> <tr> <td data-bbox="831 1230 1192 1300">Resp: Client</td> <td data-bbox="1192 1230 1486 1300">Stage: Preparation and Implementation</td> <td data-bbox="1486 1230 1740 1300">Due Date:</td> <td data-bbox="1740 1230 1990 1300">Status: In progress</td> </tr> <tr> <td colspan="4" data-bbox="831 1300 1990 1442">Risk Management: 2. The counterpart financing details have been carefully discussed with MoE and MoF. The proposed counterpart financing is manageable. Given the significant importance of the project, GoN is committed to provide necessary budgetary allocation.</td> </tr> <tr> <td data-bbox="831 1442 1192 1476">Resp: Client</td> <td data-bbox="1192 1442 1486 1476">Stage: Preparation</td> <td data-bbox="1486 1442 1740 1476">Due Date:</td> <td data-bbox="1740 1442 1990 1476">Status:</td> </tr> </table>			Resp: Client	Stage: Preparation and Implementation	Due Date:	Status: In progress	Risk Management: 2. The counterpart financing details have been carefully discussed with MoE and MoF. The proposed counterpart financing is manageable. Given the significant importance of the project, GoN is committed to provide necessary budgetary allocation.				Resp: Client	Stage: Preparation	Due Date:	Status:														
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Resp: Client	Stage: Preparation	Due Date:	Status:																										

		and Implementation		
3. Project Risks				
3.1 Design	Rating:	Moderate		
Description: The plant factor could be much lower than the original design due to unexpected weather conditions, and the solar power plant might not be able to supply expected amount of electricity. Strong daily and seasonal variation of generated electricity may also cause supply system instability.	Risk Management: Techniques for appropriate solar power plant operation and power flow management will be transferred to the NEA officers through desktop training programs and on-the-job training.			
	Resp: Client	Stage: Implementation	Due Date:	Status: Not yet due
3.2 Social & Environmental	Rating:	Low		
Description: 1. The Project is a category “B” project. The project is not expected to have any significant social and environmental impacts (biodiversity, forests, soil erosion, etc.). 2. A large scale solar farm could be a visual obstacle, and thus there is a possibility that protest against the project from residents in the neighbor may occur.	Risk Management: 1. The NEA will use their own unused lands for the grid solar farms and thus there will be no private land acquisition. The project, however, will carry out social screening to identify any adverse social impact and presence of indigenous community. Accordingly, RAP and VCDP will be prepared as appropriate. Environmental Assessments will be carried out, EMPs will be agreed with the NEA, and the implementations of the mitigation measures will be monitored. Implementation risks of such interventions are considered to be low.			
	Resp: Client & Bank	Stage: Preparation and Implementation	Due Date:	Status: Not yet due
	Risk Management: 2. The project sites were neither selected in visual impact sensitive areas nor overlooked by significantly populated area.			
	Resp: Client	Stage: Preparation	Due Date:	Status: In progress
3.3 Program & Donor	Rating:	Low		
Description: There are no donors involved in this project.	Risk Management: In Nepal, donor coordination meetings have been held at least once in a half year to share information and avoid the redundancies for the cooperation to the energy sector. The sector wide approach is well functioning in the rural electrification area, in which European bilateral donors are actively involved. Especially for the large scale development, such as hydropower and transmission expansion, the WB coordinates well with major donors, such as ADB, JICA, and Norway.			
	Resp: Bank	Stage:	Due Date:	Status: Not yet due
3.4 Delivery Monitoring & Sustainability	Rating:	Substantial		
Description: 1. The NEA’s capacity on project management, monitoring, and evaluation are weak.	Risk Management: 1. The NEA’s management has committed to keep a stable project implementation team. Computerized management system introduced in the NEA by the WB fund will support to share information and strengthen the NEA management capacity.			

