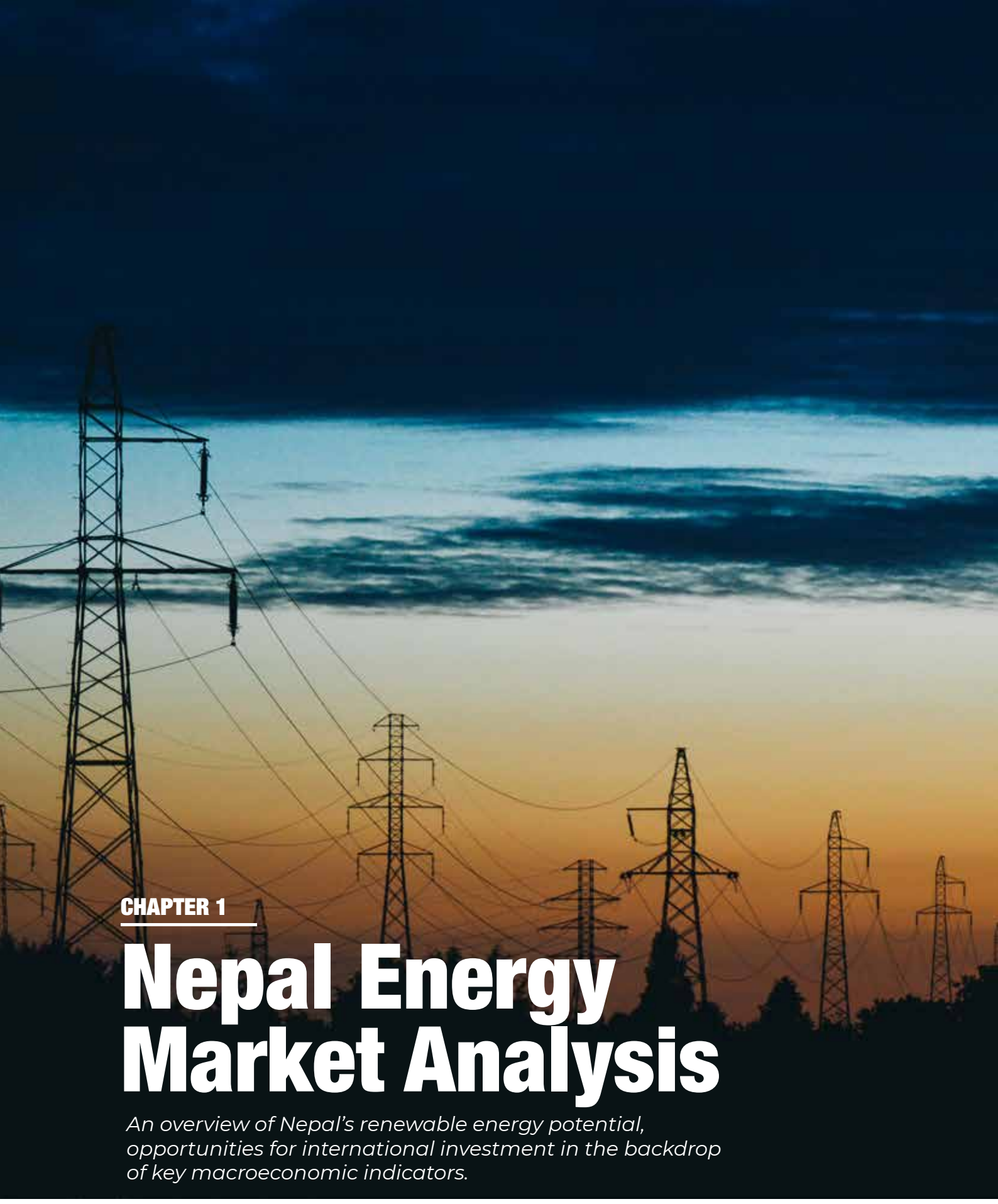

CHAPTER 1

Nepal Energy Market Analysis

An overview of Nepal's renewable energy potential, opportunities for international investment in the backdrop of key macroeconomic indicators.

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dolma foundation

CHAPTER 1

Nepal Energy Market Analysis

This chapter is an excerpt from the publication: Lessons on how to promote and execute equity capital in the renewable energy sector of Nepal (Dolma Foundation, 2019).

The full publication can be accessed at: www.dolmaenergy.com/publication

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Dolma Foundation is a non-profit organisation, promoting prosperity by investing in education and sustainable business in Nepal that are risky for the private sector.

This report series was produced and authored by Matthew Ribeiro-Norley and Vishal Bista. The team is grateful for collaboration and data within Dolma and from various agencies in Nepal. The cut-off date for data in this report was January 2019.

SUGGESTED CITATION

This chapter is an excerpt from the publication: Lessons on how to promote and execute equity capital in the renewable energy sector of Nepal (Dolma Foundation, 2019).

DISCLAIMER

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EXECUTIVE SUMMARY

CHAPTER 1: ENERGY MARKET ANALYSIS

Chapter 1 sets the tone for the series in highlighting that commercial institutional investors are the only sector with the capacity to finance this gap.

Nepal currently sits on a USD 17.8 bn infrastructure gap (excluding transmission and distribution) which needs to be addressed.

A prime solar belt region with 300 days of sunshine, and holding an economically feasible potential of ~43,000 MW of hydropower, Nepal boasts impressive renewable energy potential.

Despite this, Nepal's total installed capacity (March 2018) stands at 1,017 MW – 968 MW from hydro resources and 49 MW from thermal alternatives. Solar capacity is limited to 1.2 MW.

Electricity imports remain high in the dry season (Oct-Mar) for both peak load and base load energy, and as of March 2019 stood at 650 MW.

The Nepalese Rupee has remained pegged to the Indian rupee since 1993, primarily in the interest of price stability.

Based on Dolma's findings, the Project Internal Rate of Return for hydropower projects in Nepal range from 15-20%.

The main barriers to entry in Nepal include political stability, policy stability, currency, weak governance, climate change and bureaucracy.

Barriers to exit include the process of repatriating funds (whereby multiple authorities are required to sign-off after taxes are paid); as well as the lock-in period of up to three years after IPO on the Nepal Stock Exchange.

While there is a clear opportunity to export electricity to India in future, a clear framework agreed by both parties has not yet been enforced.

CHAPTER 2: CLIMATE CHANGE

Chapter 2 reflects on the environmental and social implications of a changing climate. Known for its pristine glaciers and abundant flora, the Himalayan region has witnessed an alarming number of climate-related tragedies in the last two decades. Between 2000 and 2015, ICIMOD estimates that 45,534 people died due to flooding, 10,893 to extreme heat, and 191 by drought, in Himalayan countries alone.

Higher temperatures have resulted in glaciers receding at alarming rates, adding volume to Glacial Lakes which pose a threat to those living downstream in the event of a burst. Moreover, unpredictable river flow can be a threat to farmers.

This chapter also puts into perspective that while CO2 rates remain high, the most immediate threat to the region – as identified in a series of recent reports from the Intergovernmental Panel on Climate Change (IPCC) and International Centre for Integrated Mountain Development (ICIMOD) – are short-lived climate pollutants, such as black carbon.

Despite its shorter life-span (approximately 50 years), black carbon is a warming agent with 1,500 times the warming effect of CO2. According to research, fossil fuel sourced black carbon appears to have twice the particle-specific warming potential of biomass sourced black carbon.

Based on conversations Dolma has had with regional climate scientists, prioritising the mitigation of short term climate pollutants is paramount to reversing Himalayan glacial melt – of which one third is expected to disappear by 2100 in a business-as-usual environment.

CHAPTER 3: TRANSMISSION AND DISTRIBUTION

Chapter 3 traces Nepal's energy infrastructure development and progress. Unlike energy generation, Nepal's transmission network grew at an annual rate of 8% from 2008 to 2012.

Electricity markets in Nepal are gradually un-bundling. Until 1990 all production, transmission and distribution were vertically controlled by the Nepal Electricity Authority.

Since 1990, Independent Power Producers have added ~500 MW to the grid.

Despite plans to un-bundle the NEA's transmission and distribution business following The Hydropower Development Policy 1992, it was only with assistance from the Asian Development Bank in 2015 that the National Transmission Grid Company was set up.

As this publication went to print, the newly-found distribution company had still not made any significant progress.

There are some USD 817 mn allocated to the enhancement of Nepal's transmission and distribution, mainly led by key donors such as ADB, Government of Norway, MCC and JICA.

A further USD 471.5 mn is being spent on policy and institutional reforms led mainly by the World Bank, ADB, and Canadian Government.

CHAPTER 4: REGULATORY ADVOCACY

Chapter 4 puts forward a number of recommendations to government that would facilitate the enabling environment for international investors.

Nepal has over the last five years (2013-2018) amended and introduced several regulations to facilitate public-private partnership and encourage further private sector investment.

Despite the government's best intentions to prioritise infrastructure, some have labelled the planning "erratic": since 2001 there have been five strategic documents on energy capacity targets, one every three years on average.

The most recent government plan, from 2016, calls for the construction of 10,000 MW by 2030.

The World Bank and others have argued that to attract and retain investment to the tune of tens of billions of dollars, an enabling environment is required.

"Quick-Win" regulatory reforms that would have a disproportionately positive impact on the infrastructure investment environment in Nepal:

Automatic route for foreign investment
Foreign currency power purchase agreements
Return on equity (ROE) clarifications
Alternative and auxiliary energy tariffs (new technologies such as batteries)

Long-term reform opportunities beyond the scope of this project:

Sovereign credit rating
Cost-plus approach
Competitive bidding
Protection for seasonality
Benefit sharing
Cooperation with regional partners

CHAPTER 5: INSTITUTIONAL INVESTOR INVESTMENT LANDSCAPE

Chapter 5 identifies three key catalysts for driving institutional investors into frontier markets like Nepal: low global interest rates; the commercial viability of renewable technologies; and heightened public, shareholder and regulatory opinion in relation to carbon emissions.

The need to attract large amounts of FDI to finance Nepal's power needs is well documented, both the Investment Board of Nepal and National Planning Commission agree that to meet just domestic demand, approximately USD 18 bn is required in capital investment (both debt and equity), or USD 1.5 bn annually.

The Dolma team interviewed some of the world's largest institutional investors, testing the risk and return mandate for Nepal against their current and emerging risk strategies. Interviewees included funds with

assets under management from USD 1 bn to 6 tn.

These were our findings:

Some investors suggested that the required return on equity for construction risk could be up to 20%, provided a Nepal project vehicle can demonstrate equivalency to investment grade status after successfully mitigating risks.

Among institutional investors there is a clear negative bias against credit and currency risk, suggesting that FX risk, real or perceived, prevents perhaps trillions of dollars from flowing to the poorest economies.

Dolma's findings also suggested that a country's credit rating is fundamental to getting an investment proposal through the first step of the investment procedure. In some cases, the lack of a sovereign credit rating and international sovereign bonds for Nepal has been too large a barrier to overcome in our discussions with some investors who are often restricted to considering countries that are at least investment grade (BBB-).

Some solutions to perceived risks included adopting Political Risk Insurance (PRI); Currency Hedging Mechanisms; and Bank Guarantees, amongst others.

Investors interviewed fell into two groups –leaders and followers – the former willing to take higher risk in search of greater yield and the latter less so; 2) there is no clear connection between Assets Under Management (AUM) and risk profile when it comes to investing in frontier markets like Nepal.

CHAPTER 6: COMPLEMENTARY INVESTORS

Chapter 6 discusses complementary investors (or blended concessional finance) which provide a new wind of opportunity for institutional investors – previously unable to invest in frontier market because of perceived risk. Blended capital works to de-risk perceived obstacles.

Investment instruments typically involve the deployment of grants, concessional lending, guarantees, and equity. These are deployed using adaptable programme, policy and sector investment loans, debt swaps, PPPs, advanced market commitments, and first loss reserve tranches.

Green bonds have recently also proven to be a potential solution by providing debt financing to eligible climate change projects. As of 2018, green bond issuance reached some USD 250 bn.

Complementary investors have played a key role in attracting investment to Nepal's renewable sector – these include Development Finance Institutions such as FMO, OEEB, DGGF and FINNFUND, as well as Multilateral platforms like IFC and ADB.

As stated in chapter 5, Dolma finds that at least two blended finance instruments are required for institutional investors to consider a renewable energy project in Nepal: political risk insurance and a currency hedge.

Dolma's research finds that countries successful in solving these risks for investors were able to make bold moves within their own domestic economies.

Nepal could follow the path of successful governments in doing so by creating its own government backed instruments and enacting reform.

CHAPTER 7: LEGAL STRUCTURING

Chapter 7 explains the legal structuring backdrop which is an essential component for foreign investors considering large infrastructure in Nepal.

To invest in Nepal through the FDI route, it is important to analyse and decide upon which country to invest from. To date there are 15 jurisdictions which hold a Dual Taxation Agreement (DTA) with Nepal which mitigates the risk of paying double taxation.

