

# PROJECT INFORMATION DOCUMENT (PID) CONCEPT STAGE

Report No.: PIDC2081

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<b>Project Name</b>	Nepal: Grid Solar and Energy Efficiency (P146344)
<b>Region</b>	SOUTH ASIA
<b>Country</b>	Nepal
<b>Sector(s)</b>	Other Renewable Energy (70%), Energy efficiency in Heat and Power (15%), Transmission and Distribution of Electricity (15%)
<b>Theme(s)</b>	Infrastructure services for private sector development (100%)
<b>Lending Instrument</b>	Investment Project Financing
<b>Project ID</b>	P146344
<b>Borrower(s)</b>	Government of Nepal represented by Ministry of Finance, His Majesty's Government of Nepal,
<b>Implementing Agency</b>	Nepal Electricity Authority
<b>Environmental Category</b>	B-Partial Assessment
<b>Date PID Prepared/ Updated</b>	13-May-2014
<b>Date PID Approved/ Disclosed</b>	14-May-2014
<b>Estimated Date of Appraisal Completion</b>	05-Jun-2014
<b>Estimated Date of Board Approval</b>	23-Sep-2014
<b>Concept Review Decision</b>	

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## I. Introduction and Context

### Country Context

1. Despite a decade-long armed insurgency and protracted political transition, Nepal has made exemplary progress in poverty reduction and human development. It has met the MDG target of halving the percentage of people living on less than \$1.25 per day, accelerating the pace of poverty reduction sharply from 1.5 percentage points per year over 1996-2004 to 2.5 percentage points over 2004-2011. In addition, Nepal has achieved gender parity in education and sharp reductions in infant and maternal mortality. To maintain momentum, Nepal will need to exploit its demographic opportunity, helping its reasonably-educated youth raise agriculture productivity and incomes and transit to non-farm employment in the urban areas. A constituent assembly (CA) established to issue a new constitution by May 2012 reached the end of its mandate without agreeing a constitution. After almost a year of political turbulence, marked by policy inconsistency and dramatic delays in public spending, the four largest political parties in March 2013 agreed a technocratic interim

administration mandated to undertake elections for a new CA; the election date has since been set for November 19, 2013. The CA will agree a new constitution and then function as a parliament.

### **Sectoral and Institutional Context**

**Relatively high access to electricity but low consumptions:** As per national census published in 2013, about 75 percent of the population in Nepal is estimated to have access to electricity (grid and off-grid), with a significant disparity between access levels in urban Nepal (around 90 percent) and rural Nepal (around 30 percent). While they may have connections, they do not necessarily have service due to shortage of supply. Average annual consumption remains very low at about 70 kWh per capita, compared to 733 kWh for India and 2,600 kWh for China.

**Rich hydropower resources and huge gap between power supply and demand:** Nepal's grid-connected generation capacity is low. While the country is endowed with huge hydropower potential relative to the size of the population, about 84,000 MW theoretically and 43,000 MW economically exploitable, the installed hydropower generation capacity as of July 2013 is merely 746 MW, of which 704 MW is grid-connected. Due to seasonal fluctuation of water flows, in November 2012, the available capacity was only 625 MW including 53MW thermal and about 100 MW import from India (hydro contributed only 472 MW) while the peak demand was 1,095 MW. The massive gap between power supply and demand resulted in acute shortage of electricity and load shedding of up to 18 hours per day in the grid-covered areas in dry seasons.

**High distribution system losses:** Net energy loss reached 26.4 percent of net generation in 2012. Major causes of the system losses include: (i) overloading of distribution transformers; (ii) long distance and overloading (due to wrong sizes) of distribution feeder lines; (iii) high voltage drop of the distribution system due to lack of reactive power compensations; and (iv) commercial losses (poor metering, electricity theft, etc.).

**Poor financial performance of the power sector:** Nepal Electricity Authority (NEA) is loss-making and heavily indebted. NEA's financial position has deteriorated sharply in recent years due to the rapidly rising costs, insufficient increases in retail tariffs, among other factors. For every kilowatt-hour of electricity it sells NEA incurs a loss of about 2 cents. NEA is neither able to service its debts, nor generate funds required to invest in generation, transmission, and distribution infrastructures.

