A Report on

Market Data for Private Sector Investments in Nepal

Renewable Energy Sector

Prepared By

dolma developmentfund

UKaid
from the British people

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Intellecap
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dif@dolmafund.org
www.dolmafund.org

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ABBREVIATIONS

AEPC	Alternative Energy Promotion Centre, Nepal
CBS	Central Bureau of Statistics, Nepal
CAGR	Compounded Annual Growth Rate
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
GW	Giga Watt
GWh	Giga Watt Hour
HIDCL	Hydroelectricity Investment and Development Company, Nepal
IPP	Independent Power Producers
IPPAN	Independent Power Producers' Association, Nepal
IHA	International Hydropower Association
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IPO	Initial Public Offering
kW	Kilo Watt
KWh	Kilo Watt Hour
KTOE	Kilo Tons of oil Equivalent
MW	Mega Watt
MWh	Mega Watt hour
NEPSE	Nepal Stock Exchange
NEA	Nepal Electricity Authority
NPR	Nepalese Rupee

PE	Private Equity
PPA	Purchase Power Agreement
REEEP	Renewable Energy and Energy Efficiency Partnership
ROE	Return on Equity
SAARC	South Asian Association for Regional Cooperation
SWERA	Solar and Wind Energy Resource Assessment
SEBON	Securities Board of Nepal
SARI	South Asia Regional Initiative for Energy
SME	Small & Medium Enterprise
T&D	Transmission and Distribution
US$	United States Dollars
WACC	Weighted average cost of capital
WHO	World Health Organisation
VC	Venture Capital

BACKGROUND OF THE STUDY

With the recent political stability and favourable macro-economic environment in Nepal, there has been a spurt in growth of many sectors such as Agriculture, Energy, Finance, Healthcare, Education and Tourism which constitute the backbone of the country's economy. Given that the Nepalese economy is still in recovery mode after a long political upheaval, there is both a need as well as an opportunity to catalyse the growth of businesses. However, as elsewhere in the developing world, access to finance is a key challenge for many enterprises in Nepal. Private sector providers of risk capital such as venture capital funds, private equity funds, impact investors and SME lending facilities are well positioned to play a pioneering role in addressing this need and at the same time build the case for the "business opportunity" of investing in Nepal. Early successes in investments can unlock further mainstream international and domestic capital; and form the corner-stone of a strong and resilient private sector in Nepal which will in turn drive inclusive growth.

One of the biggest challenges which investors in Nepal face is: lack of clarity around market landscapes, business profiles, valuation benchmarks and exit opportunities***. Market Data for Private Sector Investments in Nepal*** attempts to bridge this information divide. It seeks to act as a guide to foreign and domestic investors by providing insights into the landscape of renewable energy and especially hydropower sector in Nepal. These insights include structure of the sector, state of the energy value chain, identifying more promising investment opportunities, and evaluating capital flow and valuations in the sector. The report has been compiled analysing data from several credible sources, including existing research literature and industry publications. The secondary data was validated and additional information was gathered by engaging with key stakeholders in the sectors such as industry players, experts, financial institutions, policy makers, development finance institutions and sector associations. The report is constrained by limited consistent availability of data. In absence of hard and consistent data in some cases, the report relies on data from the field and relevant, triangulated proxy data from secondary sources.

METHODOLOGY AND APPROACH

This report is an effort to assess investment landscape in Nepal across six sectors of agriculture, renewable energy, financial inclusion, healthcare, education and tourism. The report is based on (a) primary data from interviews and focus group discussions with enterprises, experts and policy-makers and (b) secondary data from relevant government and policy publications in Nepal. The report draws on data derived from sources such as Nepal government publications, data from World Bank and Intellecap's proprietary knowledge base. The primary research was conducted in collaboration with the Dolma Impact fund team.

The report has been compiled using data from several credible sources, including existing research literature and industry publications. The secondary data was validated and additional information was gathered by engaging with key stakeholders in the sectors such as industry players, experts, financial institutions, policy makers, development finance institutions and sector associations.

The report is constrained by limited consistent availability of data across all sectors. In absence of hard and consistent data in some sectors, the report relies on data from the field and relevant, triangulated proxy data from secondary sources. It must also be noted that report does not extensively cover all the value chain elements in a sector - only promising, potentially high growth sectors are analysed. Users of this report should be cognisant of these data limitations.

Renewable Energy in Nepal

70% Peak power deficit in Nepal leading to load shedding up to 12 hours a day in in 2012-13

42,000 MW Hydro Energy potential in Nepal of which only 2% has been captured for generation of electricity

US$680 Million Estimated market size of the private power generation companies by 2020 at a CAGR of 33% from 2012-13

US$1.5 billion Capital requirement for small and medium size hydropower projects over the next 3-5 years

13%-16% Estimated hurdle rate for the hydropower sector in Nepal

1. Executive Summary

Renewable Energy sector has positive outlook in Nepal in the medium to long term.

The renewable energy sources of energy in Nepal: Hydro, Solar, Bio-Mass and Wind have great potential for future growth and meet power requirements of Nepal. Nepal has one of the highest economically exploitable Hydro Energy potential in the world at 42,000 MW[1] of which only about 2% has been captured for generation of electricity. Solar power shows great promise for meeting the off-grid power requirements as opposed to grid power in Nepal as the geographic landscape of the country makes it difficult to supply grid power to each part of the country. However high production costs and over dependency on subsidies makes solar power less competitive than hydropower and affects the commercial scalability of the sector. Bio-mass and wind energy as sources of power are still at very nascent stage of development.

Hydropower sector is the most attractive sector for investors and with greatest potential to grow in the renewable energy space.

Majority of the private sector activity in renewable energy segment in recent past in Nepal has been seen in the hydropower generation space for supplying to grid power. The grid hydropower sector is an attractive sector for investors given the stability in the projected cash flows of the enterprises operating in the sector. The power deficit situation in Nepal is expected to continue until 2020[2] and hence all the grid power produced will be required to meet the energy demand. In addition the operating margins or EBITDA margins for hydropower companies are much higher when compared to companies utilising other renewable source of energy such as Solar or Wind. The EBITDA margins for the listed hydropower companies in Nepal have been found in the range of 50% to 90% that resonates well with the 60% to 80% EBITDA margins in India for similar hydropower enterprises indicating high competitiveness of this sector in Nepal[3]. The higher profitability margins of the generation companies in the hydropower sector make it more attractive for investors.

Increasing domestic demand fuelled by rising income levels, industrial growth and government focus on the energy sector are the key growth drivers for grid power in Nepal.

Rising demand for electricity from households and industry and current power deficits as high as 70% are expected to drive the grid power sector in Nepal in future. The demand for grid power is expected to grow at a CAGR of around 9% and peak demand is estimated to reach at 2052 MW in 2020 with annual requirement of electricity at 10,000 GWh from peak demand of 1024 MW in 2011-12[4]. From the supply side, the current installed capacity of grid power is inadequate to meet the peak demand requirements. The installed capacity of gird power in Nepal in 2012-13 was approximately 762 MW resulting in a sharp demand supply mismatch with peak power deficits as high as 70%[5]. The private sector is poised to play a key role in reducing the power deficit in Nepal through active participation in power generation.

The energy sector and the hydropower sector have been identified as one of the priority lending sectors by the Nepal Rastra Bank. The Nepal Government of late has focused on the sector and embarked upon the Electricity Crisis Resolution Action Plan to improve the power generation situation and provide impetus to private sector participation.

Although the hydro energy sector in Nepal has overall positive outlook, there are some infrastructural and regulatory challenges specific to the sector that it needs to resolve in near future

[1] Shrestha HM, Cadastre of hydropower resources, Moscow Power Institute, Moscow, USSR; 1966
[2] NEA annual report 2012-13
[3] Intellecap Analysis 2014
[4] NEA Annual report 2012-13, Intellecap Analysis 2014
[5] NEA annual report 2012-13

Nepal at present has less than sufficient power evacuation, transmission and distribution infrastructure given high level of activity in power generation space. This challenge however, could be resolved to some extent by encouraging private sector participation through public private partnership (PPP) models.

