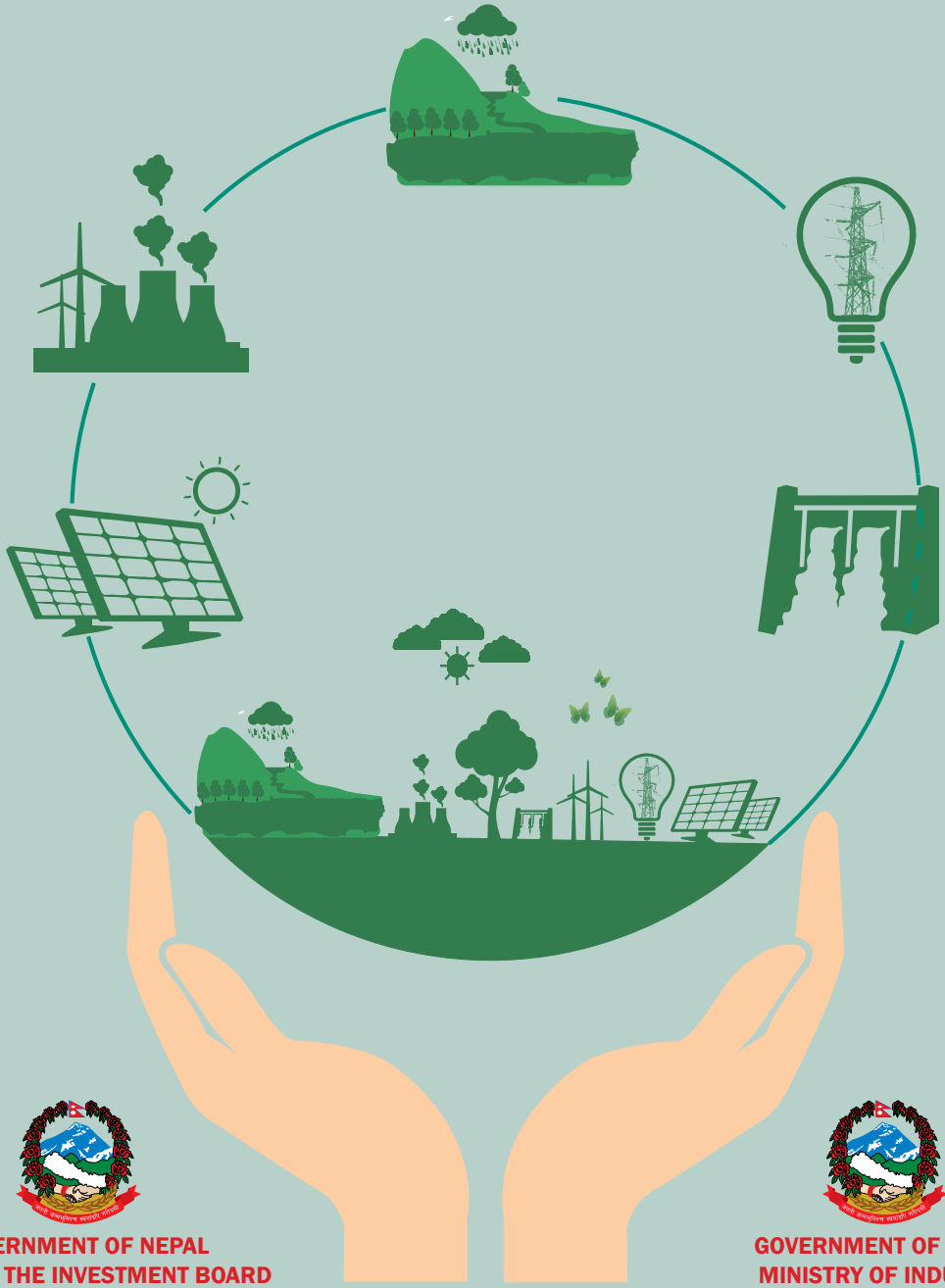
ENERGY
SECTOR PROFILE



GOVERNMENT OF NEPAL
OFFICE OF THE INVESTMENT BOARD

GOVERNMENT OF NEPAL
MINISTRY OF INDUSTRY

DISCLAIMER

All of the information included in this brochure is for informational purposes only and may not reflect the most current legal developments, adjustments, or settlements. This information is not offered as legal or any other advice on any particular matter. The Investment Board and the contributing authors expressly disclaim all liability to any person in respect of anything, and in respect of the consequences of anything, done or omitted to be done wholly or partly in reliance upon the whole or any part of the contents of "Sector Profile: Energy". No reader should act or refrain from acting on the basis of any matter contained in this brochure without first seeking the appropriate legal or other professional advice on the particular facts and circumstances

Publisher

Investment Board Nepal
Office of the Investment Board
ICC Complex, New Baneshwor,
Kathmandu, Nepal
Phone: 977-1-4475277, 977-1-4475278
Fax: 977-1-4475281
Email: info@ibn.gov.np
Website: www.ibn.gov.np

Government of Nepal

PAPER

Environment friendly, woodfree paper

DESIGN, PRINT PRODUCTION: PENTAGRAM, 5171078
business.pentagram@gmail.com

FOREWORD

The promulgation of the constitution last year has punctuated Nepal's long political transition to a Federal Republic. The conclusion of this process marks the beginning of another process, that of economic transformation. The Government of Nepal has realized that its sources of funds, alone, will not meet the capital required to transform Nepal. Private investments, both domestic and foreign, will be key to Nepal's growth agenda.

In the recent years, Nepal has made great strides towards attracting private sector investments. The Investment Board, chaired by the Right Honourable Prime Minister, was established in order to fast-track large investments and act as a one-window facilitation agency. Similarly, Nepal is in the process of amending various laws and regulations to make them more investment friendly.

In an effort to attract investment, Investment Board Nepal, with the support from Ministry of Industry, has produced "Nepal Investment Guide". Building on to this initiative, the Investment Board has again taken lead to come up with this publication. This document highlights sector-specific opportunities for investment, policy environment, incentive structures, and licensing processes. This sector profile has been produced at a very opportune time as Nepal embarks on the path of economic transformation.

I am confident that this document contains sector-specific information you would want to know in your search for potential investment destinations. Similarly, I believe that this document will give you a basic understanding of the issues and concerns you, as a potential investor, may have.

I would like to thank the Department for International Development (DFID) and Japan International Cooperation Agency (JICA) for providing financial support for this publication. Similarly, I would like to thank the staff at the Office of the Investment Board, Mr. Rob Taylor, Chief of Party, NHDP (peer reviewer), and others who have, directly or indirectly, contributed to the production of the document.