Dolma finds that Mauritius is generally viewed as the "gateway" to Nepal because both countries hold a DTA – Mauritius is

also known as a transparent jurisdiction that ranks well according to the financial services index. It also has experience fund management and administrative services which manage approximately USD 670 bn in assets.

Despite Mauritius' favourable positioning, the choice of domicile is based on the circumstances and preferences of individual investors.

Dolma views the UK as one of many strong locations to set up a fund manager, and has based the examples in chapter 7 on an English limited partnership or UK company as the fund vehicle.

CHAPTER 8: FINANCIAL STRUCTURING

Chapter 8 explores key regulated and non-regulated institutions that could act as potential sources of financing for energy projects in-country.

Nepal is yet to formulate specific regulatory provisions for private equity funds that invest in private companies.

There are a number of private equity players investing in renewable energy in Nepal, which include IFC, Dolma Impact Fund I and Equicap.

Dolma found that key exit issues for international investors include, but are not limited to the following:
Valuation at exit
Taxation in change of ownership
Repatriation issues

Dolma found that there could be some challenges for investors keen to invest through a project finance model, particularly for debt financing:

A limited tenor and floating interest rates on long term loans.
Generally, a limited capacity for banks to lend.
A limited scope for corporate bonds, which is still a nascent market.

The chapter also explores key financial issues for investors and how to integrate these solutions at the fund level: these include suggestions for currency risk, political risk, and debt risk.

CHAPTER 9: PROJECT DESIGN AND ENGINEERING

Chapter 9 focuses on the practical realities of executing renewables projects in Nepal, acknowledging that besides hydropower – Nepal's most mature energy asset class – other newer technologies such as solar and batteries could play a significant role in servicing growing supply, and providing auxiliary services.

Despite Nepal's installed generation capacity standing at 1,100 MW, there are some 7,000 MW in licenses that have been issued by the government to IPPs. The vast majority of these are for hydro-run-of-river (RoR) projects.

Dolma has identified a priority pipeline of hydro and solar projects that are optimal from a project execution perspective.

The chapter also includes a summary of leading battery technologies and which would be most suited in Nepal's context.

While there are no Nepali contractors that offer Engineer Procurement Construction (EPC) contracts this chapter analyses local firms that have a track record for hydro and solar projects in-country.

As financiers are increasingly aligning their investment mandates to the UN's Sustainable Development Goals, the chapter also outlines high level strategies for climate adaptation and resilience.

ABBREBIATIONS

TABLES

FIGURES

ABBREVIATIONS

ADB	ASIAN DEVELOPMENT BANK
CAGR	COMPOUNDED ANNUAL GROWTH RATE
CSP	CONCENTRATED SOLAR POWER
DHI	DIFFUSE HORIZONTAL IRRADIANCE
DNI	DIRECT NORMAL IRRADIANCE
DOED	DEPARTMENT OF ELECTRICITY DEVELOPMENT
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
FDI	FOREIGN DIRECT INVESTMENT
FITTA	FOREIGN INVESTMENT AND TECHNOLOGY TRANSFER ACT
GDP	GROSS DOMESTIC PRODUCT
GHI	GLOBAL HORIZONTAL IRRADIANCE
GON	GOVERNMENT OF NEPAL
GWH	GIGAWATT HOURS
IBN	INVESTMENT BOARD NEPAL
INR	INDIAN RUPEES
IPP	INDEPENDENT POWER PRODUCERS
KM2	KILOMETER SQUARE
KW	KILOWATT
KWH	KILO WATT HOURS
MAED	MODEL FOR ANALYSIS OF ENERGY DEMAND
MOE	MINISTRY OF ENERGY
MW	MEGAWATTS
NEA	NEPAL ELECTRICITY AUTHORITY
NEPSE	NEPAL STOCK EXCHANGE
NPR	NEPALESE RUPEES
PPA	POWER PURCHASE AGREEMENT
PV	PHOTOVOLTAICS
SAARC	SOUTH ASIAN ASSOCIATION FOR REGIONAL COOPERATION
SARI/EI	SOUTH ASIAN REGIONAL INITIATIVE FOR REGIONAL INTEGRATION
UN	UNITED NATIONS
USD	UNITED STATES DOLLAR
VAT	VALUE ADDED TAX
WECS	WATER AND ENERGY COMMISSION SECRETARIAT

1.1 INTRODUCTION

It is no secret that Nepal faces an acute shortage of Foreign Direct Investment (FDI) relative to its neighbours (see Figure 1). According to the World Bank's recent report, "Powering Recovery", and similar publications, the lack of adequate financing for infrastructure projects has proven to be a major setback for development.

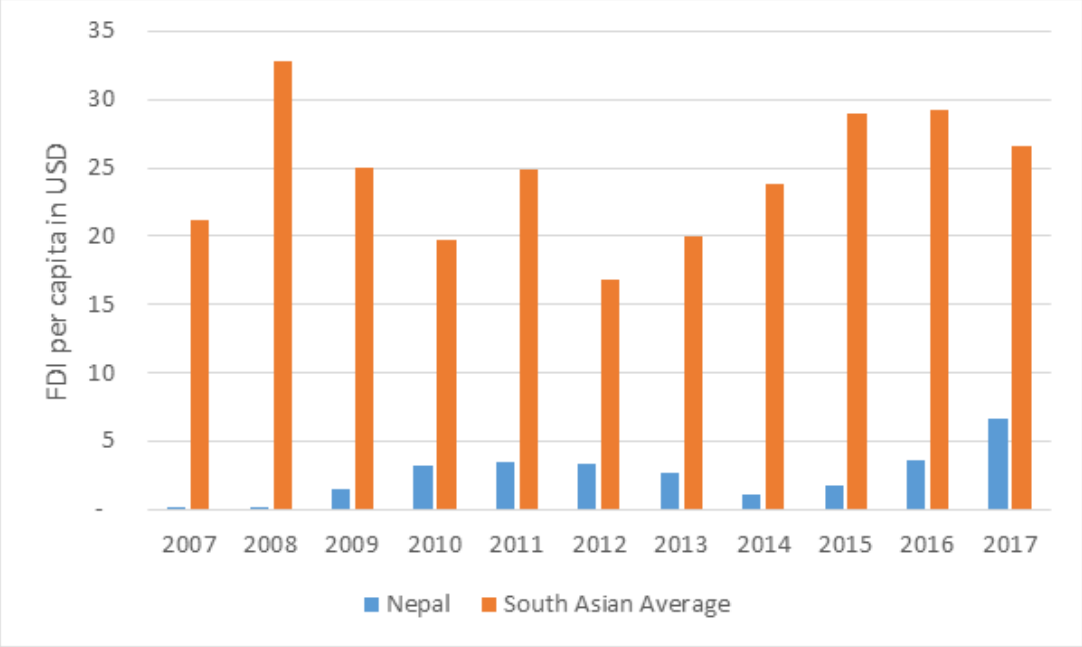
Given the current global economic climate of low interest rates and bond yields, as well as international recognition of the causes of climate change, institutional investors (including pension and life insurance funds) are increasingly re-positioning themselves towards developing markets and raising their allocations to renewable energy. According to the Financial Times, a third of global pension funds are turning towards infrastructure projects in search of greater yields.

This phenomenon presents an opportunity for Nepal – one that is essential to take advantage of to finance the ~USD 25 bn (excluding transmission and distribution) required to achieve the government-stated target of 10 GW in 10 years. According to the Nepal Banking Association, the theoretical maximum available for hydro in the domestic banking sector is NPR 180 bn (USD 1.7 bn). Development Finance Institutions (DFIs) may be able to allocate around USD 2 bn, the IFC dominating with approximately USD 1.5 bn. Assuming generous domestic equity participation at USD 2 bn, this leaves an additional FDI financing requirement of approximately USD 17.8 bn. For context, the government's budget is USD 11 bn at the current exchange rate (September 2018).

The commercial institutional investor market is perhaps the only sector with the capacity to finance this gap, with OECD pension funds holding assets under management (AUM) of USD 25 tn.5 In addition, if this sector could be attracted to Nepal's energy sector, it may be induced to financing other much-needed infrastructure projects in Nepal.

This series of reports will help to understand risk and opportunities in Nepal from the perspective of an institutional investor and suggest solutions to reduce or hedge these risks. Market Analysis, the first report in the series, explores the potential renewable energy generation, along with existing generation and transmission infrastructure in Nepal. It gives an overview of the current regulatory environment in Nepal. It then explores risks relating to exit and entry. Finally, it explores the possibility of Nepal trading electricity beyond its borders.

FIGURE 1: NEPAL'S FDI PER CAPITA COMPARED WITH THE SOUTH ASIAN AVERAGE



1.2 RENEWABLE ENERGY POTENTIAL GENERATION IN NEPAL

Nepal boasts an impressive renewable energy potential, which has been well documented by independent researchers, multilateral agencies, and the government. The need for greater energy production and Nepal's natural advantage for renewable energy generation is undisputed.

HYDROPOWER

- 43,000 MW of economically feasible potential
- 225 bn cubic meters of water flows from rivers in Nepal to India, contributing to over 70% of freshwater supply in North India
- The terrain that stretches between the tall snow-capped mountains in the north and the plains of the south provide the steep gradient required for hydropower development
- Incentives available to hydropower developers:
  - Income tax exemption for 10 years and 50% off for five years thereafter
  - VAT exemption on imports; VAT refund of USD 50,000/MW at commercial operation date
  - Foreign currency denominated PPA for projects above 100 MW (subject to NEA approval, granted on a case-to-case basis)

TABLE 1 TOP 5 HYDROPOWER PLANTS BY CAPACITY INSTALLED IN NEPAL

Project	Capacity (MW)	Developer
Kali Gandaki A	144	NEA
Madhya Marsyangdi	70	NEA
Marsyangdi	69	NEA
Khimti	60	IPP
Upper Marsyangdi A	50	IPP

TABLE 2 THEORETICAL, TECHNICAL, AND ECONOMICAL HYDROPOWER POTENTIAL OF NEPAL

Major River Basins	Theo-retical Potential (in MW)	Technical Potential	Economic Potential		
		No. of project sites	Potential in MW	No. of project sites	Poten-tial in MW
Sapta Koshi	22,350	53	11,400	40	10,860
Sapta Gandaki	20,650	18	6,660	12	5,270
Karnali and Ma-hakali	36,180	34	26,570	9	25,125
Southern Rivers	4,110	9	980	5	878
Total	83,290	114	45,610	66	42,133

SOLAR

Solar (both Photovoltaic and Concentrated Solar Power is a less developed asset class in Nepal, and its potential for development remains high. The 2008 UN "Solar and Wind Energy Resource Assessment in Nepal", still widely referenced, stresses that Nepal is in a prime solar belt region, located at 30 degrees latitude with 300 days of sunshine. National average solar radiation varies from 3.6 to 6.2 kWh/m2/day.

Grid connected conc entrated solar power

- Roughly 37,501 km2 of Nepal falls under CSP potential, which is 25% of its total area.
- If only 2% of the best solar irradiance is used for power generation, CSP could yield 1,829 MW.
- There are currently no existing CSP installations in the country.

GRID CONNECTED SOLAR PHOTOVOLTAIC

- The commercial potential for PV (photovoltaic) grid connection is estimated at 2,100 MW.
- Currently, only 1,214 Kilowatts (kW) of grid-connected photovoltaic capacity is installed in Nepal.
- The NEA is constructing a 25 MW solar plant at their Devighat Hydropower Station. This project is financed by the World Bank and is expected to be online in 2018.

The national landscape for solar PV/CSP in Nepal is promising from a natural resources point of view – i.e., there is high solar irradiance across the country. One hurdle, however is a lack of transmission substations to absorb power. Given these limitations, most solar scoping studies, including the Asia Development Bank's Solar grid impact study, focused mainly on the Terai (southern plain region bordering North India) region of Nepal, where there is a mature transmission infrastructure. The Dolma Foundation was interested in scoping other parts of the country, namely higher altitude regions where irradiance is known to be greater and there is less competition for land, but with limited options for power evacuation should a plant be commissioned. The country's solar irradiance map is shown in Figure 2.

It should be noted that the measure for solar irradiance is GHI (Diffuse Horizontal Irradiance), which is different from DNI (Direct Normal Irradiance) in the sense that it represents the total amount of shortwave radiation received from above by a surface horizontal to the ground. This value is of interest to PV installations.

Nepal's GHI levels, independent of other criteria such as infrastructure availability, point to two hotspots:

1. Mustang and Manang regions
2. Nepal's Far West region

Both sites are useful reference points, being relatively flat, with high solar irradiance, and located at a commercially viable altitude of 3,000 meters. According to the latest Transmission Master Plan,3 a number of substations within a few kilometres' radius of areas with prime solar irradiance are planned to go online in the next 2–3 years.

As infrastructure development progresses, the high altitude solar space will present an opportunity for developers to balance Nepal's grid in the drier seasons when hydropower generates less energy. However, this conclusion does not consider other factors, such as site access in remote regions and environmental and social analysis.