NEA is the single buyer of grid electricity in Nepal and has never defaulted on its payments to the power generation companies despite its financial problems. This fact sends a positive signal for the industry, however with the installed power generation capacity expected to increase by 8 folds in next 5-6 years[6], NEA could be under pressure to meet payments in case its revenues do not increase proportionately. Allowing the industrial sector to directly purchase grid power from the power generation companies could mitigate this risk in the short to medium term.

With favourable regulatory framework and policies, investment in hydropower sector is expected to grow in near future

The 38-point Electricity Crisis Resolution Action Plan that was brought out by the government in 2009 has played a key part in growth of the private sector activity in Nepal in hydropower generation in the last 3-4years. In addition tax benefits, provision of subsidies, priority sector lending for hydropower and provision of IPO during construction period and other policies supporting the hydropower sector indicate that the hydropower sector is expected to achieve high growth in near future. The government regulations allow the power generation companies to list their projects in the construction stage even before the projects have started to generate any revenues. The power generation companies can thus acquire the requisite equity capital at the capital intensive construction stage and in turn can make their business model more sustainable.

Equity investments are well suited for small and medium hydropower projects in Nepal over a medium to long time period of 5-10 years

For mid to small ticket private equity investors[7] in Nepal (domestic or foreign) small and medium hydropower projects come across as most attractive targets for investments over a medium to long time period of 5-10 years. The attractiveness of the enterprises that own/operate small or medium size hydropower projects over larger hydropower projects is driven by three factors a) comparatively lower total installed capital costs that makes it easier for the local banks to provide debt finance compared to the larger projects b) high private sector activity with proven records of successful projects and c) clear Purchase Power Agreement (PPA) guidelines for projects up to 25 MW (considered to be small and medium size projects).

Capital requirements in the small and medium size hydropower projects expected to be around US$1.5 billion over a period of next five years. Foreign investors could play a key role in meeting the capital requirements

Of the total 140 private players in power generation in Nepal, 131 are estimated to own /operate small and medium size projects[8]. These small and medium size hydropower projects are expected to have a capital requirement of around US$1.5 billion in the next 3-5 years[9]. Local banks and equity investors, who are the key source of capital providers at present, will alone not be sufficient to meet this capital requirement. The power generation companies would be thus increasingly looking to foreign investors for capital requirements. Hence opportunities exist for foreign investors (equity or debt) in meeting these capital requirements.

[6] NEA Annual report 2012-13, Intellecap Analysis 2014

[7] The typical investment size for an enterprise in the hydropower sector for first time investors in Nepal has been taken in the range of US$ 500,000 to US$ 2 million

[8] NEA Annual report 2012-13, Intellecap Analysis 2014

[9] Intellecap Analysis 2014

Valuation of Hydropower enterprises in Nepal is challenging due to limited historical financial data and lack of adequate industry benchmarks lack of data.

Valuation of the listed hydropower companies at Nepal Stock Exchange (NEPSE) based on the available financial data in the public domain corresponds to ROE% ranging from 5.8% to 19.1%, an EV/ EBITDA Multiple ranging from 15x to 45x and EV/Operating revenue ranging from 9x to 20x[10]. The EBITDA margins listed hydropower companies in India and ROE range is quite similar to the listed hydropower companies in Nepal. However the valuation multiples of the Nepalese companies have been found in a wide range given the high volatility and risks perceived in Nepalese capital markets. Given the limitations of less developed capital markets in Nepal, lack of adequate industry benchmarks and a small sample size of listed companies for estimation, the valuation multiples should not necessarily be seen as industry benchmark for valuation of other hydropower generation companies in Nepal.

Hurdle rate[11] can be estimated to a reasonable extent and utilised as an indicator of minimum expected returns. **Estimated hurdle rate for hydropower sector in Nepal ranges from 13% to 16% for small and medium size projects. Thus hydropower projects with internal rate of return (IRR) of 16% or more, are expected to create significant value for the investors**

Hurdle rate could be utilised to overcome the challenges of valuation multiple method and could be utilised for the valuation of hydropower enterprises. Hurdle rate can serve as a good indicator of minimum expected return from investments in the sector. The two benchmark rates considered for the hurdle rate analysis include (a) Cost of Equity and (b) Weighted Average Cost of Capital (WACC). Based on the data from the sector and comparable proxies, the Cost of Equity for investments is estimated in the range of 27% to 30% for enterprises with projects in development and construction stage and from 14% to 17% for enterprises with projects in operations stage. The Weighted Average Cost of Capital for enterprises with projects in development and construction stage is estimated to range from 13% to 16% and is an indicator of the hurdle rate.

The benchmark hurdle rate for the hydropower sector indicates that hydropower projects with IRR of 16% or more may create significant value for the investors, while projects with IRR of less than 13% may not create adequate financial value for the investors.

The Construction stage of a hydropower project is best suited as the entry point for PE/VC investment in the small and medium hydropower projects in Nepal.

The hydropower projects have high gestation period where the complete project cycle from development to operations stage can take more than 6 years to complete. The risk of time delays and cost overruns in a hydropower project typically reduces as the project transitions from development to construction to operations stage. The requirement of capital is the highest in the construction stage and most of the power generation companies in Nepal also prefer equity investment in the construction. Hence hydropower projects in construction stage are more attractive for investment and could be the investment entry points for VC/PE investors in Nepal in the hydropower sector.

IPO route is likely to be the most suitable method of exit in the hydropower sector. Other exit methods such as secondary sale could also be a possibility in future

IPO route seems to be the most likely mode of exit for PE/VC investors in Nepal for the Hydropower sector. Most of the enterprises in the hydropower sector covered in primary research preferred the IPO route as a method of exit for investors. Enabling government policies and regulations on IPO listing were seen as the key drivers for exiting through the IPO route. However factors such as lock-in

[10] Intellecap Analysis 2014

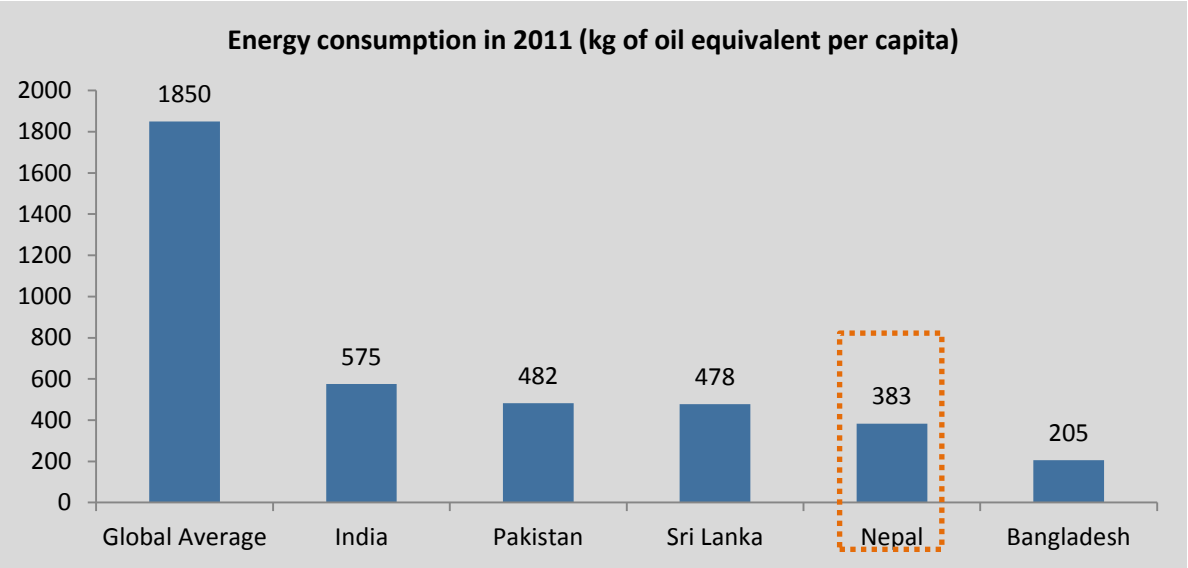
[11] The hurdle rate is the minimum acceptable return on an investment – i.e., the project appropriate discount rate

period requirement of three years, requirement of issuing shares at par and Reparation of capital could be key challenges for IPO exits.