MAHA PRASAD ADHIKARI
CEO, Investment Board Nepal

ACRONYMS

AEPC	Alternative Energy Promotion Centre
BIPPA	Bilateral Investment Protection Agreement
BOOT	Build, Own, Operate and Transfer Model
CSP	Concentrated Solar Power
DoED	Department of Electricity Development
DPR	Detailed Project Report
DTAA	Double Taxation Avoidance Agreement
EIA	Environmental Impact Assessment
FCY	Foreign Currency
FY	Fiscal Year
GDFP	Gross Domestic Fixed Investment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GoN	Government of Nepal
HPP	Hydro Power Projects
IBN	Investment Board Nepal
IEA	International Energy Agency
IEE	Initial Environmental Examination
IFC	International Finance Cooperation
IPP	Independent Power Producers
IUCN	International Union for Conservation of Nature
MBF	Main Boundary Fault
MCT	Main Central Thrust
NEA	Nepal Electricity Authority
PDA	Project Development Agreement
PTA	Power Trade Agreement
PV	Photovoltaic
SWERA	Solar and Wind Energy Resource Assessment
WECS	Water and Energy Commission Secretariat
VAT	Value Added Tax

CONTENTS

LIST OF TABLES AND FIGURES

COUNTRY PROFILE

COUNTRY OVERVIEW

Country profile

Table 1. Country Profile

Country name	Nepal (Federal Democratic Republic of Nepal)
Region	South Asia
Capital	Kathmandu, located in central Nepal
Population	28.5 million[1]
Area	147,181 square km
Altitude	59 - 8,848 m (Mt Everest)
Standard time	GMT + 5:45 hours
Governing system	Republic: multi-party parliamentary democracy with elected prime minister accountable to the parliament as executive head; constitution promulgated in 2015
Language	Nepali, written in Devanagari script; English is widely used in business
Religion	Secular state; Hinduism 81.3%, Buddhism 9.0%, Islam 4.4%, Kirat 3.1%, Christianity 1.4%
Geography (south to north)	Terai region: Altitude 59–700 m Hilly region: Altitude 700–3,000 m Mountain region: Altitude 3,000–8,848 m
Currency	Nepali rupee (NPR), 1 USD = 108 NPR (as of 1 January 2017), 1 INR = 1.6 NPR (fixed rate)
ISD code	+ 977
Climate	Terai region: tropical/sub-tropical, hilly region: moderate, mountain region: sub-alpine/alpine

Economic indicators

Table 2: Economic indicators of Nepal

PARTICULARS	2011	2012	2013	2014	2015
Population (million)	27.2	27.5	27.8	28.2	28.5
GDP (USD billion)	18.9	19.2	19.4	19.8	21.2
GDP growth rate (%)	3.4	4.8	4.1	5.9	2.7
GNI per capita (USD)	610	690	730	740	730
GNI PPP per capita (USD)	2,050	2,170	2,270	2,440	2,500
Agriculture value added (% GDP)	38.3	36.5	35.0	33.8	33.0
Industry value added (% GDP)	15.4	15.5	15.7	15.4	15.4
Service value added (% GDP)	46.3	48.0	49.2	50.7	51.6
Workers' remittances (USD billion)	4.2	4.8	5.6	5.9	6.7
Inflation consumer prices (%)	9.3	9.5	9.0	8.4	7.9

Source: World Development Indicators, 2016

[1] Estimated population in 2015

ECONOMIC OVERVIEW

Nepal is strategically located between India and China, two of the largest economies in the world. In 2015, the country adopted a new constitution that embraces multiparty democracy, federalism and private sector-led liberal economics. The government is committed to the promotion of foreign investment, providing a unique opportunity for foreign direct investment (FDI) in Nepal.

Although Nepal is classified as a least developed country (LDC) by the United Nations, its goal is to graduate from this status by 2022 and transition to a middle income country by 2030. To achieve these targets, an economic growth rate of 7–8% and investment in infrastructure of USD 13–18 billion by 2020 will be required. The Ease of Doing Business Index 2017 by the International Finance Corporation (IFC), World Bank Group places Nepal second only to Bhutan among all South Asian countries.[2] Nepal's investment potential, combined with these feature, have led to an increase in interest in FDI in recent years.

Nepal has also put in place fiscal incentives and other arrangements to facilitate global trade. As a member of the World Trade Organization (WTO), Nepal offers one of the lowest import duties in the region. Nepal has also signed Double Taxation Avoidance Agreements with 10 countries and concluded Bilateral Investment Protection and Promotion Agreements (BIPPAs) with 6 countries. Following the entry into force of the Nepal-India Trade and Transit Treaty, Nepal enjoys duty and quota-free access to India's massive and growing market. China's rapidly growing economy also provides duty free access to approximately 8,000 products.

As a result of its prolonged political transition and inadequate infrastructure, Nepal's economic growth rate has remained at 3.8%, on average, for the past 10 years, which is below the South Asian average. Remittances continue to play a critical role in GDP growth for consumption. In FY 2015/16, remittances comprised approximately 29.6% of GDP. Remittances help to increase aggregate demand in the local market, despite low economic growth.[3] Over the last decade, disposable income has increased by 14.4% per year on average, which has led to a comparable increase in consumption.

At present, with foreign currency reserves of USD 9.8 billion (as of July 2016), Nepal is in a good position to receive finance imports. However, the trade deficit, which reached 31.3% of GDP in FY 2015/16, continues to be of concern. It is expected that FDI will stimulate domestic production and gradually close this gap. Despite the catastrophic earthquake of 25 April 2015 and the transport blockade of the border that followed, Nepal has begun to rebuild and continues to be a highly attractive destination for FDI in various sectors.

[2] World Bank (2017) *Doing Business 2017: Equal Opportunity for All*. World Bank Publications
[3] Rastra Bank Nepal (2016) Current Macro economic and Financial Situation of Nepal 2015/16. Available at: https://nrb.org.np.ofg/current-macroeconomic

THE ENERGY SECTOR

OVERVIEW

Nepal's energy sector is widely recognized as being the key to the nation's future economic growth, and the vehicle that will enable the Government of Nepal (GoN) to meet its development goals. In addition to setting quantitative targets for electricity generation, transmission and distribution, prioritizing rural electrification, and promoting the efficient use of electricity, the GoN has signaled its commitment to sector reform and the promotion of private participation in the sector.