2. Fast rotation of the staff within the NEA reduces the institutional retention of operational experience and knowledge.	Resp: Client	Stage: Preparation and Implementation	Due Date:	Status: Note yet due
	Risk Management: 2. The WB team will request the NEA’s management to commit to a stable project and operation team. The NEA is also developing and implementing Enterprise Resource Planning system by the WB fund that will be extended to the operations and will help retain and share information. GSEEP could be a pilot project on the operation side.			
	Resp: Client	Stage: Implementation	Due Date:	Status: Not yet due
4.0 Overall Implementation Risk	Rating:	Substantial		

Annex 5: Implementation Support Plan
Nepal: Grid Solar and Energy Efficiency Project (P146344)

Strategy and Approach for Implementation Support

1. The strategy for implementation support was developed based on the nature of the Project. It aims at making the support to the client for implementation compliant with Bank rules/safeguards at all times, achieving high quality, according to the schedule, and focus on the implementation of the risk mitigation measures as defined in the ORAF.
2. Procurement: To avoid fiduciary problem on the procurements under the Project, an independent PEP will be formulated to provide independent bid evaluation results to the NEA and the Bank directly. To enhance procurement capacity on NEA, NEA officers will take a Bank supported two-week training program of “Procurement Procedures for the World Bank Aided Projects” by Administrative Staff Collage of India (ASCI) in Hyderabad, India.
3. Procurement for the EPC Contract for the solar farms will be focused on competitions of delivered the energy output (GWh) to the NEA grid in the most cost effective way. Bid evaluation will be based on cost of energy output estimated with reference solar radiation and temperature data provided in the Bidding Documents. The reference data is provided for all bidders to estimate the energy output on a common basis, and a conversion to energy output based on measured data will be specified in the Bidding Documents. Guaranteed energy output will become a contractual obligation, and incentives or penalties to be applied for actual energy output above or below the guaranteed energy output will also be pre-defined in the Bidding documents. The Bidders will have the flexibility to choose the key equipment (such as invertors and transformers, etc.) for an integrated system that can deliver the guaranteed energy output in the most cost effective way. To support the bidders in cost estimation and project design, a pre-bid meeting including a site visit will be organized during the bidding process. The EPC contract will include a 5-year O&M services task, and the solar radiation, temperatures and energy output will be measured for applications of penalties or incentives. By end of the EPC contract period, a test and acceptance will be conducted for official hand over of the O&M to NEA engineers. An OE will be hired to help evaluate the technical part of the bids, supervise the project construction, and review the O&M manual to be prepared by the EPC contractor. The EPC contract will include requirements on training of NEA engineers for O&M.
4. **Environment and Social Safeguards:** The Bank team will supervise and provide support to the NEA for the implementation of the agreed action plans including RAP, ESMF, VCDP, among others. To improve the safeguards compliance, training program will be provided by the Bank staff members during project implementation.
5. **Technical Aspects:** An OE will be hired to assist NEA in supervising the EPC Contract execution and preparing necessary documents during the construction. Both the EPC Contractor and the OE will provide on-the-job-training to NEA engineers, especially for the O&M of the solar farm facilities after commissioning.
6. **Project Management:** To enhance capacity in project management, including construction planning, quality control, schedule management, cost control, safeguard management, among others, one week training programs will be provided to NEA’s project officers. Technology transfer regarding the project management to NEA is also included in a task for the OE.

Implementation Support Plan

7. Formal supervision and field trip would be carried out semi-annually or as often as needed to support NEA in implementation of the Project. Most of the Bank Team members for the Project are based in the Kathmandu Office and can provide support to NEA when needed.

8. Intensive supervision of FM will be undertaken by the Bank, which will include follow-up on the implementation of the agreed Action Plan for FM improvement at NEA among other things. The FM rating will be reviewed periodically based on progress of the agreed and required FM actions.

9. Frequency of Procurement *Supervision*. Bank supervision would be carried out every six months and more frequently in the early stages of Project implementation.

10. Detailed inputs from the Bank Team are outlined below:

Table 5.1: Main Focus on Implementation Support

Time	Focus	Purpose	Responsibility	Estimate
First 3 months	Hiring OE	Selecting appropriate an EPC Contractor	NEA	OE cost (US\$ 1.0 mil) is included in the project cost.
	Formulating Independent PEP	Maintain procurement transparency	NEA	Necessary cost for the PEP (US\$ 0.1 million) is included in the capacity development budget.
	Sites Preparation Complying with Safeguards	Realization of smooth EPC Contractor mobilization to the sites	NEA	WB support US\$ 30,000 for area survey and geotechnical investigation.
	1 st Implementation Support Mission	Facilitate smooth project start up	WB and NEA	US\$ 30,000 for WB members to participate the mission.
	Establishment of Monitoring and Evaluation	Efficient regular project monitoring and early problem detection	NEA, OE, and EPC Contractor	Necessary costs are included as a part of the project budget.
First 12 months	OE's continuous support to NEA	Facilitate prompt technical judgments	OE and NEA	OE cost (US\$ 1.0 mil) is included in the project budget.
	Technology transfer from OE to NEA through on-the-job-training	Enhancing NEA's technical knowledge on solar power development and project management capacity	OE and NEA	Necessary costs are included as a part of the OE budget.
	PEP's continuous support to GoN	Maintain procurement transparency	NEA	Necessary cost for the PEP (US\$ 0.1 million) is included in the capacity development budget.