2. Energy Sector in Nepal: Overview

Energy Consumption is one of the important indicators of socio-economic development of a nation and per capita energy consumption is often viewed as a key index of the economic development[12]. Rising use of energy is also tied to rising Human Development Index[13]. In the case of Nepal, energy consumption per capita is far less than the global average per capita energy usage and the second lowest in the SAARC region after Bangladesh. For example, in 2011 energy use per capita in Nepal was 383 kg of oil equivalent, much lower than the global average of 1850 kg, 575 kg in India and 478kg of oil equivalent in Sri Lanka[14]. A robust industrial growth at CAGR of nearly 5% and rising income levels (GNI per capita) at CAGR of 9.3 % for the last 4 years (2009 to 2013), indicates that there is a high potential of future demand of energy in Nepal as the country moves forward on the human development index[15].

Figure 1: Energy consumption in Nepal in 2011



Source: World Bank Development Indicators database (accessed in March 2014)

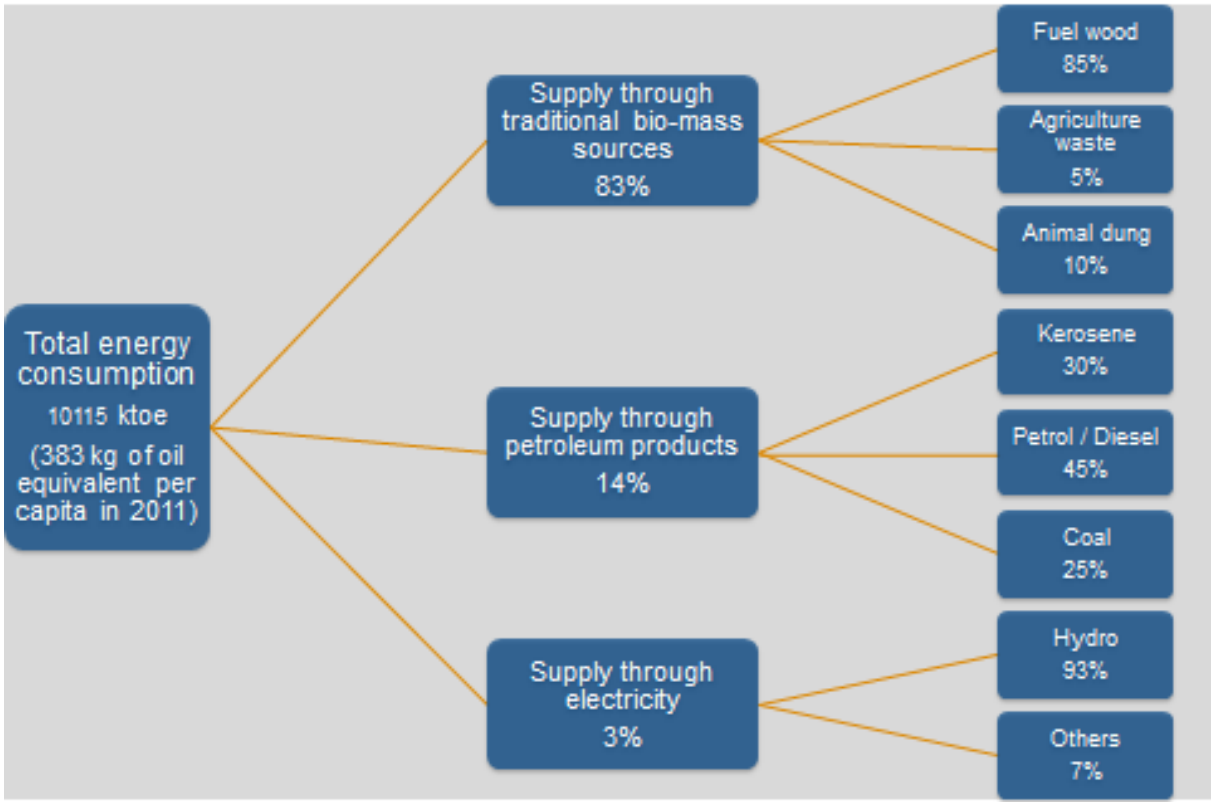
2.1 Energy sector: Demand and supply dynamics in Nepal

Over reliance on traditional sources of energy

The energy sector in Nepal is dominated by traditional energy sources such as fuel wood, agricultural waste and animal dung which are mainly used for domestic purpose covering over 83% of the total energy requirements. Petroleum products such as petrol, diesel, kerosene and coal cover around 14% of the energy demand and electricity fulfils just 3% of the energy needs of Nepal[16].

[12] Heller, T.C. and Victor, D.G., A political Economy of Electric Power Market Restructuring, 2004
[13] World Bank data series and UN HDI index
[14] World Bank Database: Energy use (kg of oil equivalent per capita), Accessed in March 2014
[15] Ministry of Finance Nepal: Economic Survey Report 2012-13
[16] 2011-12 estimates, Ministry of Finance Nepal: Economic Survey Report

Figure 2: Energy consumption and supply flow chart in Nepal (2010-11 estimates)



Source: Ministry of Finance Nepal, Economic Survey Report 2012-13

Nepal needs to move from traditional energy sources towards renewable sources

In Nepal, sources of biomass energy are available freely in nature. Fuel wood alone accounts for nearly 70% of total energy requirements in Nepal. However with growing population, growing energy demand and decreasing forest area, the availability of fuel wood for local energy demand fulfilment, is an area of concern. There is increased pressure on Nepal's forest to fulfil the fuel wood requirements[17]. A report by Centre for Rural Technology (CRT) Nepal estimates that about 44,000 hectares of forest area in Nepal is degraded and deforested annually, while only about 4,000 hectares are reforested thus making it difficult to collect fire wood[18].In addition, inefficient and incomplete combustion of fuel wood results in emission of greenhouse gases which cause breathing and health problems[19]. Around 35,000 ton of CO_2 was released in Nepal due to burning of fuel wood as per 2011 estimates[20]. Thus with the decline of fuel wood consumption, there will be considerable decrease in CO_2 emission and simultaneously a reduction in the pressure on forests to meet the local energy demands. The World Health Organisation (WHO) estimates that around 2.7% of Nepal's disease burden is attributable to the burning of solid fuel primarily in the form of fuel wood, which is resulting in over 7000 deaths per year[21]. Hence with the reduction in fuel wood usage the disease burden in Nepal will also be considerably reduced.

Petroleum products or fossil fuel is another key source of energy in Nepal as shown in Figure 2. Nepal has limited sources of fossil fuels or energy and nearly all fossil-derived fuels consumed in the country are imported in refined form. The constant increase in the price and increased consumption of

[17] Mathema et al, Can hydropower drive green economy for Nepal , 2013
[18] Centre for Rural Technology Nepal assessment, 2005
[19] Smith et al, Greenhouse gases from biomass and fossil fuel stoves in developing countries, 1993
[20] 1 kg of fuel wood or 0.39 kg of oil equivalent emits 1.83 kg CO_2 (Source: IPCC)
[21] WHO, Indoor air pollution: National burden of disease estimates 2007

petroleum imports is severely impacting the economy of the country[22]. For instance, the cost of petroleum fuel import was around 27% of Nepal's total merchandise exports in the year 2000/01 which increased to nearly 53% in the year 2010/11[23]. The total cost of importing petroleum products in Nepal in 2010-11 was about NPR 76 billion or around 6 % of Nepal's GDP.

Electricity as a source of energy in Nepal

Electricity as a source of energy would provide efficient, low cost and environmentally friendly energy supply in Nepal. Electricity is the also the highest quality energy source followed by natural gas, oil, coal, fuel wood and biomass[24]. However Nepal ranks at the lowest amongst the key SAARC countries in the Energy Development Index, developed by IEA, which tracks progress in a country's or region's transition to the usage of electricity.