Nepal's principal energy sources include biomass, hydroelectricity, petroleum products and coal. In 2012, Nepal's per capita energy usage was 367 kg of oil equivalent (kgoe). During the same period the figures for India and China stood at 624 kgoe and 2143 kgoe respectively.[5] Biomass, comprising waste and sustainable resources such as fire wood, animal dung, and agricultural residue, is by a wide margin, the country's dominant and most widely used energy resource. Petroleum products account for approximately 12% of total energy consumption. Electricity, however, supplies only 2% of the country's energy demand. All of the petroleum products consumed in Nepal are imported from India. Diesel, kerosene and gasoline make up 75% of all petroleum products.

The largest available renewable energy resource is hydropower, with a theoretical potential of approximately 83,000 MW. While economically viable hydropower capacity in Nepal stands at 42,000 MW the current installed capacity is only approximately 800 MW. The existing capacity is comprised of five "large" hydropower stations (greater than 25 MW) and more than 80 small ones. The annual generation from hydropower plants in Nepal is 3,635 Gigawatt hours (GWh) or 73% of the total supply. The remaining 27%, or 1,370 GWh, is imported from India. Nepal's domestic hydropower supply includes 1,269 GWh (35%) which is sourced from Independent Power Producers (IPPs), while 2,366 GWh (65%) is supplied by Nepal Electricity Authority's (NEA) power stations.

There are four main river systems in Nepal: (i) the Mahakali, (ii) the Karnali; (iii) the Gandaki; and (iv) the Koshi systems. All originate in the Himalayas and produce significant flows, even in the dry season. In comparison, the Babai, West Rapti, Bagmati, Kamala, Kankai and the Mechi are medium-sized rivers that originate either in the Midlands or the Mahabharat range. These are fed by precipitation and ground water regeneration. These rivers run continuously. Together they have tremendous potential for hydropower development.

In addition to hydropower, Nepal also possesses other renewable resources with significant potential, including solar and wind. Nepal averages approximately 6.8 hours of sunshine per day over a potential area of 6,074 km^2 it also has a wind power density in excess of 300 W/m^2.

The Ministry of Energy (MoE) develops and supports energy sector activities. Other administrative bodies under the MoE supporting the sector include the Water and Energy Commission Secretariat (WECS), the Department of Electricity Development (DoED), and the Nepal Electricity Authority (NEA). In addition, the Alternative Energy Promotion Centre (AEPC) under the Ministry of Population and Environment is responsible for

[4] The Economic Survey 2015/16 and Nepal Rastra Bank Current Macroeconomic and Financial Situation of Nepal.
[5] The World Bank, 2015.

the promotion of renewable and alternative energy technologies.

The Investment Board Nepal (IBN), established by an act of parliament in 2011, is the administrative body responsible for the implementation of Nepal's large infrastructure projects, including hydropower projects above 500 MW. IBN's legal mandate is, inter alia, to improve the country's investment climate by creating a framework for the selection and evaluation of projects, providing incentives to encourage investments, negotiating concession agreements (Project Development Agreements), and carrying out investment promotion activities.

Institutional Arrangement

Policy Level

- Ministry of Energy
- Alternative Energy Promotion Center

Regulatory level and Operation level

- Department of Electricity Development
- Tariff Fixation Commission
- Nepal Electricity Authority
- Investment Board Nepal

INVESTMENT OPPORTUNITIES

AREAS FOR INVESTMENT

Nepal's energy sector is rich in potential, both for large-scale and innovative small-scale projects. Currently, the nation's major focus lies in the hydropower sector where the GoN intends to install 26 GW (42 GW considered to be financially viable) of hydropower capacity by 2035. These plans are not however, intended to exclude other energy sources; the GoN also intends to develop wind and solar power. Notwithstanding these exciting opportunities, there are manty hurdles to overcome in order to develop Nepal's energy sector.

Currently Nepal is in the midst of an energy crisis. 40 % of the people of Nepal have no access to electricity. 70 % of the energy consumed in Nepal comes from burning wood for fuel. For those that do have access to power, load shedding during the dry season often approaches fifteen hours a day. In Nepal, generation, transmission and distribution are held by the state owned, vertically-integrated utility, NEA. Today NEA suffers approximately 40 % technical and commercial losses. The state controls access to all markets and networks, and prices are set by government. Nepal's hydropower sector is driven by its climate which is comprised of clearly delineated wet and dry seasons. Nepal's demand, however large it may be, cannot absorb all of its potentially great wet season production. Much of this power will have to be exported to the region. Conversely, during the dry season, Nepal will need to import power to cover its generation shortfalls. Yet to date, no regional power trading mechanisms have been implemented to allow the efficient evacuation of energy to regional markets. While the situation may seem bleak, nothing could be further from the truth. There is good reason for optimism. Nepal's natural and human resources are sufficient to meet the challenges that lie ahead and the international community is working closely with the GoN and local decision makers to help unlock the nation's vast energy potential.

From the existing 800 MW of installed capacity, domestic demand is expected to grow to more than 6,000 MWs by 2030. This will require more than approximately US$ 6.45 billion in downstream infrastructure investment. This massive development will only begin unlock Nepal's energy sector potential. A great deal of power will also have to be exported. In that regard, South Asia has already established ambitious targets for renewable capacity. Eventually it hopes to replace its reliance on fossil fuels with renewable sources of energy. Some of this replacement capacity can be provided by Nepal.

HYDROPOWER

Nepal's hydropower sector is the nation's crown jewel. It is widely recognized that this largely unexploited asset is the key that will unlock the nation's development potential. Nepal's hydropower potential is ranked second in the world, behind only Brazil which is geographically, fifty times larger. Nepal's river systems comprise approximately 83,000 MW of hydropower potential, of which only approximately 800 MW, less than one per cent of its proven potential, has been harnessed.[6] The national grid system transports nearly 98% cent of Nepal's generated capacity, and 99% cent of the energy supplied. In addition, both the public and private sectors as well as Independent Power Producers (IPPs) also manage isolated supply systems.

Table 3. Some Major Hydropower Projects in Nepal

Hydropower Projects	Capacity (MW)	Domestic Energy Share	Cost Estimate ($ M)	Status
Upper Karnali	900	12% free to GoN (Option to buy additional power)	1,050*	PDA signed
Arun III	900	21.9% free to GoN (Option to buy additional power)	1,009*	PDA signed
Upper Marshyangdi 2	600	To be decided	723*	Generation license applied
Upper Trisuli 1	216	100% Domestic	580	PDA signed
Tamakoshi 3	650	To be decided	925*	To be bid out
West Seti	750	100% Domestic	1,000	JVA initiated
Upper Arun	335	100% Domestic	445	--
Upper Tamakoshi	456	100% Domestic	441	Under Construction
Budhigandaki	1,200	100% Domestic	2,593	DPR completed

Note: Cost estimations exclude cost of transmission lines. (World Bank, 2015)

*Due Diligence Report, IBN, 2013

[6] WECS 1994; WECS 1996

Nepal has only one storage project; the rest of the country's generating stations operate on a run of river basis. More storage projects are needed. The GoN's current plans are to develop 6,000 MW of storage and run of river projects which will collectively produce 10,000 MW by 2026. To date, the hydropower sector has attracted most of the country's foreign direct investment (FDI). According to the Department of Industry, 73 (only 2% of the total) projects have been registered as energy projects. But in terms of the foreign investment pledged, energy-based projects comprise 46% of the total.