	Project implementation support	Monitoring and evaluation of the project progress	WB and NEA	US\$120,000/year for WB members to support the implementation.
12 - 60 months	O&M technology transfer from EPC Contractor to NEA through on-the-job-training	Enhancing NEA's O&M capacity development	EPC Contractor and NEA	Necessary costs are included as a part of the EPC Contract budget.
	Appropriate and adequate spare parts preparation on site	Avoiding operational problems	EPC Contractor	O&M cost (US\$ 2.5 mil) is included in the EPC Contract budget.

Table 5.2: Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Project monitoring and evaluation (comprehensive)	1) TTL: 8 Staff Weeks/year 2) Technical Expert: 8 Staff Weeks/year 3) Sector Policies: 6 Staff Weeks/year 4) Social Expert: 4 Staff Weeks/year 5) Environmental Expert: 4 Staff Weeks/year 6) Procurement: 8 Staff Weeks/year 7) Financial Management: 4 Staff Weeks/year	Minimum 2 times annually (depending on circumstances, a third supervision trip may be required)	
Safeguards compliance	1) Social Expert: 1 Staff Week 2) <u>Environmental Expert: 1 Staff Week</u> 3) <u>Moderator: 1 Staff Week</u>	One round trip each to invite 3 international trainers to Kathmandu	Training programs will be provided to 10 NEA officers for social and environmental safeguards for 1 week.
WB procurement	<u>Outsource</u> to the Administrative Staff Collage of India (ASCI)	One round trip for each trainee	The 2 weeks training program of "Procurement Procedures for the World Bank Aided Projects" by Administrative Staff Collage of India (ASCI) will be provided to 5 NEA officers in Hyderabad, India.
Project management	1) Training Facilitator 1 Staff Week (outsource) 2) PM Expert (PMBOK) 1 Staff Week (outsource) 3) IT (MS Project)	One round trip each to invite 3 international trainers for "A Guide to the Project Management Body of Knowledge (PMBOK)" and "MS	Focus on enhancing capacity on construction planning, quality control, schedule management, budget control, safety management, among others. Training programs

	1 Staff Week (outsource)	Project” to Kathmandu	will be provided to 20 NEA officers for 1 week.
O&M for solar farm	1) Operator Training 24 Staff Week (outsource) 2 instructors for 3 months 2) Maintenance Training 8 Staff Week (outsource) 2 instructors for 1 month	One round trip for each trainee	Training program at an actual operating solar farm, such as in Thailand. Training programs will be provided to 5 operators for 3 months and 2 maintenance engineers for 1 month.

Annex 6: Assumptions Used for Economic and Financial Analysis Nepal: Grid Solar and Energy Efficiency Project (P146344)

1. **Scope of Analysis.** Under the Grid Solar and Energy Efficiency Project, economic and financial analysis carried out for the grid connected solar farm component only.

Energy and Capacity. GSEEP has been designed as a number of grid connected solar plants on the NEA owned lands in the central part of Nepal. The total cumulative installed capacity would be about 25 MWp with average availability of 20 MW. The average annual electricity generation is expected to be 33 GWh based on the reference annual average solar radiation on horizontal plan. The average annual electricity generation is calculated as follows:

- a. Average annual solar radiation on horizontal plan = 1650 kWh/m²
- b. Performance Ratio = 0.8
- c. Annual Specific Yield = a x b = 1320 kWh/kWp
- d. Installed capacity = 25,000 kWp
- e. Annual electricity generation = c x d = 33.0 GWh
- f. Annual reduction in generation due to efficiency deterioration of solar panel = 1%

2. **Capital Cost.** Financial costs of the project have been estimated including physical and price contingencies to the base costs. The project costs are estimated is based on December 2013 USD. Economic costs have been arrived at by removing price contingencies, custom duties and taxes (at 1.5% of foreign cost), VAT as well as IDC from the financial cost. Only the base costs and physical contingencies are included. The local currency component of the project costs have been multiplied by the standard conversion factor of 0.85 to adjust for the price distortions of the items like unskilled and skilled labor and exchange rate.