FIGURE 2: SOLAR RADIATION AND NEA SUBSTATION LOCATIONS

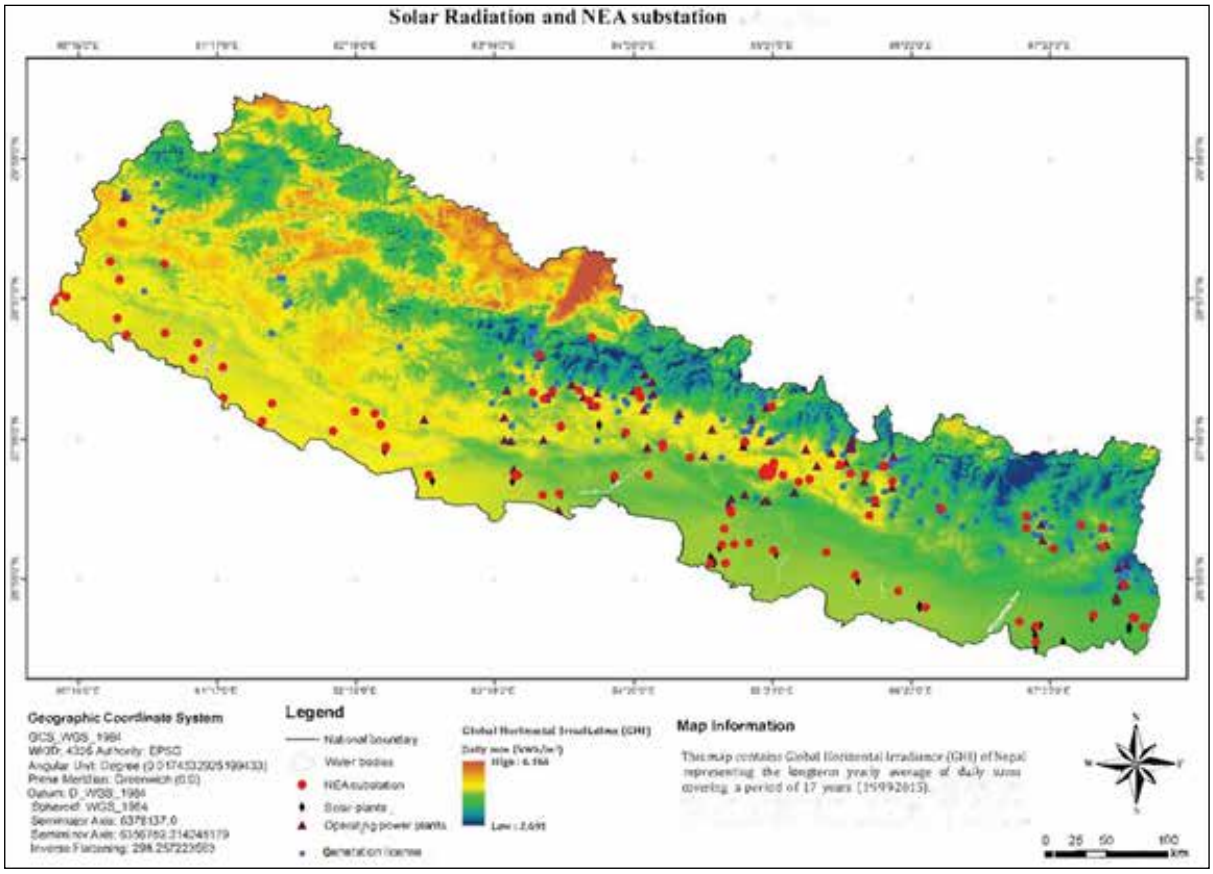


FIGURE 3: NEPAL GLOBAL HORIZON IRRADIANCE HOTSPOTS [5]