**Government strategy for the short, medium and long terms:** To deal with the energy crises and eventually achieve sustainable, reliable and affordable electricity supply in Nepal, the strategy of Government of Nepal (GoN) is to: (i) reduce the load shedding by adding generation capacity that can be installed in a short term; (ii) reach supply and demand balance in a medium term through commissioning of hydropower under construction and power import from India; and (iii) develop its huge hydropower resources to sustain domestic growth and earn export revenues in a long term.

**Institutional structure of the power sector:** The electricity sector is under the responsibility of the Ministry of Energy (MoE), which is responsible for formulating sector policy and regulation, and overseeing planning, investment and development of the power sector. The MoE is also responsible for issuing licenses for electricity generation, transmission and distribution. In addition, the Investment Board established in November 2011 was entrusted with the responsibility of facilitating the development of large infrastructure projects including hydropower projects above 500 MW. NEA was formed in August 1985, under the Nepal Electricity Authority Act of 1984, as a

vertically-integrated government-owned utility responsible for generation, transmission and distribution of electricity in Nepal. Independent Power Producers (IPPs) also invest, own and operate power generation facilities, mostly based on hydro resources. For domestic grid-based electricity supply, NEA serves as the single buyer for the electricity generated by IPPs.

### **Relationship to CAS**

The proposed Project supports GoN strategy to deal with the current crisis in the energy sector. It is also consistent with the joint IDA/IFC Interim Strategy Note (ISN) for Nepal (FY12-13). The ISN stressed the importance of increased access to electricity, enhancing connectivity, and improved reliability of power supply.

## **II. Proposed Development Objective(s)**

### **Proposed Development Objective(s) (From PCN)**

The proposed project development objectives are to: (i) increase grid power supply through installation of solar power generation facility; and (ii) support NEA to prepare actions for financial performance improvement through distribution system loss reduction and financial restructuring.

### **Key Results (From PCN)**

The key results of this project (or potential indicators) will be:

to measure achievement of the objectives:

- Electricity supplied to NEA grid (GWh/year)
- Progress in preparation of a country-wide Distribution System Loss Reduction Master Plan (DLRMP)
- Progress in preparation of an Action Plan for NEA's Financial Restructuring

to measure intermediate results:

- Progress in commissioning of grid-connected solar power generation facilities (MW)
- Progress in pilot loss reduction project implementation in selected areas and percentage of loss reduction (%)

## **III. Preliminary Description**

### **Concept Description**

Grid-connected Solar Farm Development (US\$50 million): This component will support design, construction, commissioning, and operation and maintenance (O&M) of a grid connected 20 MW solar farm (without having electricity storage facility) nearby Kathmandu valley to supply electricity directly to NEA's distribution network. It will include supply, installation, and commissioning of solar power generation equipment and associated 11kV medium voltage (MV) line connecting to the existing substations. Land owned by NEA has been selected for the solar farm and no private land will be involved. NEA has conducted initial load flow and system stability studies, fault level analysis, connection concept design, facility protection design, optimal site selection, environmental and social impact assessments, and bid documents preparation. Technical assistance will be provided to NEA to finalize these technical studies and the bidding document for design, supply, installation and commissioning of the solar farm. O&M services for 5 years from the date of commission, including supply of spare parts, preparation of an O&M manual and training of NEA's engineers will also be included. An Owner's Engineer (or individual consultants) will be hired by NEA to assist in construction supervision, acceptance test, commissioning, and reviewing

the O&M Manuals.

Distribution System Planning and Loss Reduction (US\$33 million): This component will support: (a) preparing the Distribution Master Plan (DMP); (b) preparing the Distribution Loss Reduction Master Plan (DLRMP); (c) preparation and implementation of pilot 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.

Following recommendations of the DLRMP, investment for system loss reduction will be piloted in two selected distribution areas 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.

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 Geographic Information System (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 not grid-covered areas; 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.

#### IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
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	

#### V. Financing (in USD Million)

Total Project Cost:	83.00	Total Bank Financing:	80.00
Financing Gap:	0.00		
<b>Financing Source</b>			<b>Amount</b>

BORROWER/RECIPIENT	3.00
International Development Association (IDA)	80.00
Total	83.00

## VI. Contact point

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