Table 4 Classification of Hydropower Projects in Nepal

S.N.	Project Types	Capacity
1	Micro-Hydro Project	Up to 100 KW
2	Mini Hydro Power	100 KW- 1,000KW
3	Small Hydro Power	1,000 KW- 5,000 KW
4	Medium Hydro Power	5,000 KW- 30,000 KW
5	Large Hydro Power	> 30,000 KW

Source: (NEA, 2011)

Pursuant to the Electricity Act, 1992, a developer must obtain a license in order to develop a project larger than 1 MW. There is a simplified process for projects less than 1 MW. At the present time there are two kinds of licenses. The first, a survey license, is issued by the Department of Electricity Development (DoED) within 30 days of the receipt of an application and payment of a nominal fee. The maximum term of a survey license is five years. After obtaining a survey license, the licensee must carry out (i) a detailed survey and design (as evidenced in a Detailed Project Report or DPR; (ii) a financial and economic analysis; and (iii) the Initial Environmental Examination (IEE) or, as applicable, an Environmental Impact Assessment (EIA). Only then can it apply for a second license, a generation license. The generation license authorizes plant construction and operation. DoED is required to issue this license within 120 days of receipt of an application.

The Ministry of Energy (MoE) has declared the years 2016-2026 as the National Energy Crisis Reduction and Electricity Development Decade ("Energy Emergency Decade"). A Concept Paper was issued in February 2016 and subsequently endorsed by the Cabinet of Ministers signaling the GoN's intention to substantially reduce power outages and ensure energy security during the period. The Concept Paper highlights specific assistance that will be provided to projects that were affected by the Force Majeure events during 2015/16. Other key reforms identified in the Concept Paper include (i) the use of Power Purchase Agreement (PPAs) denominated in convertible currencies, (ii) the use of Government Guarantees as security for NEA payments; and (iii) one-time recommendation for Foreign Currency (FCY) payments to contractors/consultants. The paper recognizes procedural problems in acquiring land for project and has proposed streamlining of processes for acquiring land and obtaining environmental clearances for energy projects in Nepal.

Table 5. Some Potential Generation Projects (Above 200 MW)

S.N.	Project Name	Project Type	Capacity (MW)
1	Karnali Chisapani	Storage	10,800
2	Sun Koshi 2	Storage	1,110
3	Lower Arun	Peaking RoR	650
4	Tamakoshi III	Peaking RoR	650
5	SR-6	Storage	642
6	Sun Koshi 3	Storage	536
7	Peaking RoR	Peaking RoR	500
8	Lower Badigad	Storage	380
9	KR-7	RoR	330
10	Dudh Koshi	Storage	300
11	Madi	Storage	200
	Total		**16,098**

Source: (NEA Annual Report, 2015)

Project Under Construction

Table 6. Hydro Projects Under Construction

S.N	Project Name	Capacity (MW)
1	Upper Tamakoshi	456
2	Tanahu	140
3	Rasuwagadi	111
4	Madhya Bhotekoshi	102
5	Upper Trisuli 3 A HEP	60
6	Sanjen	42
7	Upper Trisuli	42
8	Rahughat HEP	32
9	Chameliya HEP	30
10	Kulekhani III	14
11	Upper Sanjen	14
	Total	**1,044**

Source: (NEA Annual Report, 2015)

Projects Proposed

Table 7. Hydro Projects Planned and Proposed

S.N	Project Name	Capacity (MW)
1	Dudh Koshi Storage	640
2	Tamor Storage	530
3	Upper Arun	335
4	Uttar Ganga Storage	300
5	Chainpur Seti	140
6	Tamakoshi V	87
7	Upper Bheri	85
8	Upper Modi A	42
9	Upper Modi	18
	Total	**2,177**

Source: (NEA Annual Report, 2015)

Transmission System

Transmission infrastructure is essential to the electricity sector's development, for without the ability to evacuate energy, generation is useless. Nepal's transmission network is in need of substantial upgrading. However, cross-border interconnections took a step forward recently, with the commissioning of Dhalkebar- Muzaffarpur transmission line between Nepal and India.

Figure 1. Major Transmission Lines & Generating Plants Existing and Proposed by 2016

Source: USAID, 2006

Several cross-border transmission links are proposed and are currently being studied.

The NEA's transmission system is comprised of a 132 kilovolt (kV) overhead line running from east to west through the Terai. This line combines single circuits, double circuits and double circuit towers, with one circuit strung. In addition, there is a 66 kV network that connects Pokhara, Kathmandu and Birgung, a city with significant industrial demand.

Planned and proposed transmission line in Nepal

Table 8. Planned and Proposed Transmission Line in Nepal

S.N.	Capacity (kV)	Transmission Lines	Length (km)	Type of Ckts
1	220	New Marshayangdi- Matatirtha	85	Double
2	132	Singati- Lamosangu	40	Double
3	132	Kabeli- Damak	90	Double
4	133	Dumree-Damauli	18	Single
5	132	Butwal- Kohalpur Second Circuit	208	D/C Tower
6	220	Bharatpur-Bardghat	73	Double
7	132	Hetauda-Kulekhani-II-Siuchatar Second Circuit	44	D/C Tower
8	220	New Heatauda-Dhalkebar-Duhabi	283	Double
9	220	Bardghat-New Butwal	30	Double
10	220	Trisuli-Thankot	54	Double
11	220	New Hetauda-Matatirtha	45	Double
12	132	Kohalpur-Attariya Second Circuit	153	D/C Tower
13	132	Middle Marshyangdi-Dumre-Marshyangdi	44	Double
	Total		**1,167**	