3. **Other assumptions** include:

- (i) Exchange rate 1 US\$=100 NPR
- (ii) O & M performance contract for 5 years estimated to be about USD 2.5 million.
- (iii) O&M (salaries, spare parts, etc.) has been assumed to be 0.5% of the investment costs after fifth year.
- (iv) Useful economic life of the project has been considered as 25 years.
- (v) The project construction period is assumed to be 2 years and electricity generation would start from the beginning of the year 2016.
- (vi) All costs and benefits are based on December 2013 prices level expressed in US\$ and no price inflation is assumed, either in benefits or costs, over the period of analysis.

Economic Analysis

4. **Identification and Valuation of Economic Benefits.** The principal benefit of the project is the electric energy generated by the project. In the case of GSEEP, the valuation of benefit is based on the avoided cost of generation from the diesel power plant.

5. In short term, diesel thermal plant is the alternative to meet the power deficit. However, the cost of the generation from diesel is too high (31.6 cents/kWh) compared to cost of generation of solar PV (14.9 cents/kWh). Therefore, it is a cost effective alternative. Without the proposed project, it is assumed that a diesel plant of equivalent capacity, sufficient to generate same amount of energy to that of the GSEEP would be installed. The technical and cost characteristics of this diesel plant are given in

Table 6.1. As the economic life of the diesel plant is assumed to be 20 years, an additional diesel generator would need to be installed after the first set diesel generator is retired in 20 years.

Table 6.1: Characteristics of Diesel Power Plant

Installed Capacity Cost	1000 USD/kW
Life	20 years
Fixed O&M cost	1 USD/kW-month
Variable O&M cost	2.6 USD/MWh
Heat rate	2180 kcal/kWh
Fuel Price (Economic)	0.93 USD/Liter
Energy Content of furnace oil	38.5 MJ/Lit















6. The net present value (NPV) of GSEEP over the diesel plant is found to be USD 44.0 million at the discount rate of 10% and the EIRR is found to be 50.7%. This suggests that electricity generation from GSEEP is highly attractive compared to equivalent diesel plant. There are environmental benefits as well which are discussed below in next paragraph.