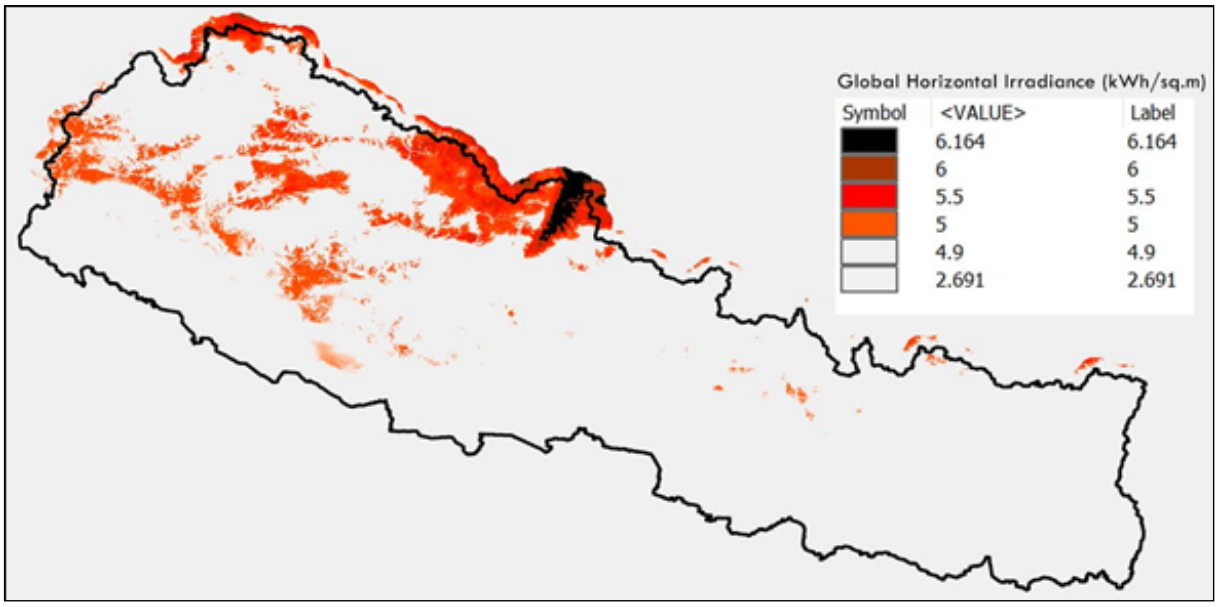


FIGURE 4: MUSTANG & MANANG IRRADIANCE (GHI) 5

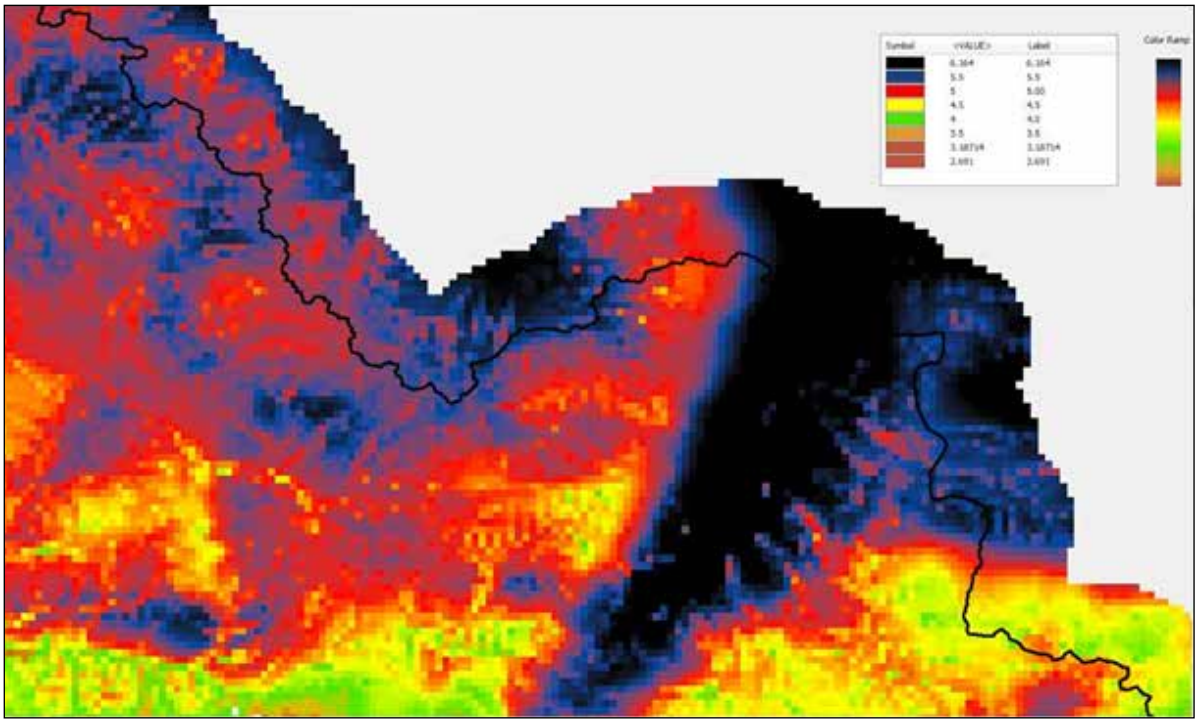


FIGURE 5: MUSTANG & MANANG ALTITUDE 5

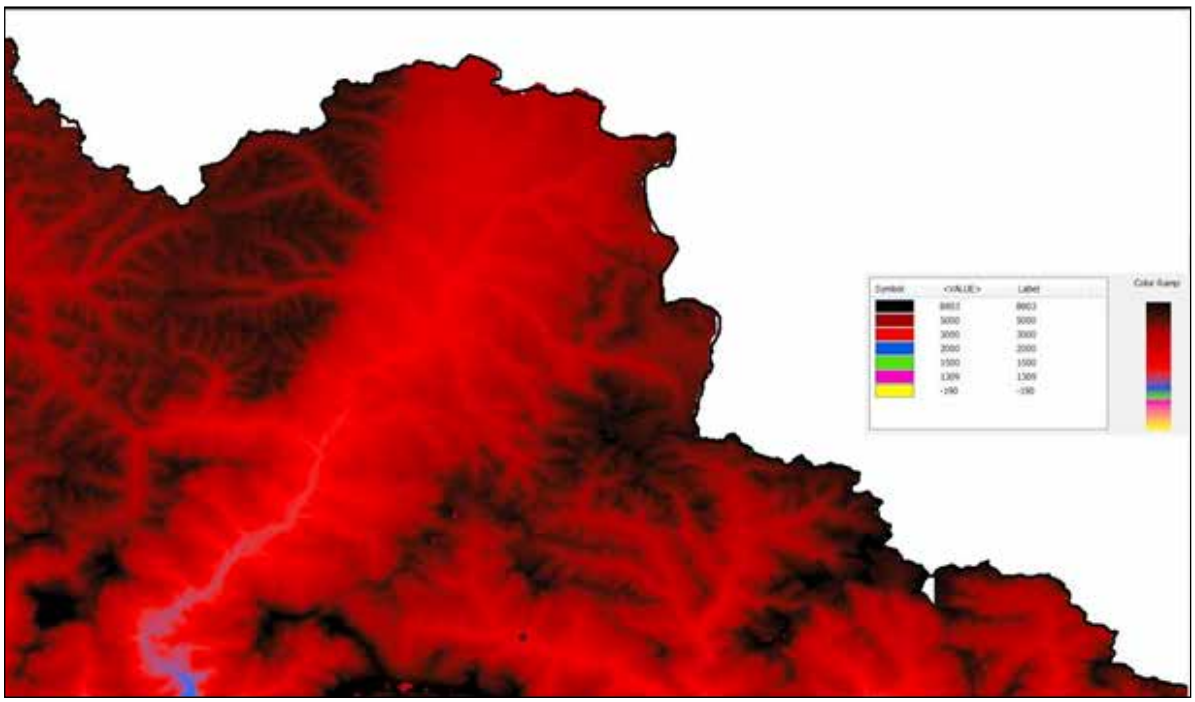


FIGURE 6: BHIJER – FAR WEST IRRADIANCE (GHI) 5

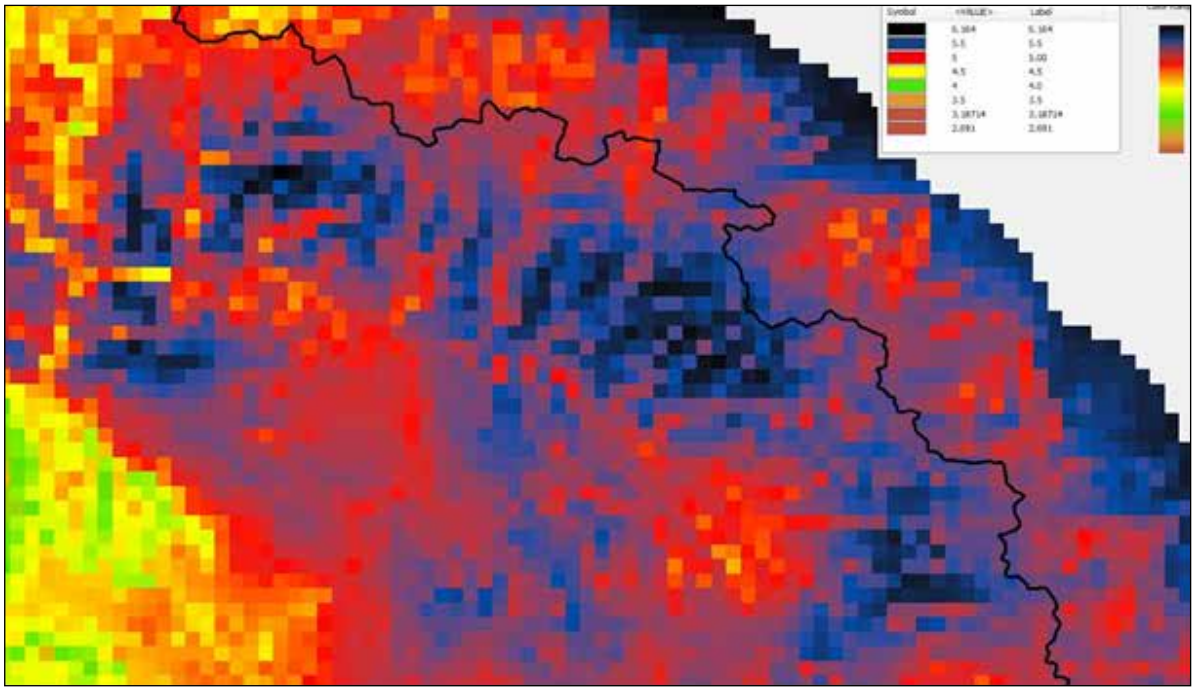
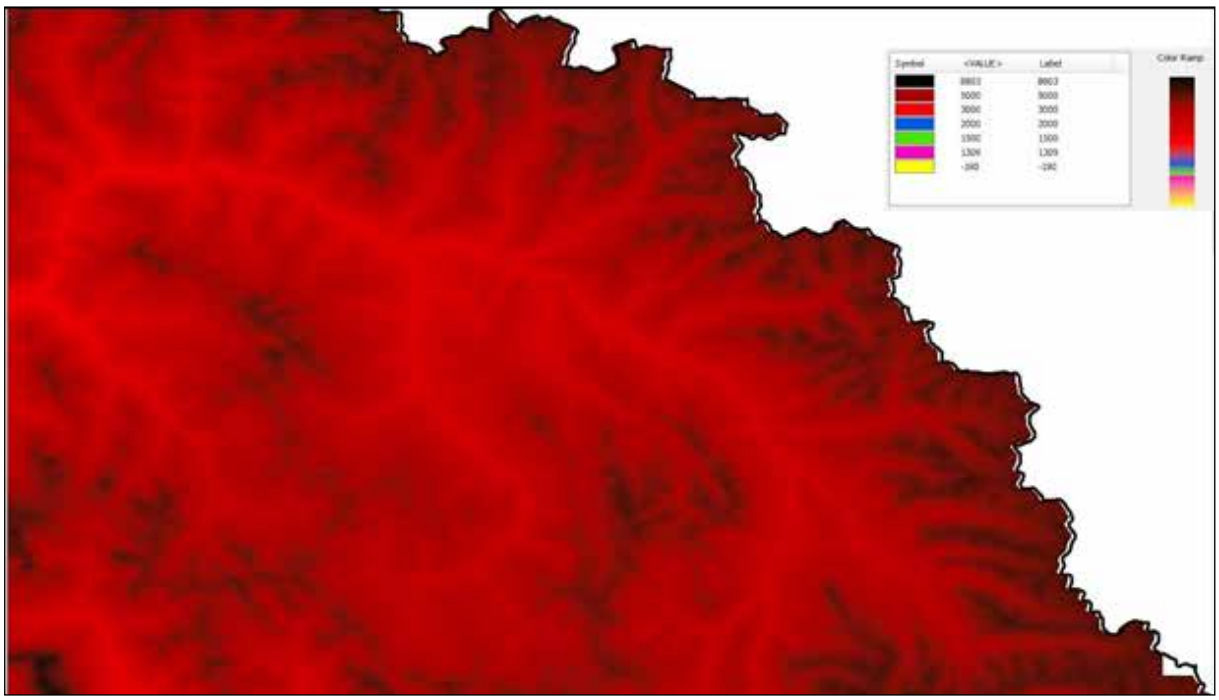


FIGURE 7: BHIJER – FAR WEST ALTITUDE 5



1.3 EXISTING GENERATION AND TRANSMISSION INFRASTRUCTURE AND FUTURE POTENTIAL

EXISTING GENERATION AND INSTALLED CAPACITY

Historically, energy generation in Nepal has been controlled by the NEA, which owns around 50% of the country's installed capacity. The remaining share is owned by 38 independent power producers. As of March 2018, Nepal had a total installed capacity of 1,017 MW, 968 MW of which comes from hydro resources and the remainder from thermal alternatives. Despite the country's solar PV/CSP potential, its installed capacity is limited to 1.2 MW.

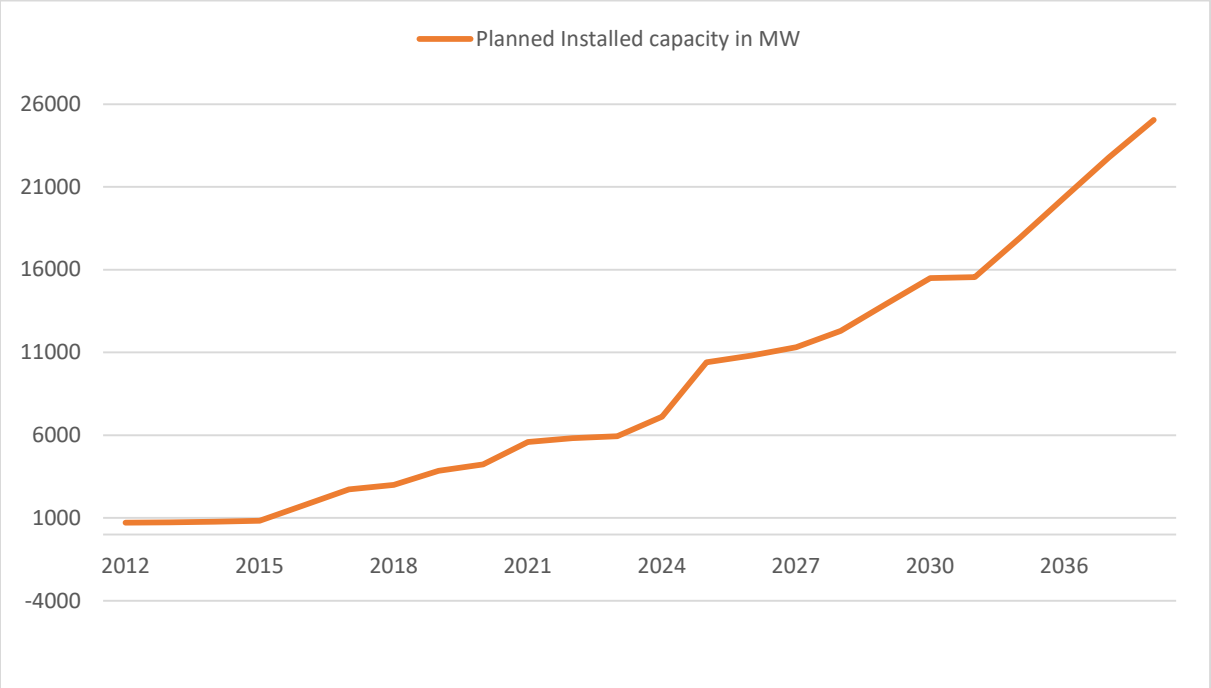
According to the NEA's FY 2016–17 report, Nepal's existing high voltage transmission network comprises 2,819 circuit km of 132 kV lines and 1,996 Mega Volt Amps (MVA) of substation capacity at the 132 kV level. Unlike the generation segment of the country, transmission has shown significant growth between 2010 and 2017, during which the 132 kV transmission line network has grown at a rate of 8.8% annually. The country also has a 66 kV transmission network with 494 circuit km of lines and a transformer capacity of 622 MVA.

The Nepal government received grant assistance from the US government through the Millennium Challenge Corporation (MCC). The NEA plans to build a 300 km of mid-hill 400 kV Transmission Line Network. The Khimti-Kathmandu 400 kV network, which is under construction with the assistance of ADB, will be connected to this network.

Nepal's transmission grid is linked to India's via 22 links at the 132 kV, 33 kV, and 11 kV levels. About 80–100 MW of power is exchanged between the two countries in radial mode via these links.

In the dry season of 2017–2018, NEA imported approximately 500 MW of electricity from India, primarily through the 400 kV Dhalkebar-Muzaffarpur (D-M) line, 132 kV Raxaul-Parwanipur line, 132 kV Kataiya-Kusaha line, and 132 kV Tanakpur line. The D-M line, currently charged at 132 kV, ensures full synchronisation of the Nepal power system with the Indian grid. This connection is to be upgraded to 220 kV in 2018 and 400 kV in 2020.

FIGURE 8: NEPAL'S PLANNED INSTALLED CAPACITY IN MW



1.4 LICENSES ISSUED AND GENERATION PROJECTIONS

HYDRO

According to the Department of Electricity Development, some projects (generating a total of 15,980 MW) have been issued survey licenses, of which projects generating a total of 4,974 MW hold a generation license and are under, or awaiting, construction. The World Bank's Nepal Development Update, "Powering Recovery" (September 2016), refers only to projects with a combined capacity of 1,800 MW that have mobilised financing and are currently under construction, as highlighted in figure 9 below. We estimate that as of July 2018, projects with a combined capacity of 3,000 MW are at various stages of construction.

Over the last decade, the installed capacity has increased by around 50 MW per year. In the last few years, this figure has increased to around 150 MW per year. A total of 1,000 MW will be commissioned in the current fiscal year, 2017–18, starting in mid-July; in the next fiscal year, the capacity addition will be around 600 MW, as the 456 MW Upper Tamakoshi Hydro is expected to go online in this period.

The World Bank suggests that the GoN's 10,000 MW target is possible but would take 15–20 years to achieve. For reference, the Nepal Electricity Authority (NEA) has suggested that domestic growth requires approximately 4,000 MW in the next 10 years.

SOLAR

As of June 2018, solar projects totalling 223 MW of generation capacity were issued survey licenses in Nepal. All recent licenses were issued on, or after, July 2016.

TABLE 3: SOLAR PROJECTS WITH SURVEY LICENSES

Project	Capacity	Validity
Solar Power Plant, Dang	20	2019
KTM Energy Solar Hybrid Power Project, Rani, Biratnagar	10	2018
KTM Energy Solar Hybrid Power Project, Tankusuwari, Biratnagar	10	2018
Mithila Solar PV Power Project, Dhanusa	10	2019
Lamki Solar Energy	10	2018
Attariya Solar Energy	10	2018
Utility Scale Solar PV		
10	2019	
Mithila 2 Solar PV Project, Dhanusa	10	2019
Others, <10 MW (36 projects)	133	
Total	223	