Source: USAID SARI/EI, 2006

NEA Joint Venture under PPP Program

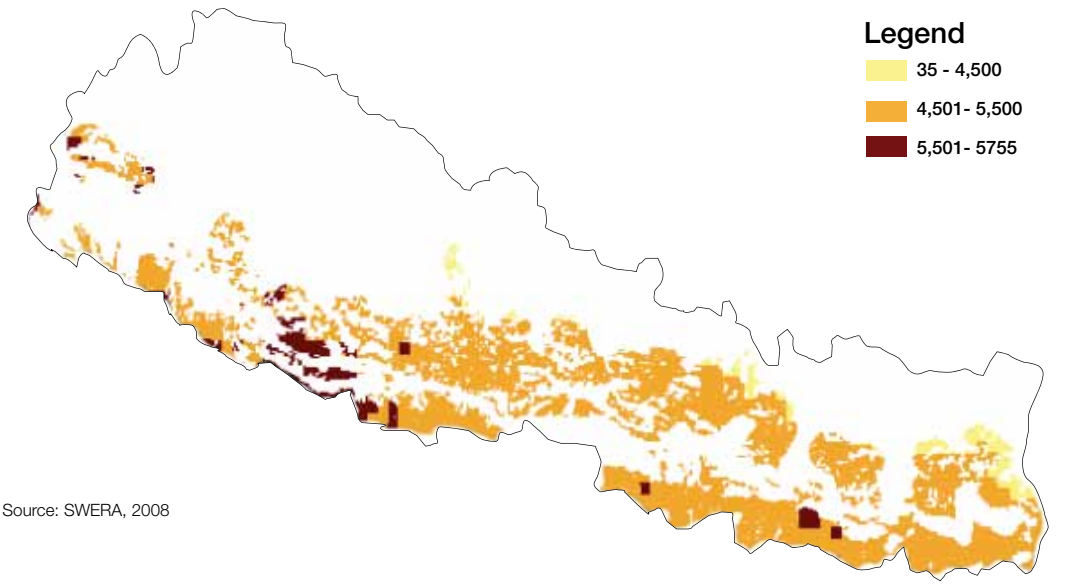
Table 9. NEA Joint Venture under PPP Program

S.N.	Capacity (kV)	Transmission Lines	Status
1	400	Dhalkebar- Muzzaffarpur Cross Border Line	Under construction
2	400	Duhabi-Purnia Cross Border	Planned and proposed
3	400	New Butwal-Gorakhpur Cross Border Line	Planned and proposed
4	66	Sanjen- Chilime	Planned and proposed

Source: USAID SARI/EI, 2006

SOLAR ENERGY

Figure 2. Solar Power Potential for Nepal kWh/sq.m/day



Source: SWERA, 2008

With an average global solar radiation ranging from 3.6 – 6.2kWh/m^2 per day, an average insolation intensity of about 4.7kWh/ m^2 per day, and sunshine on an average of 300 days in a year, there is great potential for harnessing solar energy in Nepal. As installation costs continue to decrease, solar technology is emerging as a viable and affordable solution for the country's load shedding problem.

Figure 4 shows the concentrated solar power potential available in Nepal. According to this analysis, Nepal has an area of approximately 37501 km^2, 25% of the country's total area, falling within Concentrated Solar Power (CSP) potential.

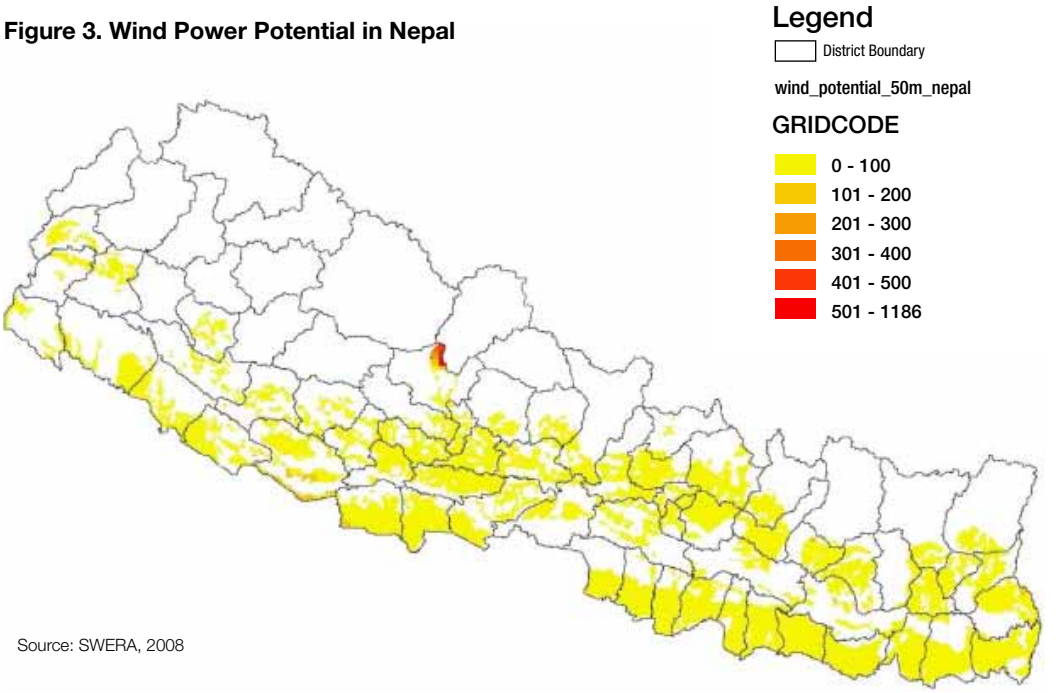
NEA has estimated that the economic potential for solar power is 1,829 Megawatt-peak (MWp), taking into account average generation of 33.5 MWp per km^2 of land area--utilizing 2% of the best solar irradiance area (out of the total available of 2,729 km^2).

A 2008 report entitled "Solar and Wind Energy Resource Assessment in Nepal" (SWERA Report) produced by the Alternative Energy Promotion Centre (AEPC) estimated that Nepal has a potential capacity of 2,100 MW for grid integrated Photovoltaic (PV) power. Approximately 8,278.8 Kilowatt-peak (kWp) of photovoltaic power is currently being used in various public and private sectors in the country.

The Government of Nepal (GoN), with support from development partners, the private sector, and non-governmental organizations has been proactive in promoting and developing Renewable Energy Technologies (RETs). The Renewable Energy Subsidy Policy, issued by the Ministry of Population and Environment in May 2016 provides for solar energy subsidies in areas without access to electricity by way of the national grid or other renewable energy sources. This subsidy is intended to promote solar PV home systems, solar mini grids, and solar thermal systems.

WIND ENERGY

Figure 3. Wind Power Potential in Nepal



Source: SWERA, 2008

Nepal has high potential for wind energy. The SWERA Report cited above estimated Nepal's gross wind power potential to be 3,000 MW. Despite this, very little development work has been accomplished. Wind data collection in Nepal began in 1967. Since then, 25 stations with Met Mast Towers have been installed for the purpose of gathering wind data from potential wind farm sites.