Table 1: Energy Development Index (EDI) Value ranking of major SAARC countries in 2011

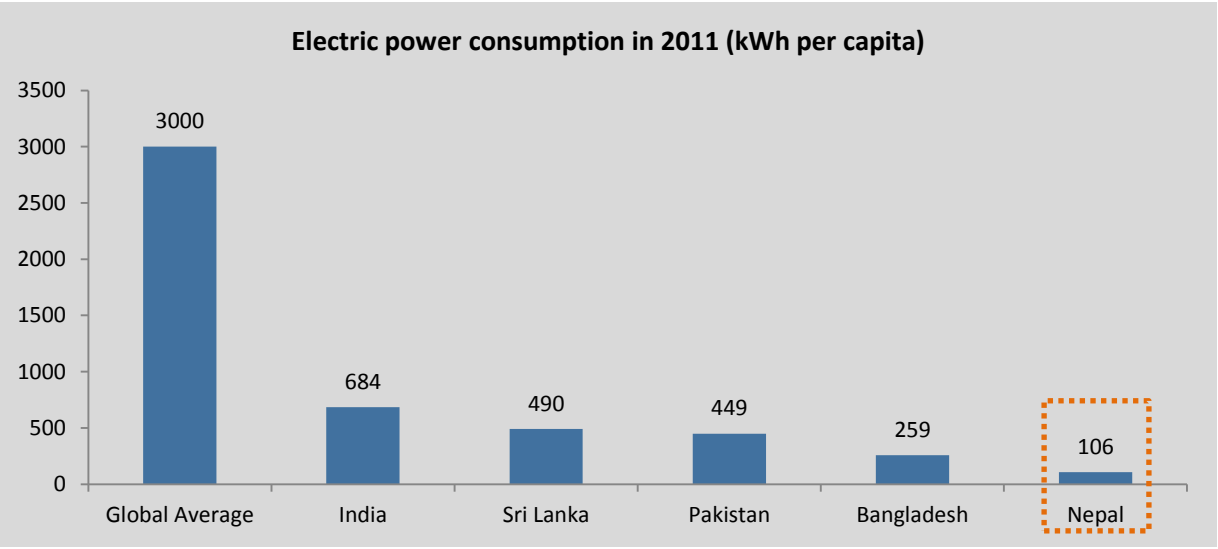
COUNTRY	EDI value	Commercial energy use per capita index	Electrification index	Electricity consumption index
India	0.294	0.139	0.72	0.098
Pakistan	0.270	0.102	0.58	0.164
Sri Lanka	0.258	0.085	0.74	0.112
Bangladesh	0.168	0.031	0.34	0.051
Nepal	0.102	0.006	0.37	0.023

Source: World Energy Outlook 2011, IEA database (accessed in March 2014)

It is estimated that only around 50% of Nepal's population has access to electricity (including on-grid and off-grid electricity) and this percentage reduces to around 20% in case of the rural areas. The population served by grid electricity is around 15% of the country's total population whereas the remaining 35% are served by off-grid electricity sources[25]. As a result of low electrification the electric power consumption in Nepal is the lowest in SAARC region at 106 kWh per capita compared to 684 kWh in India, 490 kWh in Sri Lanka and 259 kWh per capita in Bangladesh as per 2011 estimates[26]. With increase in government investment and focus on the transmission and distribution landscape, the population served by grid electricity is expected to increase substantially in future and would be one of the drivers for increased energy consumption in Nepal.

[22] Surendra K.C et al, Current status of renewable energy in Nepal, 2011
[23] Ministry of Finance Nepal, Economic Survey Report 2012-13
[24] IEA, IPCC : Energy quality
[25] REEEP policy Database, IPPAN estimates 2010-11
[26] World Bank Database, Electric power consumption (kWh per capita)

Figure 3: Electric power consumption in SAARC countries

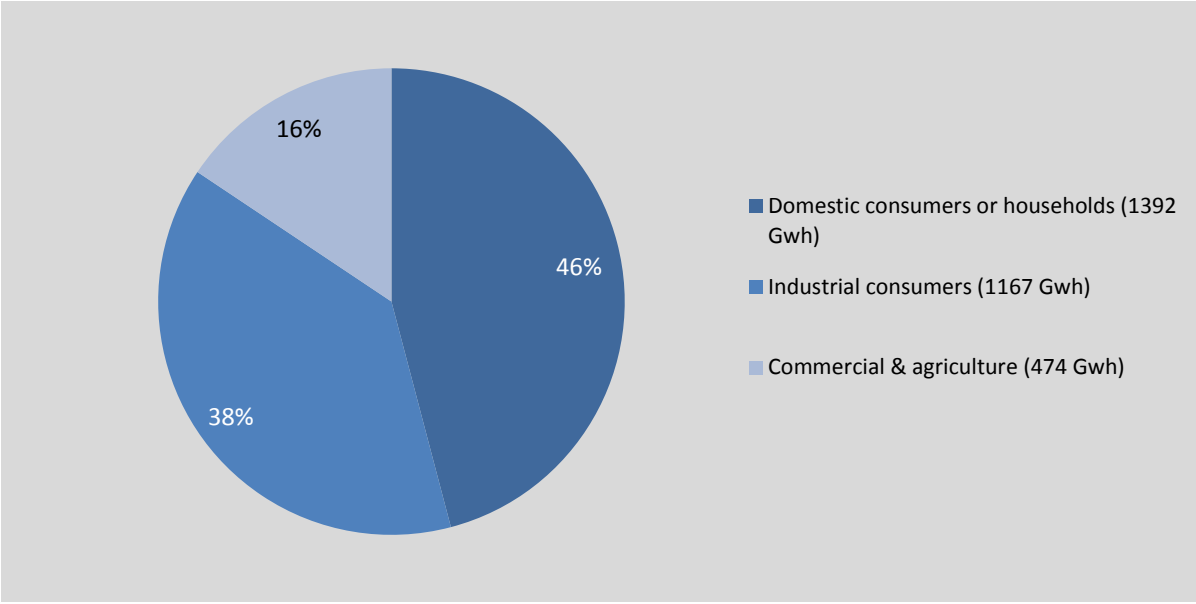


Source: World Bank Development Indicators database (accessed in March 2014)

Demand and supply of electrical power in Nepal[27]

From the demand side, the three key consumption categories in Nepal for electricity are domestic consumers or households, Industrial consumers and others including commercial & agriculture sector. The consumption of electricity in 2013 in these categories has been shown in Figure 4.

Figure 4: Key consumption categories in Nepal for grid power



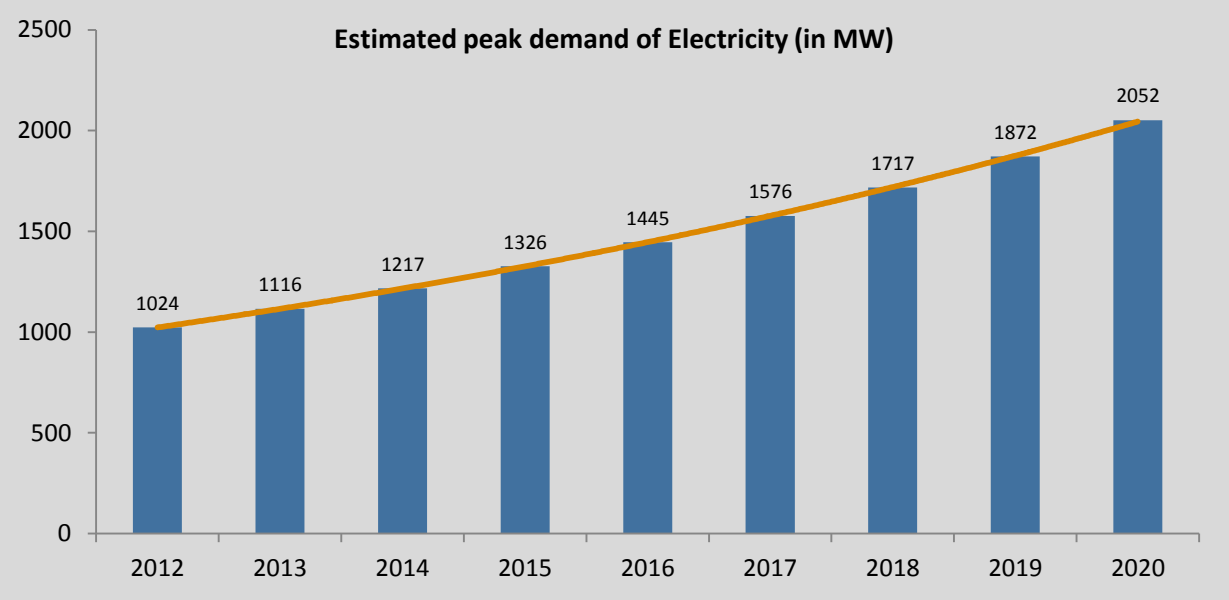
Source: NEA Annual Report 2012-13

The market size for the demand of electricity in Nepal can be estimated by considering the peak energy requirements of these three categories. Nepal Electricity Authority (NEA) estimates the peak demand from all these three categories at 1024 MW for the year 2011-12. The peak demand is expected to grow at CAGR of 9% and to be at 2052 MW in 2020 with annual requirement of electricity at 10,000 GWh[28]. The peak demand usually occurs in the winter months (or the 'dry' months) from

[27] Based on the information available from NEA
[28] Refer Annexure 10.2 for assessment methodology

November to February as consumption of electricity increases for heating purposes. In other months the peak demand normally does not fall below 90 % of the yearly peak demand[29].