FIGURE 9: PROJECTED GENERATION CAPACITY ADDITION (WORLD BANK) 4

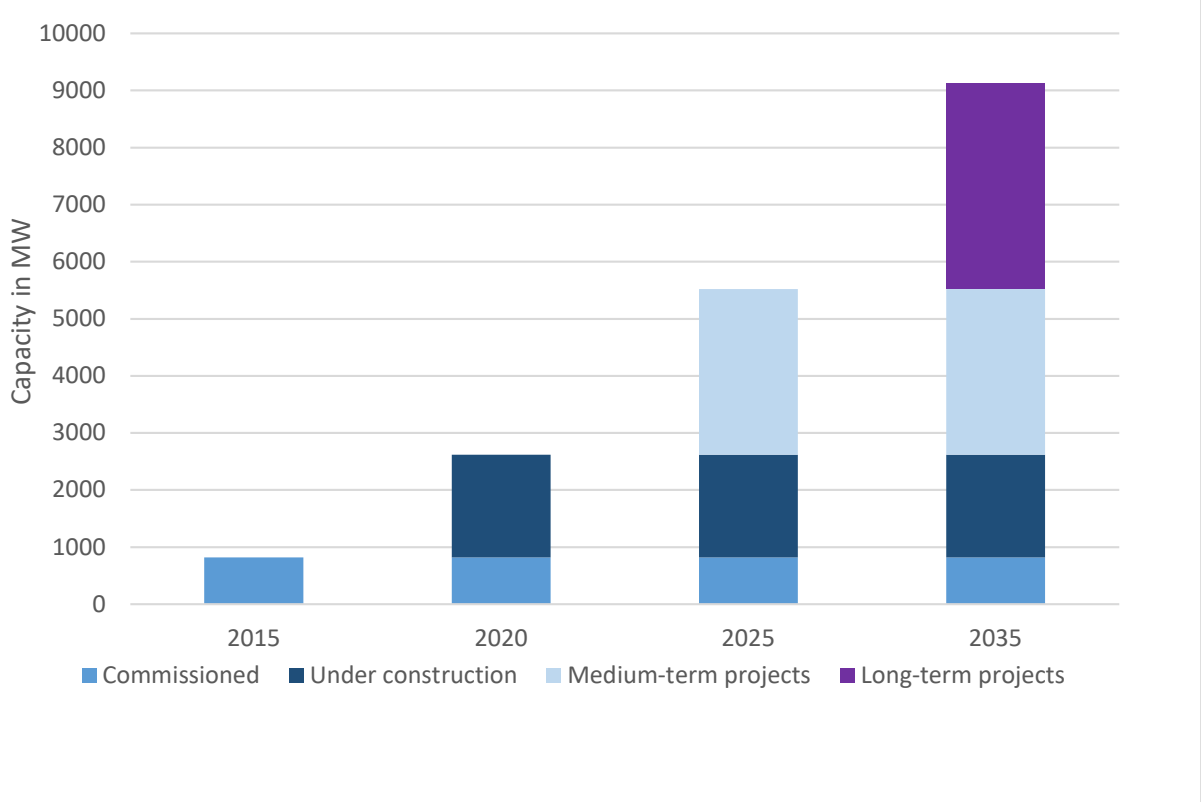
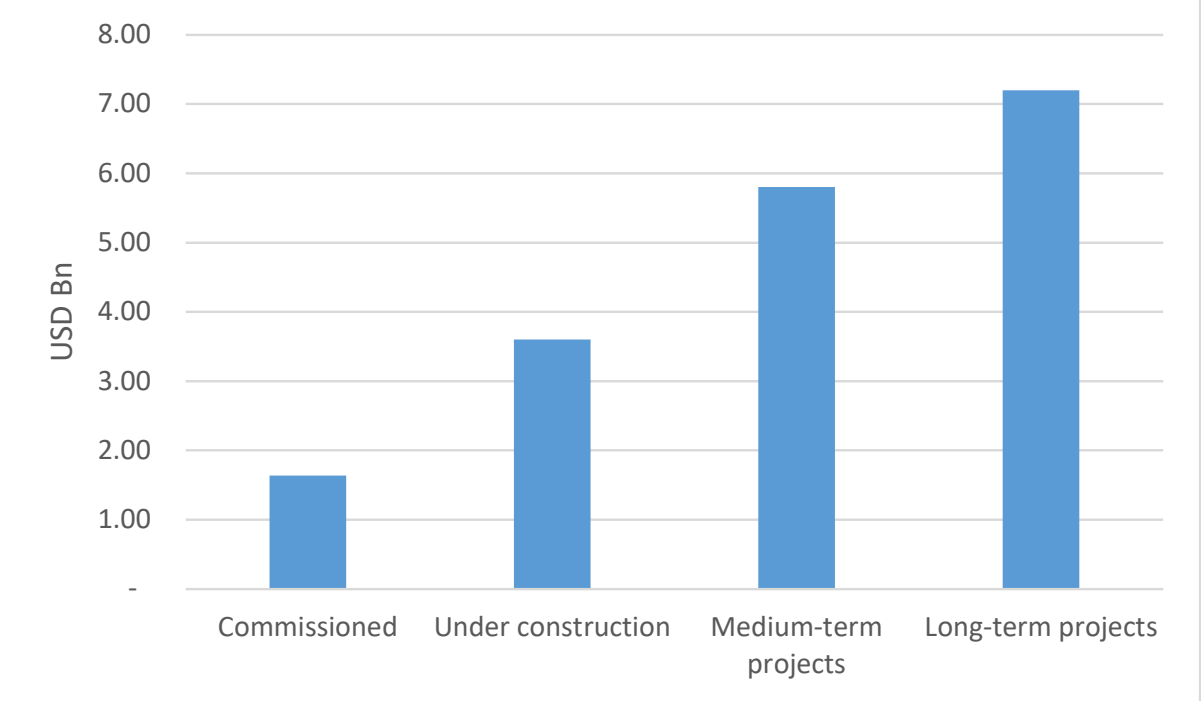


FIGURE 10: ESTIMATED INVESTMENT VALUE OF HYDROPOWER PROJECTS 4



1.5 POWER DEMAND/DEFICIT IN NEPAL

Despite its abundant natural resources, Nepal has one of the lowest rates of per capita electricity consumption in the region. Demand is nearly double the supply, and projections from the Investment Board of Nepal suggest this trend will continue until major projects finalise construction and are brought online.

At present, peak demand is estimated at 1,800 MW, while installed capacity stands at just 960 MW. In the past, the NEA resorted to severe load-shedding (up to 16 hours per day) to manage limited distribution, but in winter 2016/2017, it increased imports of coal-fired energy from India, which resulted in zero load shedding in the Kathmandu valley for the first time in decades. While this approach fixed the supply crisis temporarily, a more significant effort will be required to solve Nepal's limited domestic supply in the long run.

The forecast from the NEA is an extrapolation of historical demand, while the forecasts of the IBN and Water and Energy Commission Secretariat (WECS) are based on a Model for Analysis of Energy Demand (MAED) developed by the International Atomic Energy Agency (IAEA). Similarly, NEA's demand forecast does not include latent demand for electricity, which would exist had there been no load shedding.

The projections made by WECS assume a population growth rate of 1.4%, with urban population increasing from 38.26% at present to 53.54% in 2035. GDP growth rate is 4.5%, with the share of agricultural GDP decreasing from 31.32% to 21.99% and the share of manufacturing GDP increasing from 6.33% to 14.14% (from 2015 to 2035).

Holding these assumptions, annual electricity demand is forecasted to increase from ~3,900 GWh in 2015 to ~30,000 GWh in 2035. This increased demand is driven primarily by the manufacturing and household sectors. In manufacturing, CAGR of GDP is expected to be at 8.79% while the CAGR of energy demand is expected to be 12.47%. Similarly, energy demand at household increases at a CAGR of 9.61%, primarily due to an increase in urban population, substituting other forms of energy for electricity, increased access to electricity, etc.