On the basis of the data obtained, Kagbeni, Thini, Tangbey, Bhorleni and Chisapani (Sindhuli) have been found to be feasible wind farm locations, each having a wind power density above 300W/m^2 (watts per square meter). In the immediate future, the GoN intends to generate 20 MW wind power from the Kathmandu Valley and its surrounding hills.

OTHER SECTORS

Biomass

The applicability of biomass energy technology to Nepal, a land rich in biomass, has been widely researched. A number of additional studies are also currently underway. These are related to issues including improved cooking stoves, biodiesel, biogas, bio-ethanol, and gasifiers. In addition to these studies, most of the applied Research and Development (R&D) is currently being carried out under the Renewable Nepal Program.

Because Nepal's economy is heavily based on agriculture, biomass technology may prove to be an important energy source for Nepal's rural and remote mountainous regions. Nevertheless, research on low-cost and cold climate biogas plants is still required in order to make this technology affordable and accessible. There is also a need to expand the scope of new programs in order to utilize various biodegradable wastes including kitchen, municipal, and industrial organic wastes as potential feed stocks. This will require modifications to existing digester designs and operations. The possibility of commercial-scale investment in the sector has yet to be explored.

Geothermal

Geothermal energy is only in its earliest stages of development in Nepal. Most of the major geothermal springs in the country lie just to the north of the Main Central Thrust and south of the Main Boundary Fault.

Geothermal springs in various parts of Nepal have been identified as potential geothermal energy sites. Most of these are confined to three distinct tectonic and structural features that characterize the Himalayas in general. One group lies to the north of the Main Central Thrust (MCT) and is located beyond the Higher Himalayas in a geological formation similar to the Tibetan Autonomous Region in China. The second group of thermal springs lies close to the MCT. The third group falls on the Main Boundary Fault (MBF) in the Siwalik. The maximum surface temperature recorded among the springs in Nepal was 73°C in Srihagar (Darchula district) followed by 71°C at Tatopani (Mustang district), and 69°C in Sadhu Khola (Rupandehi district). At present, the use of geothermal spring water in Nepal is largely confined to bathing and laundry. The Tatopani spring in Myagdi district, for example, is a popular tourism destination and is extensively used for bathing and recreation. The absence of adequate knowledge of the utilization of low temperature thermal waters has been a major impediment to the promotion of this resource in Nepal.

LAWS AND REGULATIONS

LAWS AND REGULATIONS

Recognizing the importance of attracting FDI for the development of the country's energy infrastructure, the Government of Nepal has issued sub-legislation governing licenses, the grant of financial incentives, and the provision of foreign exchange facilities for electricity projects. In addition, some sector restructuring has been endorsed by the GoN and is being implemented.

In its proposal for the FY15/16 budget, the GoN has recommended the development of a master plan for a regional transmission line. To encourage investment in and ownership of hydropower assets, the GoN has also highlighted the importance of employing Public Private Partnerships (PPPs) and of using PPPs to construct transmission lines on a build/ transfer model. The budget has also set aside funds to study and develop a number of multi-purpose projects aimed at ending basic load shedding by 2018 and achieving energy independence by 2019. The GoN also plans to launch a program called 'Electricity for Every Household, Shares for Everyone' to initiate projects with attractive returns through joint investments by the government and the public. Finally, there have been discussions related to the development of a regional grid for the purpose of regional power trade.

Apart from the purely domestic projects, other projects are also being developed for export. In order to facilitate such regional trade, Nepal has also signed a Power Trade Agreement (PTA) with India, paving way for the free flow of electricity as a cross-border commodity. In addition, IBN has been actively pursuing the development of mega projects (more than 500 MW) in the hydro sector. It has concluded Project Development Agreements (PDAs), a type of concession agreement, with two Indian investors, GMR for the development the 900 MW Upper Karnali Hydropower Project (HPP), and SJVNL for the development of the 900 MW Arun III. The combined cost of these two projects exceeds USD $2.5 billion. IBN is also in negotiations with another developer for the development of the Storage-based West Seti HPP with a capacity of 750 MW.

In Nepal, four types of licenses are required to develop a hydropower project with installed capacity of more than 1,000 kW. They are discussed below.

Survey License

As the name suggests, this type of license is required to conduct investigation at a project site to assess its feasibility and preparation. It provides licensee exclusive right to study the site until the term of the license. It is required in order to study production, transmission, and distribution facilities and is more specifically called a Production Survey License, a Transmission Survey License, or a Distribution Survey License. The maximum term of a Survey License is five years. It is issued within 30 days of receiving a complete application together with a nominal fee.

Table 10. License Application Fees

Installed Capacity (KW)	License fees (Rs)
1,000-5,000	1,000
5,001-25,000	5,000
25,001-100,000	25,000
100,001-400,000	100,000
400,001-10,00,000	400,000
10,00,001 and above	10,00,000

Source: Electricity Act, 1992

Production License

After the surveying of project details has been completed, a Production License is required in order to construct and operate a production facility. The maximum term for a Production License is 50 years. The Production License is issued within 120 days of receiving complete and application and application fee. There are a number of pre-conditions to receiving a Production License, including (i) a Feasibility Study Report; (ii) the names of partners in the project and type of their association; (iii) the method of financing (a Detailed Financing Plan); and iv) a concluded power purchase agreement

Transmission License

Once a survey has been completed, a Transmission License is required in order to construct and operate a transmission facility. The maximum term for a Transmission License is 50 years. The Transmission License is issued within 120 days of receiving complete application. All the documents that were submitted to acquire Production License must be submitted in order to obtain a Transmission License.

Distribution License

Once a survey has been completed, a Distribution License is required in order to construct and operate a distribution facility. The maximum term of a Distribution License is 50 years. The Distribution License is issued within 120 days of receiving a complete application.

The Hydropower Development Policy 2001

The Hydropower Development Policy 2001 (HDP) addresses issues including private sector demand, the need for reasonable pricing, rural electrification, the need to raise the level of employment, hydro power exports and investor friendly practices.