Figure 5: Expected rise in peak demand of electricity in Nepal



Source: NEA Annual Report 2012-13

From the supply side, the installed capacity of electricity is highly inadequate to meet the present demand. The installed capacity of electrical power in Nepal was approximately 762 MW in 2012-13 much lower than the demand estimations of 1116 MW for the same period. The power deficit worsens in the 'dry' months when the supply of electricity is nearly halved and improves in the 'wet' months.

Nepal imported 173 MW of grid energy from India in 2012-13 to meet its energy demand[30]but still there was a significant gap between demand and supply of electricity. As a result there are frequent 'load shedding' hours in Nepal that could reach up-to 12 hours a day in the time of peak demand during the dry months.

12 hours of load shedding in Nepal

The extreme gap in demand and supply of electricity in Nepal leads to very long hours of load shedding in the country that could range from 6-12 hours per day. In Jan 2014, during the peak demand of electricity, NEA had to extend load-shedding hours from the earlier 9 hours a day to 12 hours a day. Leading news agency Xinhua reported "It is not an abnormal phenomenon for NEA to increase the hours of power cut following the onset of the dry season in Nepal, a country having one of the highest hydropower potential in the world that remains largely untapped."

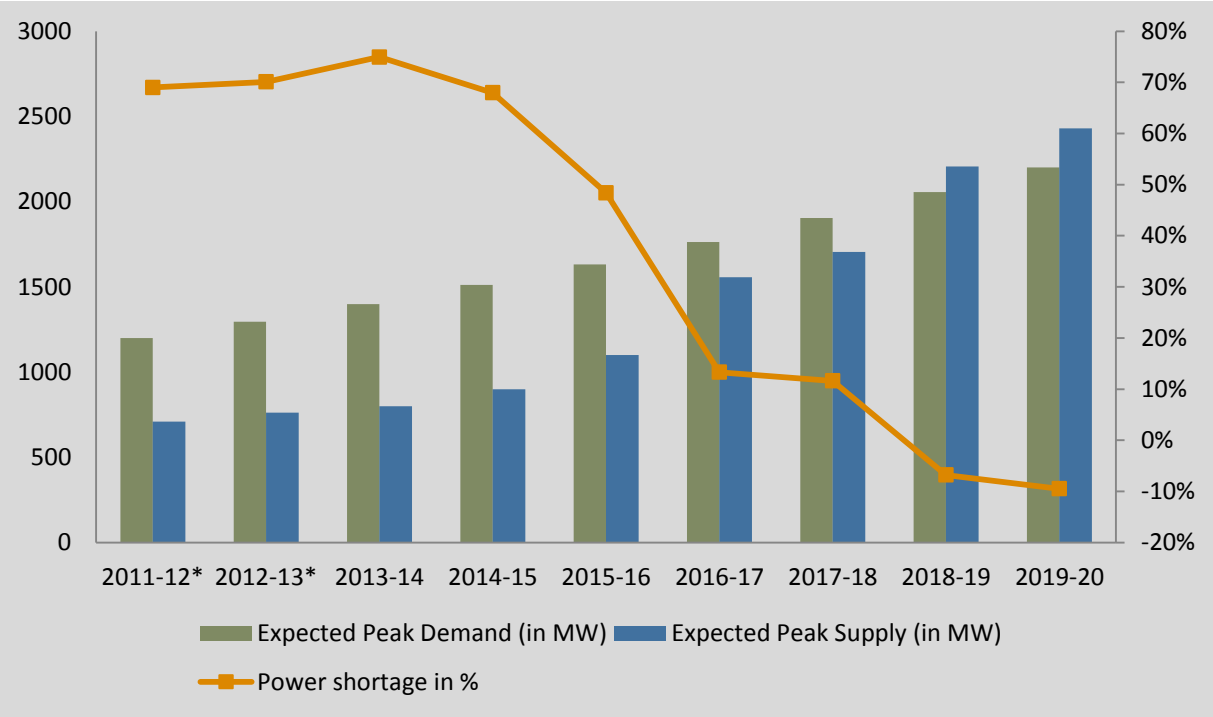
For the domestic consumers this means increased dependency on expensive imported inverters and mini solar panels for household purposes. For industrial and commercial consumers such as hotels, hospitals and academic centres, this means installing captive diesel power plants to meet the energy requirements. The cost of production or service goes up significantly, in some cases up to 40%, if these industrial and commercial centres are run with diesel plants.

The Ministry of Energy and the office of the Investment Board of Nepal have set very ambitious targets to reduce the power deficit in Nepal through active private sector participation in power generation. The private sector is expected to add around 820 MW to the existing supply by 2016-17 more than doubling the existing capacity. There is a further potential of the private sector to add more than 700 MW to the grid by 2020[31].

[29] 'Vidyut', NEA half yearly publication, 2013
[30] NEA Annual report 2012-13
[31] NEA annual report 2012-13

The demand and supply estimates of electrical power could be utilised to predict the timeline for zero power deficits in Nepal when the peak demand meets the expected peak supply. Taking into consideration the project time periods for development and construction of power projects, it is expected that Nepal should be able to meet its peak demand requirement with installed capacity of supply in 2018-19[32]. From 2019 onwards the peak supply is expected to be more than the local demand resulting in the possible export of the excess electricity to its neighbouring countries[33]. The same has been shown in Figure 6.

Figure 6: Peak electricity Demand versus Supply analysis in Nepal



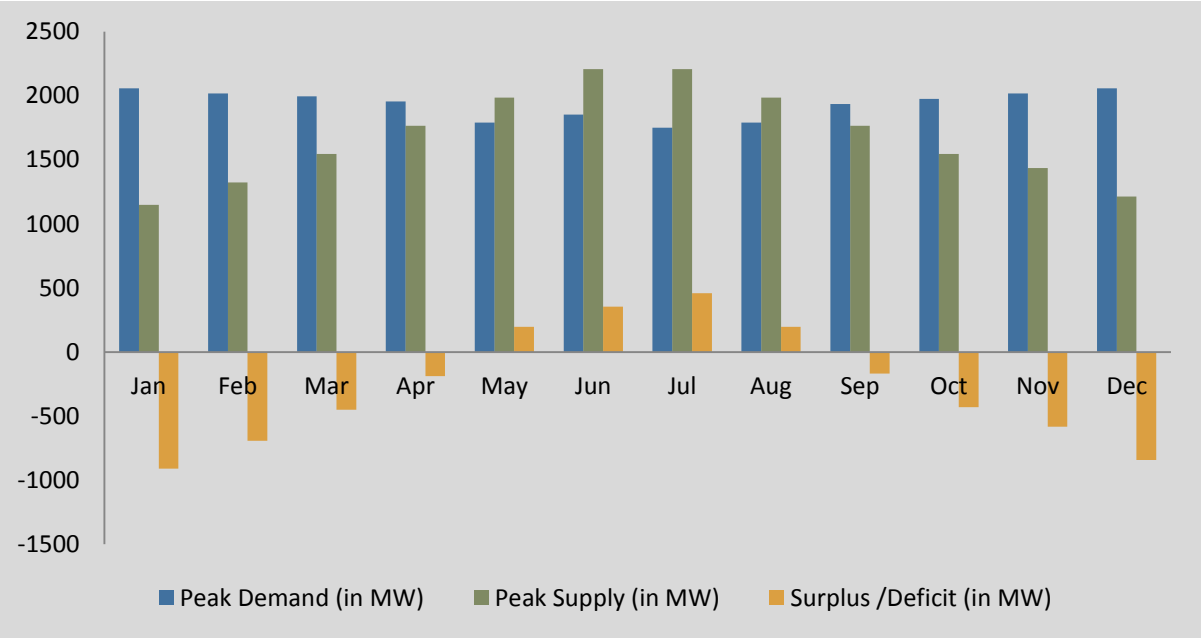
Source: NEA Annual report 2012-13, Intellecap Analysis, 2014
*Note: Figures for 2011-12 and 2012-13 is the actual peak demand and supply data from NEA

However power shortage will continue to be a problem in 'dry' months; excess surplus would be an issue in 'wet' months post 2018-19

Given all the hydropower projects developed by the private sector are ROR projects, there will be a significant power deficit in 'dry' months and excess power supply in 'wet' months even after 2018-19 when peak supply is expected to exceed peak demand. The expected peak demand and supply situation for 2018-19 has been shown in Figure 7. It is expected that peak deficits of as high as 900 MW may still be there in dry months whereas excess supply of as high as 450 MW will be available during wet months. It thus becomes imperative that Nepal should investigate the option of possible export of electricity during wet months to its neighbouring countries.