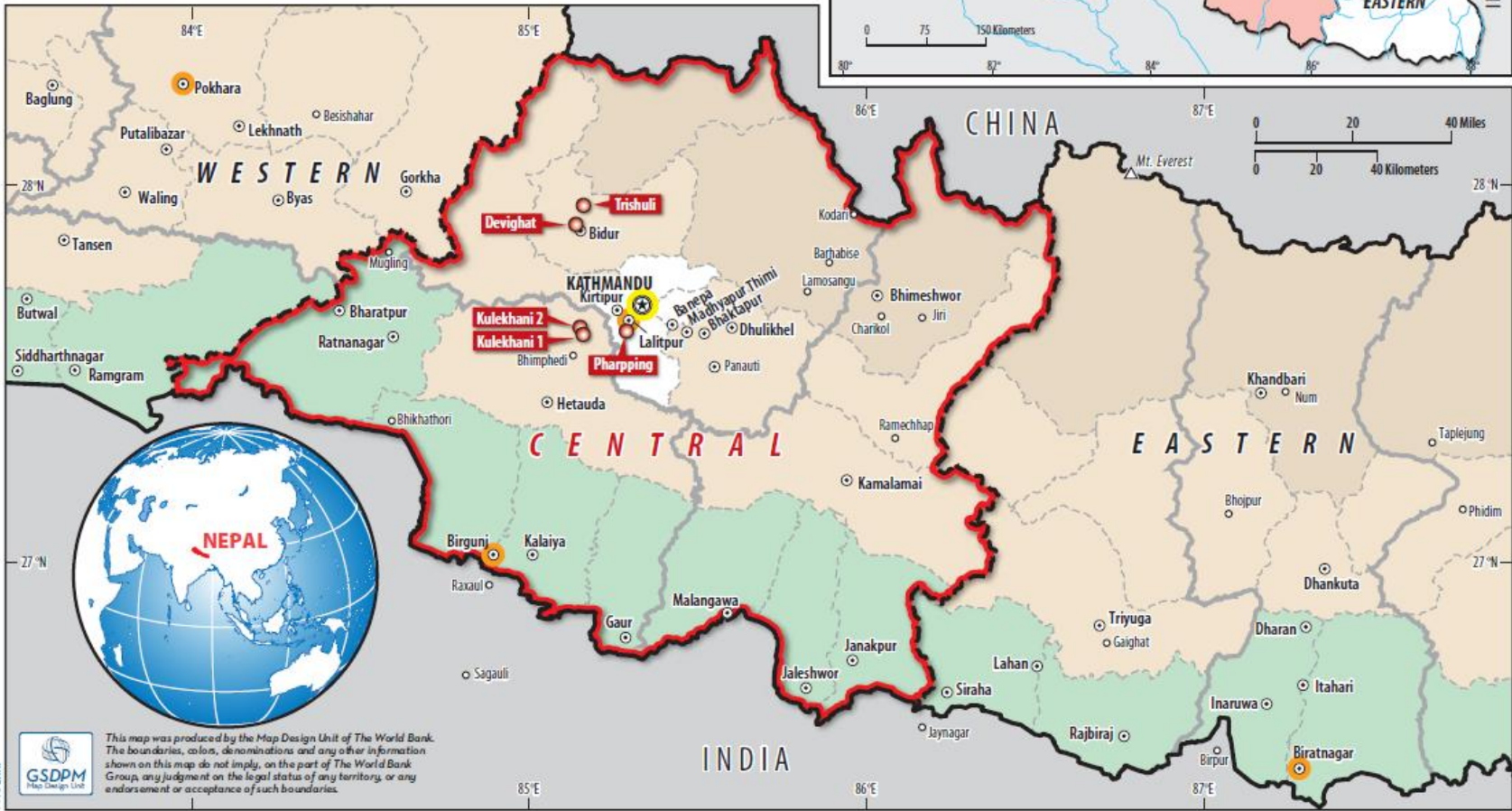
7. **Environmental Benefits.** As solar based electricity generation would avoid thermal based generation, there is a clear environmental benefit. The calculation of avoided carbon emissions is straightforward given the fuels that are assumed to be replaced. In the case of diesel plant, the CO₂ emission factor is 800 g of CO₂/kWh. Using this emission factor, the project will mitigate 26,400 tons of CO₂ annually.


Financial Analysis

8. The NEA offered rate for hydro IPP up to 25 MW is 4.80 Rs/kWh (4.8 cent/kWh) for wet season and 8.40 Rs/kWh (8.4 cent/kWh) for dry season; and average retail tariff rate of 7.95 Rs/kWh (7.95 cent/kWh) for year 2013. While the specific cost of generation by Solar PV is about 15 cent/kWh. This clearly indicates that the financial internal rate of return (FIRR) of the grid-connected solar farms will be negative. However the proposed solar farms will replace diesel power generation for reducing the load shedding and is the least cost option for reduction of load shedding in the short terms. As NEA has number of generation portfolios having different cost of generation ranging from 2 cents/kWh for low cost hydropower plants to about 32 cent/kWh in case of thermal plant owned by NEA, generation from solar PV would be a part of the least cost generation mix to meet the demand. Furthermore, given the relatively small share of the solar power generation in NEA's power generation mix (0.4 percent), the impact on NEA financial performance would be negligible although the cost of solar power generation is high compared to NEA tariff.

NEPAL GRID TO SOLAR AND ENERGY EFFICIENCY PROJECT

	PROJECT CANDIDATE SITES		MOUNTAIN ECOLOGICAL ZONE
	PROJECT AREA		HILL ECOLOGICAL ZONE
	TOWNS AND VILLAGES		TARAI ECOLOGICAL ZONE
	MUNICIPALITIES		DISTRICT BOUNDARIES
	NATIONAL CAPITAL		ZONE BOUNDARIES
	SUBMETROPOLITAN CITIES		DEVELOPMENT REGION BOUNDARIES
	METROPOLITAN CITY		INTERNATIONAL BOUNDARIES



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