OBJECTIVE

- Keep electricity costs low by using least cost generation
- The delivery of electricity with reasonable quality and price
- The need to combine electrification with the economic activities
- The expansion of rural electrification
- Need to make hydropower an exportable commodity

GON'S COMMITMENTS

- Survey license: term of 5 years
- Generation license term: 35 years for domestic supply and 30 years for export oriented projects
- Addional maximum five years for hydrological risks
- Projects turned over free of cost on good operating condition at the end
- Water rights guaranteed
- No nationalization
- Foreign exchange and repatriaction facility

PROCEDURE

- Projects to be developed by way of competitive bidding
- BOOT model for private investment
- Respect for high standards for environment protection
- GoN to assist in land acquisition
- Royalty strucuture
  fix rate upto 1000 MW export projects
  negotiable rate above 1000 MW
- Seperate Agreement for developers and GON

Water Resources Strategy 2002

A key objective of the Water Resources Strategy 2002 (WRS) is to identify effective, scientific, sustainable, and consensus-based mechanisms to facilitate the implementation of action-oriented initiatives and programs and to meet the water supply needs in Nepal. The WRS intends to meet this need by providing a systematic framework for water resources development and developing action plans to avoid and resolve conflicts, and achieve Nepal's water-related development objectives.

National Water Plan 2005

The National Water Plan (NWP) was issued to implement the WRS, which was approved by the GoN in January 2002. The NWP is a framework that guides, in an integrated and comprehensive manner, all stakeholders involved in developing and managing water resources and water services. It comprises a set of specific short-, medium-, and long-term action plans for the water sector, including programs and project activities, investments, and institutional guidelines.

Private sector participation is expected to be extensive in investment, planning, implementation, operation, data collection, and research. Particularly in hydropower, drinking water and irrigation, where there is the possibility for public as well as private investments. In the water plan, approximately 38.5% of the total required investments are expected to come from the private sector.

Electricity Act 1992 and Electricity Rules 1993

The Electricity Act 1992 governs the survey, generation, transmission and distribution of electricity; it also standardizes and safeguards electricity services. All persons seeking to survey, produce, transmit and distribute electricity must comply with the Act and the Electricity Rules issued pursuant thereto. No license is required for the generation, transmission or distribution of electricity up to 1,000 kilowatt or to conduct surveys related to such small projects. Survey licenses are issued for a maximum of 5 years and licenses for generation, transmission and distribution are issued for a maximum of 50 years.

Royalty is payable to the GoN after the generation of electricity as follows:

Table 11. Royalty for Internal Consumption Projects

		Up to 15 years		After 15 years*	
S.N.	Electricity Capacity	Annual capacity Royalty, per kW(NRs)	Energy Royalty per kWh (%)	Annual Capacity Royalty, per kWh(NRs)	Energy Royalty per kWh (%)
1	Up to 1MW	-	-	-	-
2	1 to 10 MW	100	1.75	1,000	10
3	10 to 100 MW	150	1.85	1,200	10
4	Above 100 MW	200	2	1,500	10
5	For captive use	1,500	-	3,000	-

Source: Electricity Act 1992

Table 12. Royalty for Export Oriented Hydropower Projects

		Up to 15 years		After 15 years	
S.N.	Type	Annual capacity Royalty, per kW(NRs)	Energy Royalty per kWh (%)	Annual Capacity Royalty, per kWh(NRs)	Energy Royalty per kWh (%)
1	Export oriented run-of-the-river project	400	7.5	1,800	12
2	Export-oriented storage project	500	10	2,000	15

Source: Electricity Act 1992

*After 15 years from the date of commercial operation

RECENT BREAKTHROUGHS IN NEPAL'S ENERGY SECTOR

PTA
Power Trade Agreement with India

- In October 2014, the governments of Nepal and India concluded a Power Trade Agreement (PTA) to enable government-to-government (G to G) cooperation on a number of power sector activities including transmission interconnections, grid connectivity, power exchange and trading.
- The PTA gives Nepal access to the Indian Power Market which is expected to exceed 700 GW by 2031.

PDA
Project Development Agreement

- Two PDAs (concessions) were concluded between the GoN and the developer of the Upper Karnali HPP (September 2014) and Arun III HEP (November 2014). Each are rated at 900 MW and designed for export to India.

SAARC Agreement
SAARC Framework on Energy Cooperation

- The SAARC Framework Agrement on Energy Cooperation - Electricity, entered into force in November 2014. It allows relevant institutinos in the respective countries to develop transmission Interconnectivity within the region to allow power supply within SAARC member countries.

Energy Crisis Policy
Policy developed by the Ministry of Energy

- The Government's Energy Crisis Policy 2016 aims to end Nepal's chronic load shedding by harnessing various energy sources in the country, including hydropower. It also intends to streamline a number of activities so as to make the development process simpler. Legislation to realize the policy is under development.

Transmission Plan
Plan to develop cross border Transmission Lines

- Nepal and India have agreed to prepare a master plan for the development of cross-border transmission lines.
- Electricite De France (EDF) – Centre d' Ingeniere Systeme Transport (CIST) (EDF-CIST), France has prepared a comprehensive Transmission Master Plan for power evacuation.

ANNEX 1 : INVESTMENT INCENTIVES

Incentive Category	Ordinary Provisions	Incentive Provisions
Income Tax	Normal Tax Rate : 25%	**Tax Rates** • Build, Own, Operate and Transfer Model (BOOT) projects; Construction of powerhouse, hydro power generation and transmission: 20% • Income generated by entity from export: 20% • For hydro generation and transmission entities listed in the stock exchange: 10% exemption in normal tax rate. **Tax Holiday** • Licensed person or entity producing electricity through hydro, solar, wind and bio fuel, starting its commercial production, transmission or distribution within April 12, 2024 (Chaitra end 2080): 100% exemption for 1st 10 years and 50% exemption for next 5 years. • 10% exemption in normal tax rate for industries engaged in hydro generation and transmission and listed in the stock exchange. **Disclosure Norms** • Income source disclosure not required for investment made in hydro projects of national priority until Chaitra end 2075.
Forward of Losses Carry	Normal Provision: 7 Years	• Construction of powerhouse, generation and transmission of electricity: 12 Years.
Depreciation provisions	Applicable Pool Pool A : 5% Pool B: 25% Pool C: 20% Pool D: 15%	• 33.3 % accelerated depreciation for BOOT projects, construction of powerhouse, hydro power generation and transmission. • Investment made during a year on replacement of old machineries after deduction of the accumulated depreciation till that year allowed to be booked as expense. • 50% depreciation shall be allowed to in the year of purchase of equipment to produce energy for the business

Incentive Category	Ordinary Provisions	Incentive Provisions
Value Added Tax (VAT)		• 0% VAT facility based on a recommendation from AEPC for batteries produced and supplied by Nepalese industries for use in solar energy producing industries. • VAT exemption on the import of machinery, equipment, tools and their spare parts, penstock pipes or iron sheets used in hydro power projects and not produced in Nepal (based on the recommendation of the Alternative Energy Promotion Center or the Department of Electricity Development). • VAT exemption for equipment and machines, tubular batteries, solar lead batteries, required by bio-gas, solar, wind energy industries (based on recommendation from AEPC)
Custom Duty Concessions	Various	• Duty on Generation plant having a capacity equal to or exceeding 10 kW: 1% • Duty on generating parts imported by VAT registered industries producing generators: 1%. • Duty on alternative energy based industries: 1% • Wind mill and related parts imported by wind energy based industries. • Solar panel, modules, tubular batteries solar pump imported by solar industries. • Bio-stoves imported by bio industries. • Import of mill, machinery, equipment and spare parts thereof and chemicals for the purpose of producing organic fuel. • Appliances and equipment such as main gas valves, valves used in biogas, fitting, Elbow, gas pipes, gas gauge, biogas (dung gas) lamps, gas taps (brass), gas stoves, and parts thereof, reduction elbows and rubber hose pipe necessary for dung gas including bio gas.