[32] NEA predicts that peak supply will exceed peak demand post 2018-19
[33] Refer Annexure 10.2 for assessment methodology

Figure 7: Expected peak demand and supply of electricity in Nepal in 2018-19



Source: NEA Annual report 2012-13, Intellecap Analysis 2014

Nepal has abundant renewable energy sources that can be utilised to meet energy needs and reduce the power deficit

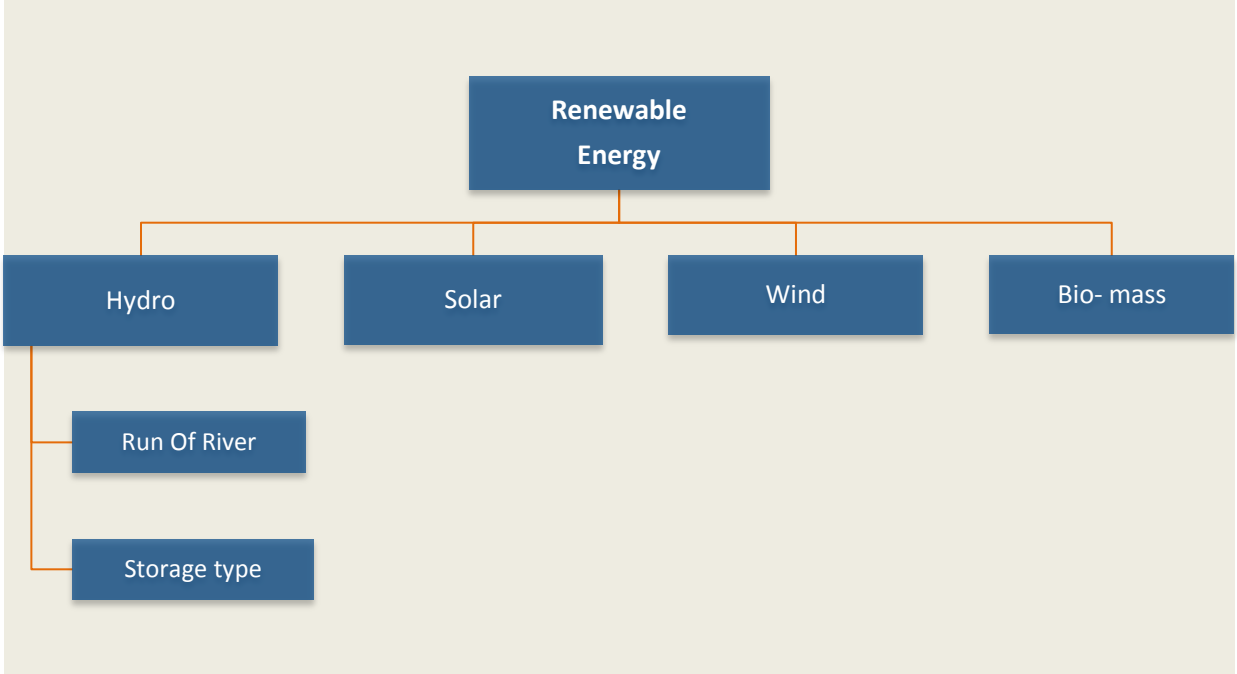
Nepal has huge potential to harness various renewable energy resources such as moving water from over 6000 rivers for Hydro Energy, long uninterrupted sunlight up to 300 days in certain regions for solar energy and abundant sources of bio-mass for bio energy production. Nepal has one of the highest economically exploitable Hydro Energy potential in the world that has not been captured adequately for generation of electricity. Similarly the potential of solar energy and bio mass energy are still largely untapped in the country for generation of electricity for commercial and household use. The environmental and public health hazards associated with the traditional bio-mass sources coupled with Nepal's increasing dependency on imported electricity sources call for an energy supply system based on renewable resources to meet the country's increasing need for energy. Adequate utilisation of the renewable energy sources has the potential to put Nepal on an accelerated growth path.

Nepal's renewable energy potential provides great opportunities to the private sector to invest the sector. The report will investigate the renewable energy sector in Nepal in the subsequent section.

2.2 Brief analysis of the renewable energy sector in Nepal

The renewable energy sector in Nepal can be broadly classified into four categories based on the source of energy utilised for generating power: Hydro, Solar, Wind and Bio-mass. Hydro can be further segmented into two parts: Run-Of-River projects and Storage type projects as show in Figure 8.

Figure 8: Sub-Sectors of Renewable Energy in Nepal



Source: Alternative Energy Promotion Centre Nepal, 2014

The renewable energy sources in Nepal are utilised for various purposes: Hydro, solar and wind are primarily used for generating electricity whereas Bio-mass is predominantly used for cooking and heating purpose. A brief snap shot of different renewable energy sources in Nepal will now presented starting with most important source: Hydro Energy.

2.2.1 Hydro Energy

Nepal has abundant renewable energy potential with Hydro Energy being the key source of renewable energy. Nepal's Hydro Energy potential is attributed to the flow and discharge of the 6000 rivers across four major river basins of length 45,000km and an annual discharge of 174 billion cubic meters[34]. Nepal's is highly dependent on Hydro Energy sources for electricity generation and hydropower is synonymous with electrical power in Nepal. The theoretical and commercial potentials of hydropower in Nepal have been estimated by different agencies and most of them seem to agree on the theoretical potential of 83-85,000MW and commercial potential of 40,000-43,000MW. The research calculations on Nepal's hydropower potential completed by the Moscow Power Institute in 1966 that is used a benchmark by different agencies has been shown in Table 2 below.

Table 2: Nepal's major rivers and their hydropower potential

S. No	River Basin	Potential in MW			
		Total theoretical potential	Technical potential	Economic potential	Utilised for electricity generation (as in 2013)