FIGURE 11: NEPAL ELECTRICITY DEMAND FORECAST 2

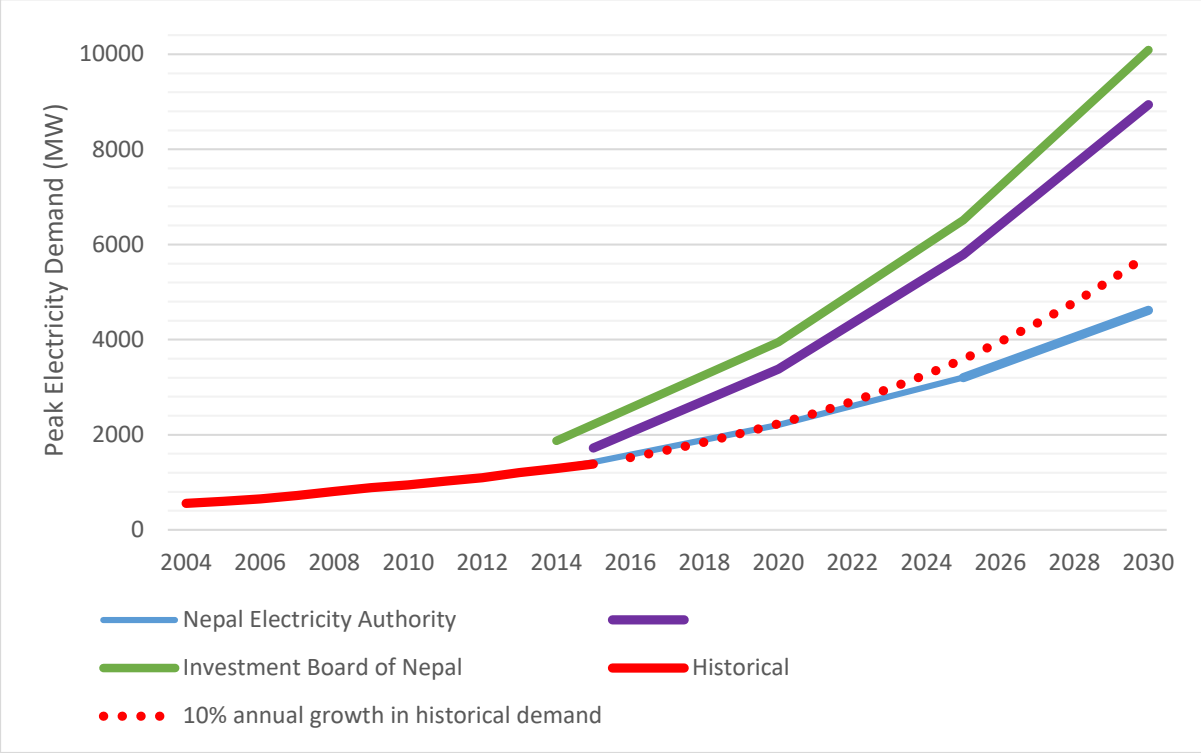


FIGURE 12: FORECASTED GDP COMPOSITION OF NEPAL 2

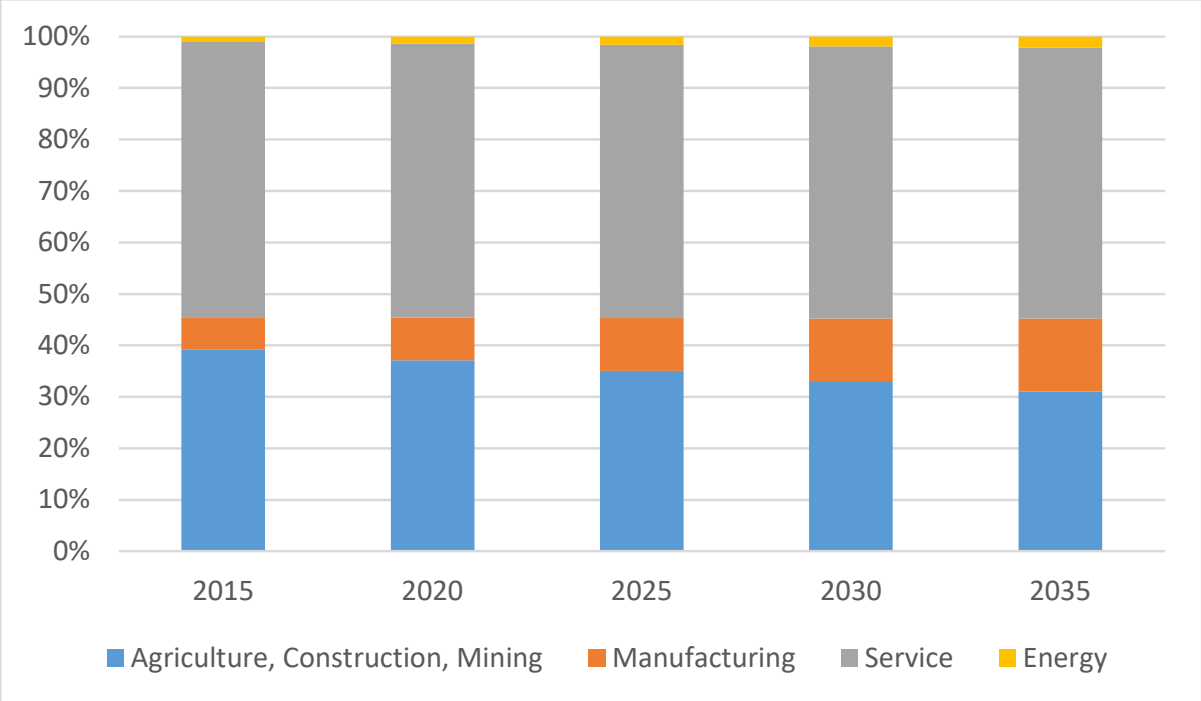


FIGURE 13: FORECASTED ELECTRICITY DEMAND (IN GWH) BY SECTOR 6

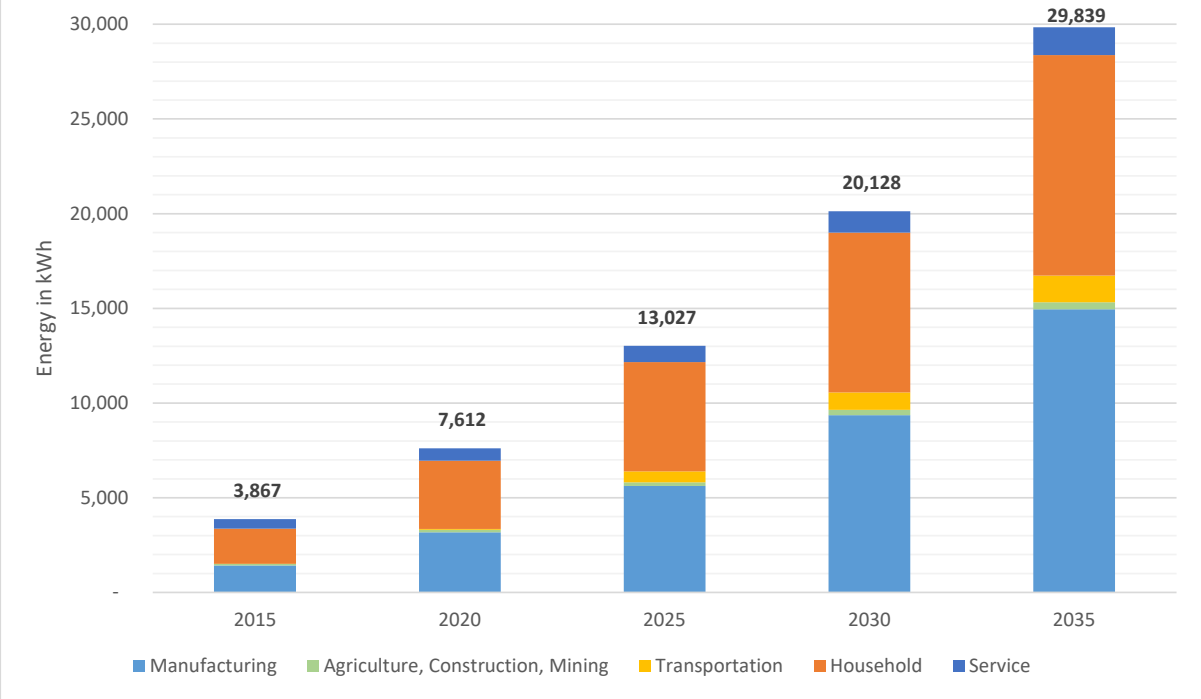
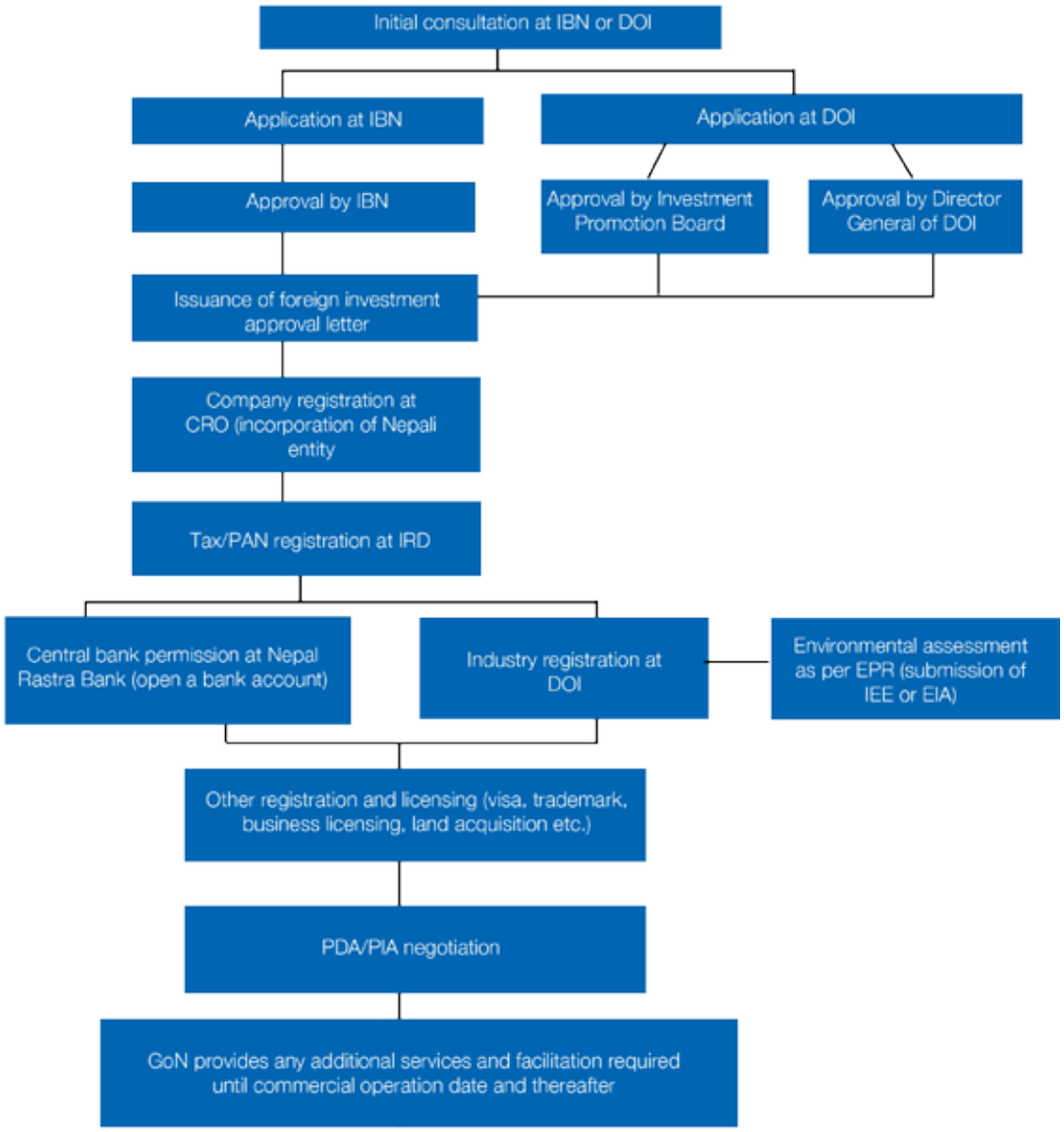


FIGURE 14: INVESTMENT APPROVING AGENCIES FOR FOREIGN INVESTMENT IN NEPAL

Investment Size	Application at	Approval by
>= USD 100 mn	Investment Board of Nepal (IBN)	Investment Board of Nepal (IBN)
>= USD 20 mn	Department of Industry (DOI)	Industrial and Investment Promotion Board
< USD 20 mn	Department of Industry (DOI)	Director General of DOI

FIGURE 15: PROCEDURE FOR STARTING INFRASTRUCTURE VENTURE IN NEPAL



1.6 REGULATORY ENVIRONMENT

LEGALITIES AROUND ENTRY AND EXIT

The Foreign Investment and Technology Transfer Act (FITTA) 1992 governs FDI and classifies the following activities as foreign investment:

a) Investments in shares (equity)
b) Reinvestments of earnings derived from a)
c) Investments made in the form of loans or loan facilities
d) Technology transfer

A foreign investor needs to invest a minimum of USD 50,000 to bring FDI to Nepal. Investments can be made in a public or private company. Investment approvals are granted either by the Investment Board of Nepal or the Industrial and Investment Promotion Board in the Department of Industries.

INVESTMENT BOARD OF NEPAL

The Investment Board Nepal (IBN) is a high-level, fast-track government agency designed to facilitate economic development by mobilising and managing domestic and foreign investment.

APPROVALS/LICENSES NECESSARY FOR PROJECT COMPLETION

Hydropower projects above 1,000 kW require a survey license from the Department of Electricity Development (DoED), and a license to generate, transmit, or distribute electricity. In addition, the following are needed:

- Project proponent must obtain a survey license before starting survey work, as well as a feasibility study and EIA.
- After the survey is completed, a generation license must be obtained from the DoED to start construction and operate the project.
- The maximum term of a survey license is 5 years.

LEGALITIES AROUND SELLING POWER

The state-owned NEA is responsible for electricity supply through the national grid. It is the sole buyer of all grid power produced in Nepal and has a monopoly on the transmission and distribution of electricity. It is also responsible for energy exchanges with India and imports electricity from the Indian grid.

In 2017, the Government of Nepal formed the following companies as part of the unbundling process of NEA:

1. Generation Company
2. Transmission Company
3. Engineering Company
4. Power Trade Company

As of September 2018, the NEA distribution companies in the seven provinces have still not been formed. The original NEA company still carries out generation, transmission, and distribution activities, but all new activities will be conducted through these subsidiaries.

The NEA owns 29 hydroelectric plants, amounting to 510 MW, connected to the grid. In addition, it purchases power totalling 450 MW from 38 independent power producers (IPPs). As the sole buyer of grid electricity in the country, the NEA has clear Power Purchase Agreement (PPA) policies for hydropower projects up to 25

MW. The NEA has already prepared a policy to sign PPAs for projects of up to 100 MW at the same rate. However, the PPA rates are not clear for projects above 100 MW and are negotiated on a case-by-case basis by the NEA. It is important to note that since the NEA is the sole buyer in Nepal, an electricity market does not exist.

CONCESSIONS AND INCENTIVES

By law, certain concessions or rebates are offered to entities operating in the renewable energy space. The 2002 Income Tax Act and other tax acts give incentives to renewable energy developers, such as:

- Any licensed person or entity producing electricity through hydro, solar, or biofuel starting commercial production, transmission or distribution by mid-April 2024 will receive 100% tax exemption for the first 10 years and 50% exemption for the next five years.
- VAT exemption and VAT refund available for energy companies.

See Section “Tax Laws in Nepal and Recommended Domicile Nations” in the Financial Structuring report for details on tax incentives in Nepal.

REGULATORY ENVIRONMENT

There are two key bodies in charge of the electricity sector in Nepal. A number of recent legislative measures (see Table 5) define the electricity paradigm that developers face.

MINISTRY OF ENERGY

The Ministry of Energy is entrusted with the formulation, implementation, monitoring, and evaluation of policies, plans, and programmes for the production of energy, including hydropower. The ministry’s objective is to manage the production of energy for the expansion of industrial and economic activities.

DEPARTMENT OF ELECTRICITY DEVELOPMENT

The DoED is responsible for stimulating the electricity sector andx improving its financial effectiveness at the national level by attracting private investment. The department is entrusted with serving the Ministry of Energy in implementing government policies related to the electricity sector. It also issues survey and generation licenses to prospective developers.

TABLE 5: ENERGY SECTOR REGULATIONS

Law/Programme	Description
Hydropower Development Policy (2001)	Ensures supply of hydropower electricity at a reasonable price, improves rural electrification, creation of employment and development of hydropower as an industrial enterprise.
Electricity Act (1992)	Provides directives on licensing, generation, transmission, and distribution surveys; transmission and distribution of electricity; standardising and safeguarding electricity services.
Water Resources Act (1992)	Makes arrangements for the rational utilisation, conservation, management, and development of water resources that are available in Nepal in the form of surface water and underground water. Also makes timely legal arrangements for determining beneficial uses of water resources.
Electricity Regulation (1993)	Provides direction to distributors and consumers of electricity and sets standards for voltage frequency and power factor of electricity.
Electricity Theft Control Regulations (2002)	Treats electricity theft as a criminal offence, locates illegal connections in rural areas, and gives NEA new powers to deal with the problem.
Electricity Leakage Control Rules (2002)	Sets direction on reporting of stolen electricity, investigation and inquiry, assessment of stolen electricity, loss or damages.
Electricity Regulatory Commission Act (2017)	Designed to regulate the electricity sector of Nepal – from generation tariff to transmission charges, distribution charges, and consumer tariffs. The commission is to look at ensuring quality, reliability, and affordability of power supply in Nepal.

1.7 CROSS BORDER INFRASTRUCTURE AND POWER TRADE REGULATIONS

RATIONALE FOR POWER TRADING

Though it has great potential for clean energy development, the South Asian region faces acute power shortages every year. In theory, countries in the region could complement each other, as each has a different seasonal pattern of demand and supply of energy, diversity of peak demand, and diversity in composition of energy sources.

In Nepal, for example, available capacity in the dry season decreases to approximately one-third of installed capacity, so regional power trading coul help ensure that daily outages and unplanned interruptions are kept to a minimum.

TABLE 6: PLANNED AND PROPOSED POWER TRADING LINKS BETWEEN NEPAL AND INDIA 13

Substation in		
Nepal	India	Voltage Level (kV)
Attaria	Bareily	400
Lamki	Bareily	400
Kohalpur	Lucknow	400
Inaruwa	Punera	400
Bardaghat	Gorakhpur	400
Duhabi	Jogbani	400

Similarly, in summer, excess capacity could potentially be exported to Northern India, Bangladesh, and Pakistan, which face high loads during these months.

Besides smoothing out problems relating to annual supply and demand, power trading could also lead to economies of scale in energy, increased revenues from trade and industrial activities, increased industrial productivity, and economic growth.

The main reason for expanding hydropower capacity in Nepal is that energy from low-cost hydro projects would replace energy from the coal-fired power plants that supply India's northern grid. Using imported coal would be expensive because of coal transportation costs from the nearest port, roughly 1,200 km away from the load centre in Delhi. Nepal's hydro plants, located within 600 km of Delhi, would be relatively cheaper and an attractive option to meet electricity demand in India's northern electricity grid.

POWER TRADE REGULATIONS

Nepal is a party to the SAARC Framework Agreement for Energy Cooperation. The agreement contains broad provisions for establishing a regional market for electricity, including non-discriminatory access to transmission, market-based pricing of electricity exchanged, and the establishment of a body to coordinate regional power integration and trade.

Besides the SAARC agreement, Nepal signed a Power Trade Agreement with India in 2014. The agreement creates a framework for cross-border sale of electricity, sharing infrastructure and open, non-discriminatory access to each other's electricity markets.