ANNEX 2 : RELEVANT AGENCIES AND ORGANIZATIONS

OFFICE OF THE PRIME MINISTER AND COUNCIL OF MINISTERS
Singh Durbar, Kathmandu, Nepal
Tel: +977-1-4211000, 4211025
P.O. Box: 23312
Email: info@nepal.gov.np
Website: www.opmcm.gov.np

MINISTRY OF INDUSTRY
Singh durbar, Kathmandu, Nepal
Tel: +977-1-4211579
Fax: +977-1-4211619
Email: info@moi.gov.np
Website: www.moi.gov.np

MINISTRY OF ENERGY
Singh durbar, Kathmandu, Nepal
Tel: +977-1-4211516
Fax: +977-1-4211510
Email: info@moen.gov.np
Website: www.moen.gov.np

MINISTRY OF SCIENCE, TECHNOLOGY AND ENVIRONMENT
Singh durbar, Kathmandu, Nepal
Tel: +977-1-4211661, 4211641
Fax: +977-1-4211954
Email: info@moste.gov.np
Website: www.moste.gov.np

INVESTMENT BOARD NEPAL
Office of the Investment Board,
ICC Complex, New Baneshwor
Kathmandu, Nepal
Tel: 977-1-4475277, 4475278
Fax: 977-1-4475281
Email: info@ibn.gov.np
Website: www.ibn.gov.np

NATIONAL PLANNING COMMISSION SECRETARIAT (NPCS)
Singh Durbar, Kathmandu
Tel: +977-1 4211136
Fax: +977-1 4211700
Email: npcs@npc.gov.np
Website: www.npc.gov.np

NEPAL RASTRA BANK
Central Office, Baluwatar
Kathmandu, Nepal
Tel: +977-1- 4410158, 4410201, 4411250
Fax: +977-1-4410159
Email: nrbtcu@nrb.org.np
Website: www.nrb.org.np

DEPARTMENT OF ELECTRICITY DEVELOPMENT
Post Box No. 2507
Bhakti Thapa Sadak, Anamnagar
Tel: +977-1-4480326, 4479507
Fax: +977-1- 4480257
Email: info@doed.gov.np
Website: www.doed.gov.np

DEPARTMENT OF CUSTOMS
Tripureshwor, Kathmandu
Tel: +977-1-4259861
Fax: +977-1-4259808
Email: csd@customs.gov.np
Website: www.customs.gov.np

DEPARTMENT OF IMMIGRATION
Dillibazar, Kathmandu.
Tel: 977-1-4429659, 4429660
Fax: 977-1-4433934 /4433935
Email: dg@nepalimmigration.gov.np
Web: www.nepalimmigration.gov.np

OFFICE OF THE COMPANY REGISTRAR
Tripureshwor, Kathmandu, Nepal
Tel: +977-1-4259948, 4263089
Fax: +977-1-4259961
Email: info@ocr.gov.np
Website: www.ocr.gov.np

INLAND REVENUE DEPARTMENT
Lazimpat, Kathmandu
Tel: +977-1-4415802, 4410340
Fax: +977-1-4411788
Email: mail@ird.gov.np
Website: www.ird.gov.np

WATER AND ENERGY COMMISSION SECRETARIAT
Singh Durbar, Kathmandu, Nepal
Tel: +977 1 4211415, 4211417
Fax: +977 1 4211425
Email: wecs@mos.com.np
Website: www.wecs.gov.np

INDEPENDENT POWER PRODUCERS ASSOCIATION, NEPAL (IPPAN)
P O Box 20010
Heritage Plaza II, Kamaladi, Kathmandu
Tel: +977-1-4169175
Fax: +977-1-4169175
Email: info@ippan.org.np
Website: www.ippan.org.np

ALTERNATIVE ENERGY PROMOTION CENTER (AEPC)
PO Box 14364, Khumaltaar Heights
Lalitpur Sub Metropolitan City
Tel: +977-1-5539390, 5539391
Fax: +977-1-5542397, 5539392
Email: info@aepc.gov.np
Website: www.aepc.gov.np

HYDROELECTRICITY INVESTMENT AND DEVELOPMENT COMPANY LIMITED
Babarmahal, Kathmandu
Tel.: 977-1-4257024, 4257025
Email: info@hidcl.org.np
Website: www.hidcl.org.np

DEPARTMENT OF INDUSTRY
Tripureshwor, Kathmandu
Tel: +977-1-4261203, 4261302
Fax: +977-1-4261112
Email: info@doind.gov.np
Website: www.doind.gov.np

FEDERATION OF NEPALESE CHAMBERS OF COMMERCE AND INDUSTRY (FNCCI)
Pachali Shahid Shukra FNCCI Milan Marg, Teku, Kathmandu
Tel: +977-1-4262061, 4262218
Fax: +977-1-4261022
Email: fncci@mos.com.np
Website: www.fncci.org

CONFEDERATION OF NEPALESE INDUSTRIES (CNI)
Trade Tower, 5th Floor Thapathali Kathmandu
Tel: +977-1-5111122, 5111123
Fax: +977-1-5111122
Email: cni@wlink.com.np
Website: www.cnind.org

INVESTMENT BOARD NEPAL
Office of the Investment Board, ICC Complex,
New Baneshwor, Kathmandu, Nepal
Tel: 977-1-4475277, 4475278
Fax: 977-1-4475281
Email: info@ibn.gov.np
Website: www.ibn.gov.np

MINISTRY OF INDUSTRY
Singh Durbar, Kathmandu, Nepal
Tel: 977-1-4211579
Fax: 977-1-4211619
Email: info@moi.gov.np
Website: www.moi.gov.np