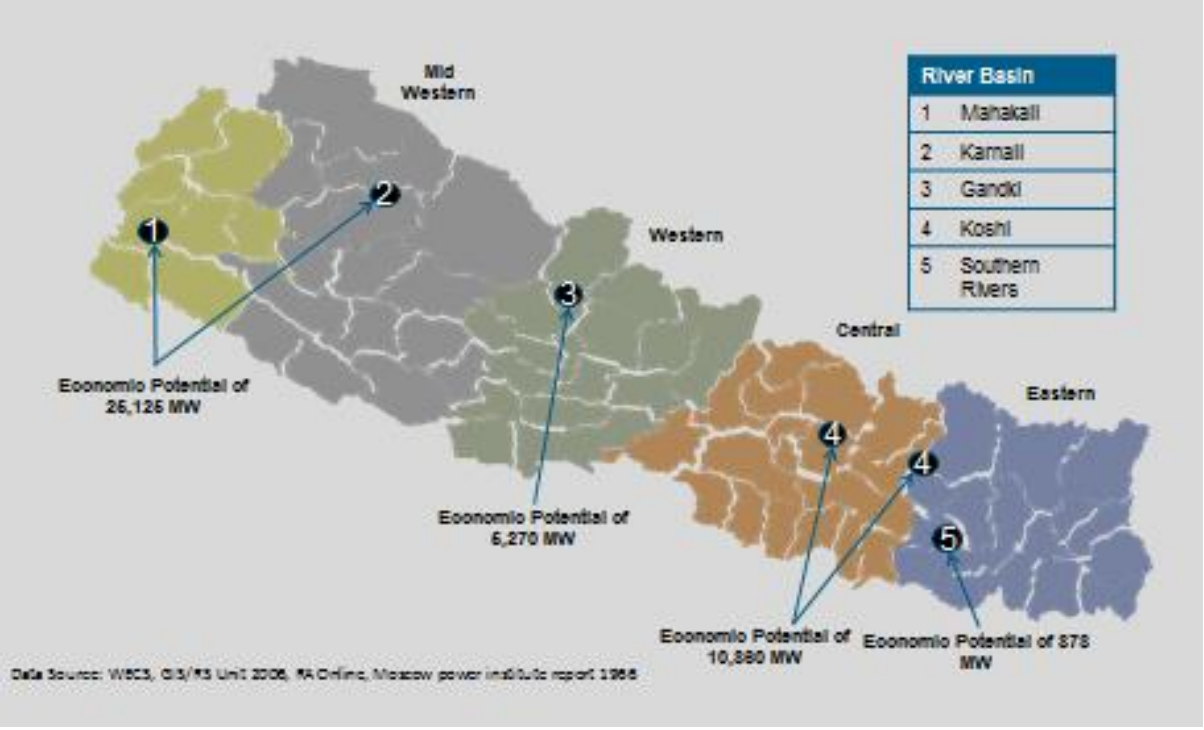
[34] WECS report on Energy Sector, 2006

1	Sapta Koshi	22,350	11,400	10,860	256
2	Sapta Gandaki	20,650	6660	5270	324
3	Karnali and Mahakali	36,180	26,570	25,125	44
4	Southern River	4110	980	878	84
	Total	83,290	45,610	42,133	708

Source: Shrestha HM, Cadastre of hydropower resources, Moscow Power Institute, Moscow, USSR; 1966

The geographic location of the river basins Koshi, Gandki, Karnali and Mahakali and Southern Rivers with estimated Hydro Energy potential has been shown in the map below[35]. In terms of the five development regions in Nepal, the maximum hydro power commercial potential seems to be in the Far-Western and Mid-Western region followed by the Central, Western and Eastern region.

Figure 9: River Basins in Nepal and Economic potential for Hydro Energy development



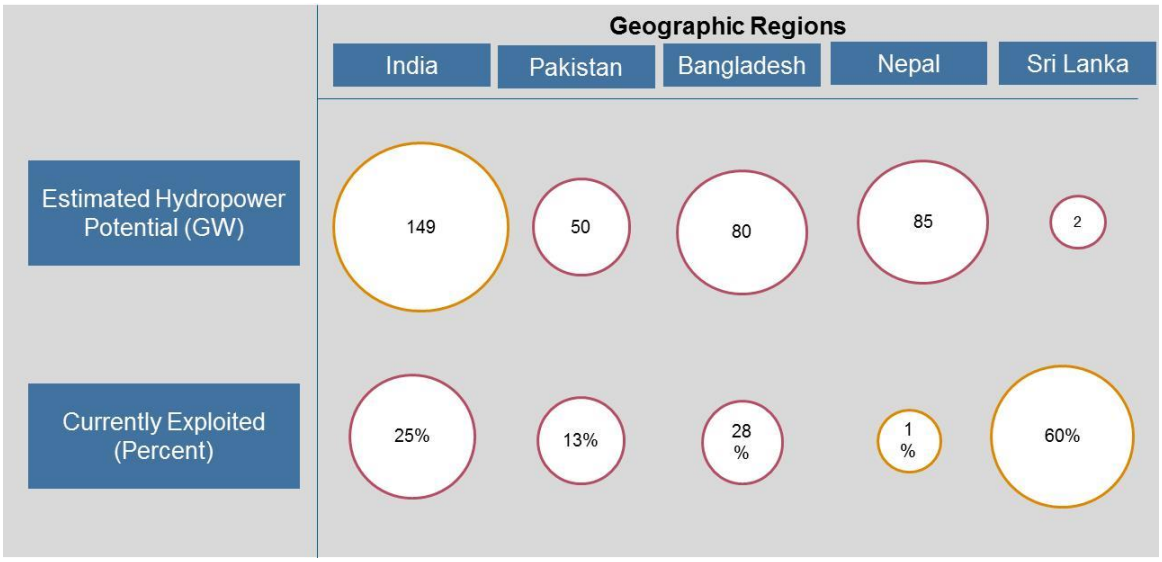
Source: WECS, GIS/RS Unit Report 2006, Shrestha HM Cadastre of hydropower resources, 1966

Hydropower generation has great generation potential in Nepal

Despite a huge potential for hydropower, Nepal has not been able to fully utilise its water resources for electrical power generation. As of 2012-13, the total installed grid and off-grid capacity of hydro power in Nepal is at 708 MW which contributes to only around 2% of the commercially feasible potential of 42,000 MW. A quick comparison of the Hydro Energy potential and exploited capacity with other SAARC nations shows that Nepal ranks the lowest in terms of present exploited capacity.

[35] Moscow power institute report 1966

Figure 10: Comparison of Hydro Energy potential in SAARC countries



Source: Intellecap Analysis, 2014

However in the past 3-4 years, there has been an increased participation of the private sector in the Hydro Energy generation space. A combination of factors such as a) government's increased focus and spending on the sector b) liberal policies to award purchase power agreements (PPAs) to private players c) availability of capital through priority sector lending and 100% FDI in the sector have given the growth impetus to the private sector in the Hydro Energy space.

Given the potential of Hydro Energy in Nepal is yet to exploited to a greater extent, the opportunity to develop the sector in Nepal is extremely high.

2.2.2 Solar Energy

Solar energy is another potential source of Renewable Energy, as Nepal receives ample solar radiation throughout the year. Various estimates by leading Renewable Energy industry bodies such as REEEP, AEPC and SWERA indicate that many parts of Nepal receive an average 3.6–6.2 kWh/m2/day of solar radiation up to approximately 300 days of sun a year equivalent to commercial potential of solar power for grid power at 2100 MW[36].

Solar energy could be a solution in Off-grid power supply systems in Nepal

The major potential of solar energy in Nepal is in the off-grid power supply system. In Nepal, the mountainous and harsh terrain makes it very difficult to construct the requisite electric grid infrastructure especially in the remote locations as it becomes too expensive for construction. The off grid solutions however can thrive under these circumstances. As mentioned earlier around 35% of Nepalese population is served by off-grid energy sources mainly through small hydro and solar plants. Solar energy could play an important role in improving access of electricity to remote rural areas in Nepal that may be difficult to connect to grid power given the diverse and difficult topography for grid connection. Solar energy could also play a key role in captive power generation for commercial use given the limited supply of grid power and the high operating costs for a diesel generator

Generating grid power through solar energy is still untested in Nepal.

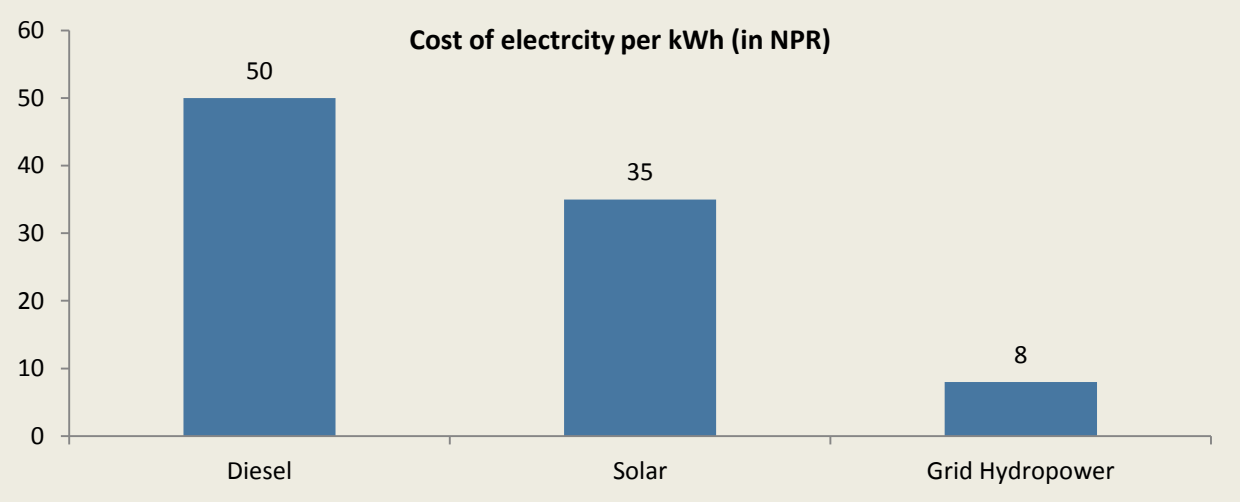
Uncertain weather in some parts of the year wherein a few months (November to February) are completely unsuitable for solar energy generation due to its mountainous terrain leading to low luminosity in Nepal make uninterrupted grid power generation through solar energy a difficult case. Moreover, grid connected solar systems typically require a back-up power source (usually gas or coal

[36] AEPC estimations 2012

based power systems) to counter the unpredictability of solar energy. Since Nepal does not have any major reserves of coal or petroleum products creating a backup power source is difficult. Due to above mentioned reasons the scope of solar energy for grid power is very limited in Nepal at present.