CURRENT AND PLANNED INFRASTRUCTURE

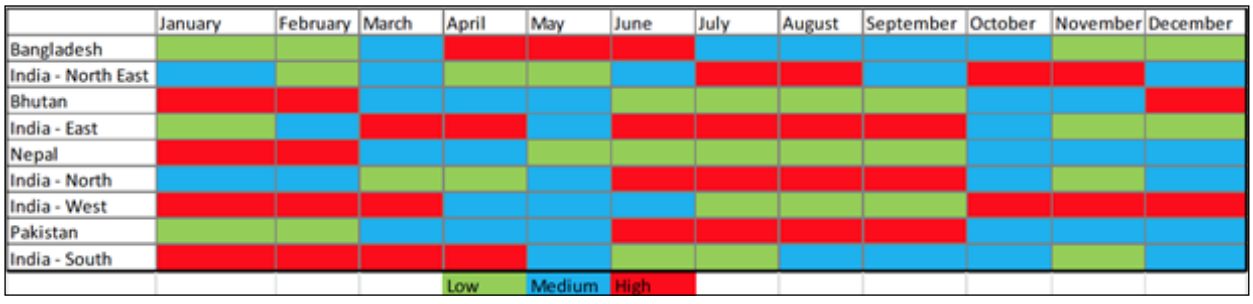
Power trading between Nepal and India takes place through four major transmission lines (Table 6).

TABLE 7: MAJOR POWER TRADING LINKS BETWEEN NEPAL AND INDIA

Transmission Link	Evacuation Cap (MW)	Traded (MW)	Voltage Level (kV)
Dhalkebar-Muzza-farpur	1,200	NA	400
Raxaul-Parwanipur	130	80	132
Kusaha–Kataiya	130	80	132
Gandak-Rampur	50	25	132
Mahen-dranagar-Tanakpur	50	30	132
Kataiya- Rajbiraj	10	8	33
Raxual- Birgunj	10	10	33
Sitamadhi-Jaleswor	10	8	33
Nepalgunj-Nanpara	10	8	33
Jayanagar-Siraha	8	8	33

Besides existing infrastructure, three major inter-country connections are planned between India and Nepal (Table 7).

FIGURE 16: MONTHLY ELECTRICITY LOAD PROFILES ACROSS SOUTH ASIAN GRIDS



1.8 CURRENCY STABILITY AND ASSOCIATED RISKS

BACKGROUND

The Nepalese Rupee (NPR) has been pegged to the Indian Rupee (INR) since 1993. The GoN has maintained this peg primarily in the interest of price stability and fears of rampant speculation should Nepal allow its currency to float.

There is a clear gap in India and Nepal's economic growth trends – in 2015, India's growth rate was 6.5% and Nepal's was 4.2%.

Over the last decade the USD has appreciated significantly against the NPR. As of September 2017, 1 USD traded at 116 NPR. While it is difficult to predict an outlook for the next 10 years, a persistent upward trend may be expected.

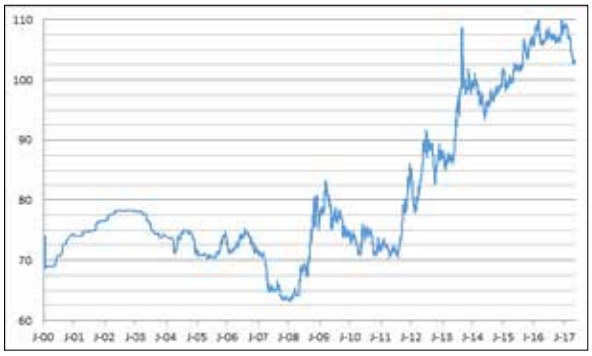
ANALYSIS OF INDIAN RUPEE

Growth in India is projected to increase from 6.7% in 2017 to 7.4% in 2018 and 7.8% in 2019, lifted by strong private consumption as well as the fading transitory effects of the currency exchange initiative and implementation of the national goods and services tax.

LATEST UPDATE

- The Nepalese Rupee started 2018 positively, trading at 1 USD = 102 NPR. This was a steep appreciation from a 10-year low rate of 1 USD = 109 NPR recorded in February 2016. However, the currency has since depreciated against USD again, and as of September 2018 hit an all-time low of 1 USD = 117 NPR.
- Foreign exchange variation risk is outside the control of IPP investors (other than projects with a partial USD PPA). In Nepal, where the average annual depreciation of the NPR has been 3.35% in the past decade, it is a substantial risk.
- According to Deloitte,17 tariffs without forex risk protection can result in losses up to 26% of the capital cost of the project, rendering such investments unprofitable and impossible to finance.
- The government has finalised the PPA for the Upper Trishuli-1 hydroelectric project. There is a provision for currency hedging in this PPA. Although the hedging mechanism is yet to be finalised, according to relevant stakeholders, the project developers would be exposed to a band of currency depreciation/ appreciation – i.e., if the currency value goes outside a certain band, then it will be covered by the hedging fund. Both the developer and the NEA will contribute towards the hedging fund.
- A project developer can use TCX, a DFI funded currency hedging fund, to hedge their currency risk. (See section on TCX in the Financial Structuring report.)

FIGURE 17: USD TO NPR (2000–2017)




NEPAL RASTRA BANK
RUPEES
ONE THOUSAND
नेपाल राष्ट्र बैक ।
असतोमा सदगमय।
कोतमाडौं ।
नेपाल ।
1000

1.9 CAPITAL REQUIREMENT AND RETURN ON EQUITY FOR CONSTRUCTION AND GENERATING ASSETS

CAPITAL REQUIREMENT

Nepal's government reaffirmed its plans to significantly expand domestic hydropower capacity at the annual Investment Summit, held in March 2017. At the event, the Ministry of Energy pledged to build 10,000 MW in hydropower by 2030. This is a recurring trend – many new governments have used inflated energy projections to highlight their commitment to infrastructure development in Nepal.

Dolma estimates that USD 20 bn is required to meet the GoN's target, approximately USD 7 bn of which is available from domestic sources of capital. On Dolma's further analysis of this milestone target in the context of available debt/ equity in Nepal, approximately USD 4 bn in equity and USD 9 bn in debt is required through FDI. The liquidity crunch in Nepal's banking sector through most of 2017 pushed up interest rates for hydropower projects.

CAPITAL REQUIREMENT FOR EXISTING LICENSES (HYDRO AND SOLAR)

According to Nepal's Department of Electricity Development, there are 35 survey licenses issued for hydro projects above 100 MW and and 37 for solar projects above 1 MW.

TABLE 8: ISSUED SURVEY LICENSES BY DOED AND CAPITAL REQUIREMENT AS OF JUNE 20181

Asset Class	Number of Licenses	Total Capacity (MW)	Capital Req. (USD millions)
Solar (>1 MW)	37	216	194.4
Hydro (>100 MW)	35	11,293	22,586
TOTAL	72	11,509	22,780.4

RATE OF RETURN FOR CONSTRUCTION AND GENERATING ASSETS IN NEPAL

Based on findings from Dolma's first fund, Dolma Impact Fund, the average project internal rate of return IRRs for hydropower in Nepal ranges from 15% to 20%. These returns reflect the broader market expected IRR for projects and equity.

The solar market, on the other hand, is still in its infancy and there have been no private sector financial closes for any on-grid project to date. Assuming 1 MW = USD 2 MILLION

HYDRO AND THE STOCK MARKET

The Nepal Stock Exchange (NEPSE), the only stock market in Nepal, is dominated by two sectors:

a. Banking and financial institutions
b. Hydropower

As of 31 August 2018, 19 hydropower companies are listed in NEPSE. The total market capitalization of the hydropower sector as of 31 August 2018 was NPR 63 bn (USD 561 mn at prevailing exchange rates).

TABLE 9: NEPSE LISTED HYDROPOWER COMPANIES

S.N.	Stock Name	MW	Total number of shares	Price per share (NPR)*	Market cap (in mns NPR)	Market capitalisation (in million USD)	Market cap (in mns USD) / MW
1	Api Power Company Ltd.	8.5	11,340,000	260	2,948	26.1	3.1
2	Arun Kabeli Power Ltd.	25	15,000,000	242	3,630	32.2	1.3
3	Arun Valley Hydropower Development Co. Ltd.	3	9,330,123	130	1,213	10.7	3.6
4	Barun Hydropower Co. Ltd.	4.5	2,551,500	132	337	3	0.7
5	Butwal Power Company Limited	76.7	22,186,720	434	9,629	85.3	1.1
6	Chhyangdi Hydropower Ltd.	6	2,700,000	120	324	2.9	0.5
7	Chilime Hydropower Company Limited	22.1	39,651,130	711	28,192	249.7	11.3
8	Dibyashwori Hydropower Ltd.	4	2,640,000	102	269	2.4	0.6
9	Himalayan Power Partner Ltd.	27	10,654,170	245	2,610	23.1	0.9
10	Khanikhola Hydropower Co. Ltd.	6.4	4,657,143	105	489	4.3	0.7
11	National Hydro Power Company Limited	7.5	13,859,112	77	1,067	9.5	1.3
12	Nepal Hydro Developers Ltd.	3.52	2,600,000	160	416	3.7	1.0
13	Ngadi Group Power Ltd.	30	5,355,548	179	959	8.5	0.3
14	Radhi Bidyut Company Ltd	4.4	4,510,040	217	979	8.7	2.0
15	Rairang Hydropower Development Company Ltd.	5.5	5,600,000	146	818	7.2	1.3
16	Ridi Hydropower Development Company Ltd.	2.4	5,010,551	115	576	5.1	2.1
17	Sanima Mai Hydropower Ltd.	22	21,100,000	294	6,203	55.0	2.5
18	Synergy Power Development Ltd.	9.6	7,000,000	107	749	6.6	0.7
19	United Modi Hydropower Ltd.	10	11,500,000	165	1,898	16.8	1.7
					63,306	561	

Nepali investors are optimistic about hydropower stocks, which is reflected in high price increases in some of the stocks. Table 9 shows significant share price growth from an initial price of NPR 100. Average market capitalisation per MW is NPR 227 mn (USD 2.02 mn), compared to an estimated construction cost per MW of NPR 200 mn.

1.10 BARRIERS TO ENTRY

FOREIGN DIRECT INVESTMENT

- **Political Stability:** Because of a prolonged political transition in Nepal after the Maoist insurgency ended in 2006, political stability was a major issue for foreign investors. Frequent government changes affected the policy framework for electricity development. However, after the recent three-tier elections in Nepal and the formation of a majority government at the federal level, investors seem to be more confident that there will be a stable government for the next five years. This should ensure reduced political risk and greater inclination for foreign investments.
- **Policy Stability:** The Hydropower Policy 2001 has still not been enacted as the Electricity Bill has been in parliament for the last six years. The Electricity Bill needs to be enacted at the earliest. Moreover, more than 32 laws, policies, and procedures that affect the development of energy projects need to be harmonised. The recent enactment of the Electricity Regulatory Commission Act is a positive step to introduce independent regulation in the electricity sector.
- **Currency:** According to Deloitte, to promote foreign investment in power generation, the GoN will need to ensure that forex risk is covered in the structuring of tariffs under the hydropower PPAs.17 In doing so, the Government through the Ministry of Energy need to insist on as long a tenure as possible for debt financing (which typically accounts for 70% of the capital of a hydro project).
- **Credit Rating:** Nepal does not have a sovereign credit rating, so institutional foreign investors are less likely to consider Nepal an option as most institutional investors require their investments to be in a country with at least an investment grade sovereign rating.
- **Governance:** There is a lack of governance in the private sector and lack of professionals on the boards of private sector organisations. Similarly, there is a lack of awareness about the statutory compliances that need to be fulfilled while running organisations. There is little adherence to environmental, social, health, and safety standards. Local standards and regulations often do not meet international standards. As a result, foreign investors are hesitant to invest in the country.
- **Climate Change:** According to the UN, Nepal is particularly susceptible to the effects of climate variations, flash-floods, forest fires, and drought. This will be magnified by climate change.
- **Bureaucracy:** There are difficult and lengthy approval procedures to enter the country as a foreign investor.
- **Labour issues:** Labour unions are prevalent and often have high and unrealistic expectations that companies cannot fulfill; they may resort to protests by stopping production.

LOCAL KNOWLEDGE

- A local partner is important to ease relations with government authorities and to help resolve local disputes.

LICENSING

- A difficult regulatory environment constrains the private sector as businesses are required to comply with 130 processes from over 41

ministries and government agencies. (Refer to section 1.3 for more details.)

GENERAL RISKS

- **Stability in the financial sector:** Some financial institutions are at risk of insolvency due to substandard risk management practices, poor corporate governance, and high credit exposure compounded by under-resourced supervision and weak enforcement of prudential norms. The regulatory framework remains weak and the operational capacity to manage the fiscal costs of a financial crisis is limited.
- **Climate change and natural disasters:** Recent records show an increasing number of droughts, floods, hailstorms, landslides, and crop diseases, mostly affecting livelihoods of the poor. Nepal is located on the edge of a tectonic plate and is at risk of earthquakes.
- **Poor country governance:** Nepal still ranks low on international governance indicators such as Transparency International's Corruption Perception Index 2017 (122 out of 175 countries). Similarly, there is also a lack of enforceability of laws and accountability from the government.
- **Poor infrastructure:** Nepal has unreliable electrical power and low-quality transportation networks, which are some of its economic bottlenecks.

1.11 BARRIERS TO EXIT

REPATRIATION OF PROFITS AND DIVIDENDS

As per section 5 (2) and (3) of FITTA, 1992, foreign investors are entitled to repatriate the following amounts from Nepal:

a) The amount received by the sale of the shares of foreign investment as whole or any part thereof
b) The amount received as profit or dividend from a foreign investment
c) The amount received as the payment of principal and interest on any foreign loan
d) The amount received under agreement for use of technology rights, patents, trademarks, technical know-how or acquiring any foreign technical, consultancy, management, or marketing service

According to the IBN, repatriation can be secured once all taxes are fully paid and all necessary legal obligations have been met. The repatriation approval is given by the central bank on the basis of the recommendation of the concerned regulatory authority (Department of Industry/Investment Board of Nepal, Department of Electricity Development/Ministry of Energy, Nepal Telecom Authority/Ministry of Communications, etc.).11 It might take time to receive clearances given that multiple authorities must authorize approvals.

PROMOTER LOCK-IN PERIOD OF THREE YEARS

The lock-in period of three years for pre-IPO shares is one of the key challenges for exits. According to the Securities Registration and Issuance Regulations 2073, pre-IPO shares held by shareholders of a company can be sold only after three years from the date of IPO. The three years lock-in period for investors is on the higher side compared to that in other SAARC countries – India's is six months; Sri Lanka's is one year. Securities law in many other countries have less stringent lock-in periods for investors who are not promoters.


OWN

1.12 OPPORTUNITIES FOR EXPORTING ELECTRICITY TO NEIGHBORING MARKETS

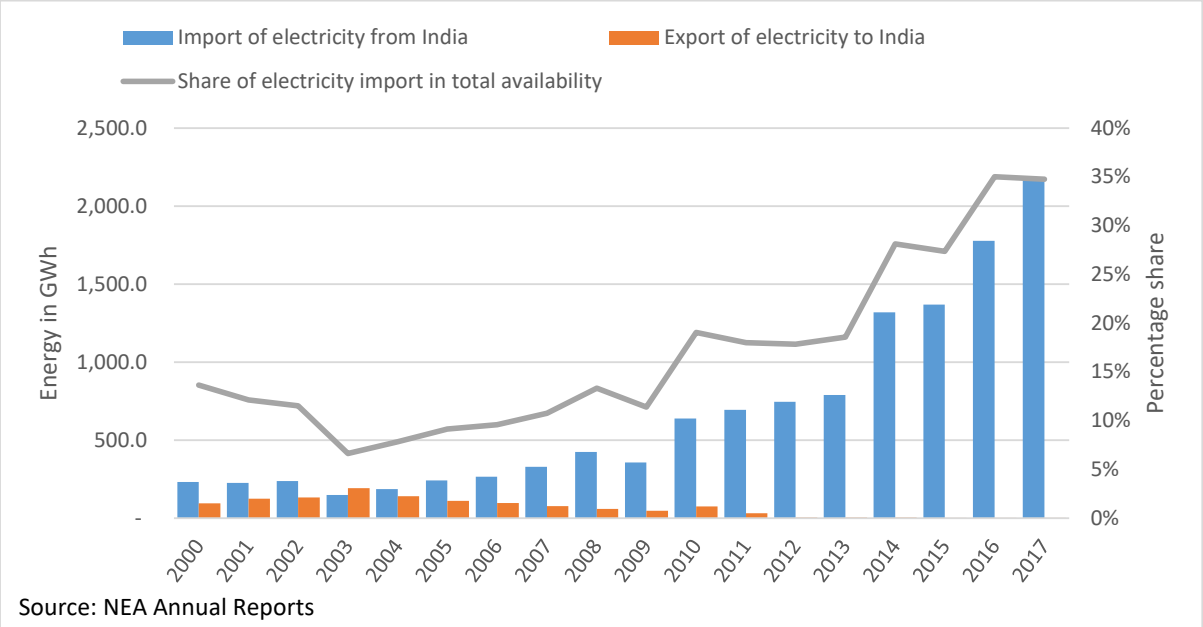
As previously noted, Nepal has an electricity trade relationship with India and no other neighbour. Figure 16 tracks electricity trade between Nepal and India for 10 years, starting in 2003. It shows a growing trend of increasing reliance on electricity imports to smoothen problems with supply in Nepal.

According to SARI/EI, Nepal has a good prospect for bilateral electricity trading with India and Bangladesh. Some countries, such as Bhutan, have similar resources and similar seasonal shortages while others such as Pakistan and Sri Lanka are too far off for bilateral electricity trade. According to an ADB report, Bangladesh's fuel mix of power is dominated by natural gas, and in the absence of discovery of new gas reserves, it may witness gas reserve depletion by 2023 and a severe power crisis (Figure 17).

According to the same ADB report, the increased cost of electricity generation because of depletion in natural resources is expected, in India's case, to increase electricity prices by 70% in between 2015 and 2030. In order to be cost effective, India also needs to find other forms of electricity.

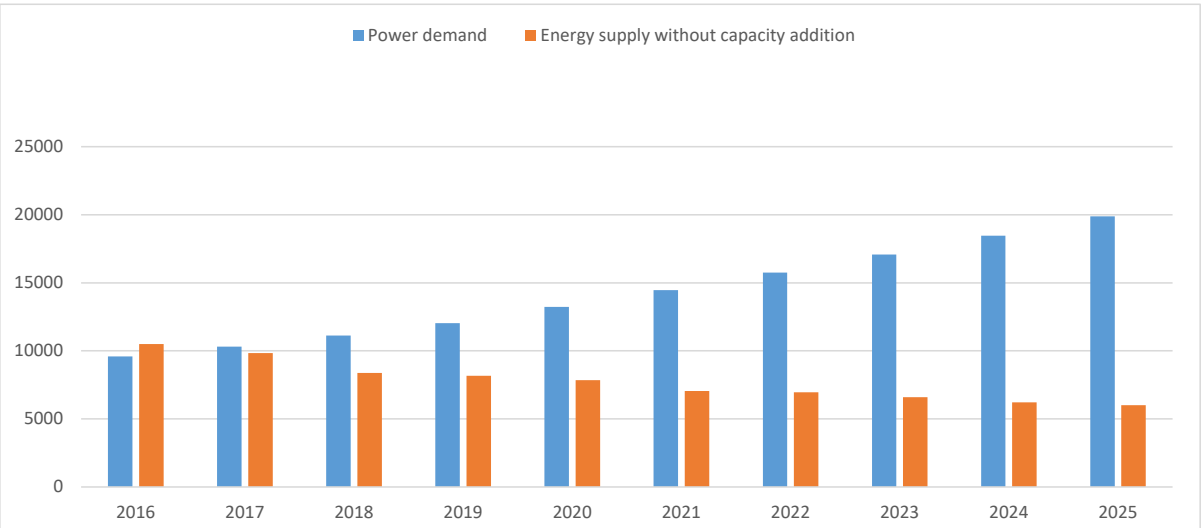
The situation in India and Bangladesh is an opportunity for Nepal to develop its hydro and solar resources and export clean carbon-free energy to these power-hungry nations. World Bank research envisages what the installed generation capacity could be if there were full regional interconnection among South Asian countries. The research assumes a baseline scenario with no increased interconnections across countries beyond what is currently in place or what countries are committed to. This baseline scenario is then compared with a scenario that has a fully integrated regional system. The research shows that there is a cumulative increase in installed capacity in a regionally integrated system compared to the baseline scenario. Bangladesh and India would lower their installed capacity by 11 GW and 35 GW respectively in 2015–2040 and substitute coal and gas energy with clean hydro energy from primarily Nepal and Bhutan. With a fully integrated regional grid, Nepal is expected to increase its installed capacity by 52 GW, mainly for export to its neighbours.

FIGURE 18: ELECTRICITY TRADE BETWEEN NEPAL AND INDIA 12



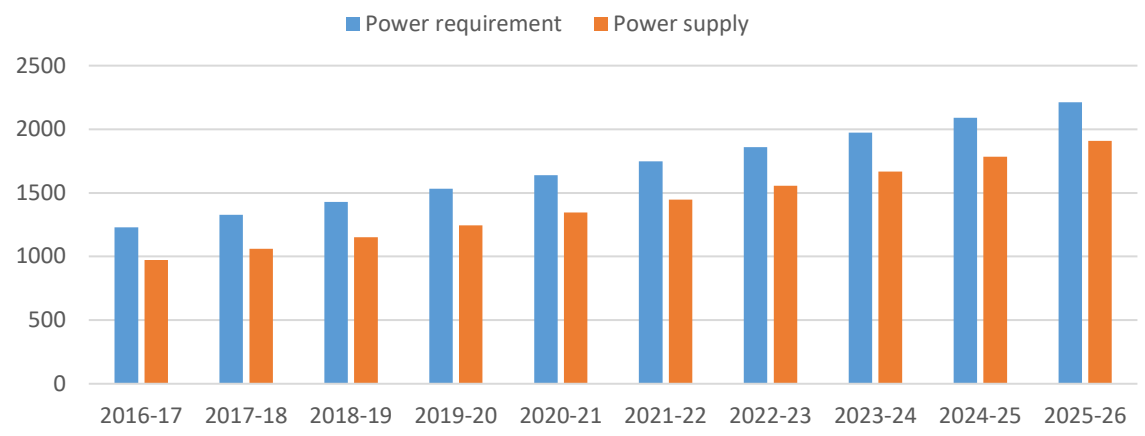
Source: NEA Annual Reports

FIGURE 19: POWER DEMAND SUPPLY SCENARIO IN BANGLADESH (IN MW) 23



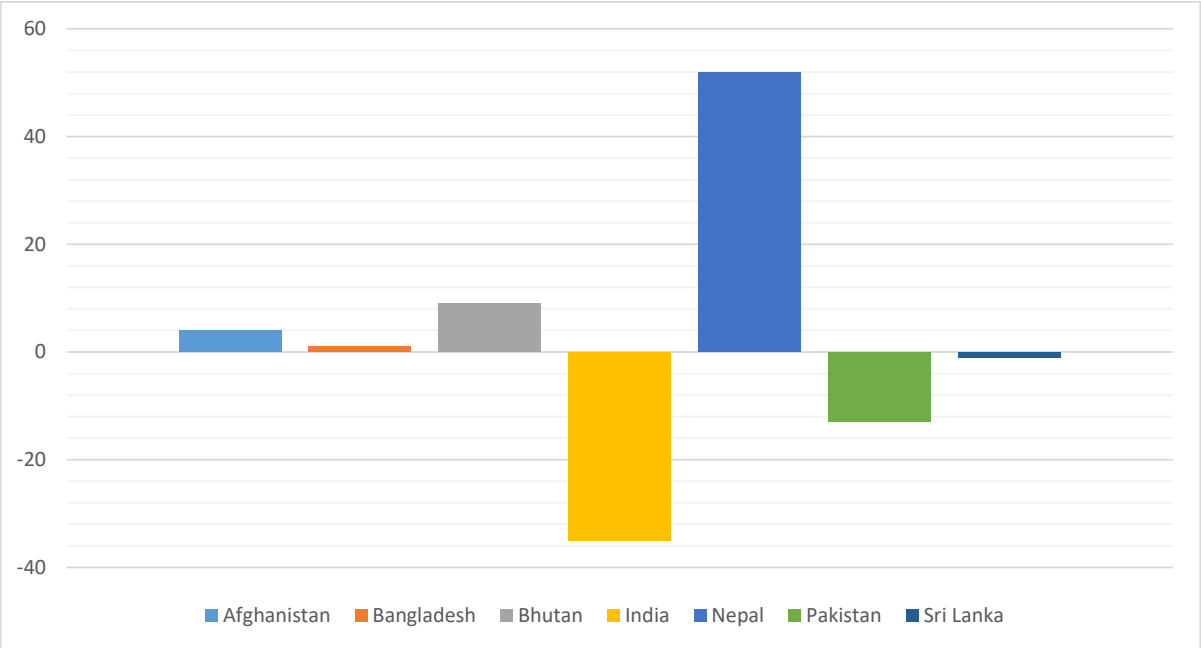
Source: People's Republic of Bangladesh, Ministry of Power, Energy and Mineral Resources, Bangladesh Power Development Board. 2016.

FIGURE 20: POWER DEMAND AND SUPPLY OF INDIA (IN BNS OF UNIT POWER) 23



Source: Government of India, Ministry of Power, Central Electricity Authority. 2016a. Draft National Electricity Plan (Volume 1)—Generation.

FIGURE 21: CUMULATIVE CHANGE IN TOTAL INSTALLED CAPACITY RELATIVE TO REGIONAL COOPERATION AND TRADE IN 2015–2040 PERIOD, BY COUNTRY (GW)



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