High production costs and over dependency on subsidy stymies scalability of solar energy

Figure 11: Average unit cost per kWh of electricity to consumers in different segments in Nepal



Source: Intellecap Analysis 2014
Note: Data on the average cost of generation from diesel plant is assumed at 2 hrs of electricity production in 1 liter of diesel at NPR 100 per liter including capital costs
Data for per unit cost of electricity through solar power including capital costs was obtained from primary research. Data for the grid hydropower has been estimated at the average rates that consumers pay for grid electricity in Nepal

While technology cost for solar energy has been declining world-wide, higher import costs of solar PV panels and associated storage systems , transportation costs, storage costs and installation costs makes access to solar technology in Nepal expensive. Therefore, the average cost of production of solar energy is very high in Nepal when compared to the other sources of energy production. For instance cost of solar electricity is around NPR 30 to NPR 35 per unit (kWh) of electricity (including installation costs) compared to NPR 7 to NPR 8 per unit in case of grid power. Solar power however is cheaper than power through diesel generators which cost around NPR 50 per unit. In addition the solar energy industry presently is dependent on the government subsidy for covering the higher initial investment required to set-up the solar energy system. Hence the solar energy segment in Nepal still has a long way to go in terms of achieving commercial scalability and competitiveness vis a vis other forms of energy. However, reducing generation costs by addressing challenges mentioned earlier can pave way for realising solar energy's potential in Nepal.

2.2.3 Bio-Mass Energy

The Bio-Mass energy segment in Nepal can be broadly divided into three categories depending on the usage of energy technologies: biogas technology, biomass technology and biofuel technology.

Biogas technology

Biogas technology (commonly known as *gobar* gas as it utilises human and animal waste) has been in Nepal for over two decades. Biogas is predominantly used for cooking as well for providing heating in Nepalese households. The total number of Biogas Plant installed in Nepal till 2012-13 was estimated at 280,000 units covering over 3000 village development committees (VDCs)[37]. Though biogas meets the needs of households, it however cannot provide the complete energy solution to

[37] AEPC, Bio gas Technology, 2012-13

Nepal because of unfavourable operating conditions which include (a) inconsistent topography (b) seasonality and predominantly cold weather High temperature of around 35–37 ◦C required for efficient operation of a biogas plant, is available only in a small geographic area in Nepal. Chilly winter temperatures throughout the country make it unfavourable for biogas production year round.

Biomass technology

Biomass technology utilises solid biomass fuel such as fuel wood, dung and agricultural residues to generate energy by efficiently burning the fuel. Improved cook stoves (ICS) is one of the most simple and cost-effective technologies that has been implemented in rural homes in Nepal[38]. Other emerging biomass energy technologies include briquettes, gasifiers, co-generation and liquid bio fuels. However ICS and biomass technology in general are not very popular in Nepal because of (a) limited usage and (b) specific fuel requirements.

Most of the ICS models do not simultaneously provide cooking and space heating, which is especially important in the higher hills and mountainous regions in Nepal. Also, ICS designed for a specific fuel such as fuel wood cannot handle other sources such as agricultural biomass which makes it relatively less popular sources of energy as against other sources.

Biofuel technology

Biofuel technology is another variety of Biomass energy which is relatively new in Nepal, announced recently in the fiscal year of 2008/09 that focuses particularly on Jatropha curcas L. as a biofuel feedstock for biodiesel production[39]. The technology is still in a nascent stage in Nepal and a detailed economic and technical feasibility study is required to identify the true potential of the bio fuels in meeting energy requirements of Nepal.

All these three sources of Biomass energy are much smaller in scale (when compared to hydro and solar), are dependent on government subsidy and grants for production, predominantly cater to the rural market and have negligible organised private sector activity. Thus the Bio-Mass energy segment will not be explored further for investment opportunities in this report.

2.2.4 Wind Energy

Wind energy is an emerging source of renewable energy in Nepal as the country's hilly terrain is suitable for uninterrupted wind supply required to generate energy. The first attempt at identifying the wind potential in Nepal was done by SWERA and AEPC in 2003. The preliminary reports have shown a very good prospect of wind energy development in Nepal with prediction of about 3,000 MW of wind power generation. However in terms of installed capacity, only two projects of 5kW and 2kW were recently implemented. Thus the activity in this segment is still in its infancy stage and there is negligible private participation in the sector at present. The Wind energy sector therefore will not be explored further in this report.

2.3 Value chain analysis

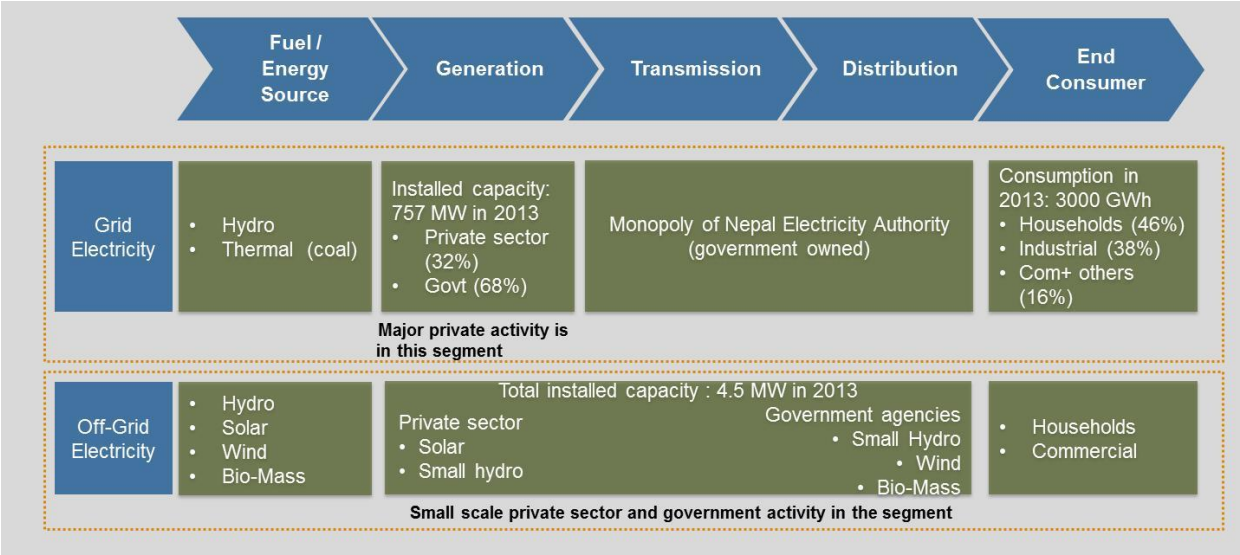
Having discussed the key sources of renewable energy in Nepal, this section would discuss and analyse the value chain in Nepal focusing on electrical power as a source of energy. The purpose of the value chain analyses is to provide an understanding of the market drivers, key actors and their transactional and collaborative relationships, other supporting actors and the enabling environment.

The energy value chain in Nepal for both grid and off grid electrical power has been shown in figure 12.

[38] AEPC, Bio mass Technology, 2012-13

[39] AEPC, Bio fuel Technology, 2012-13

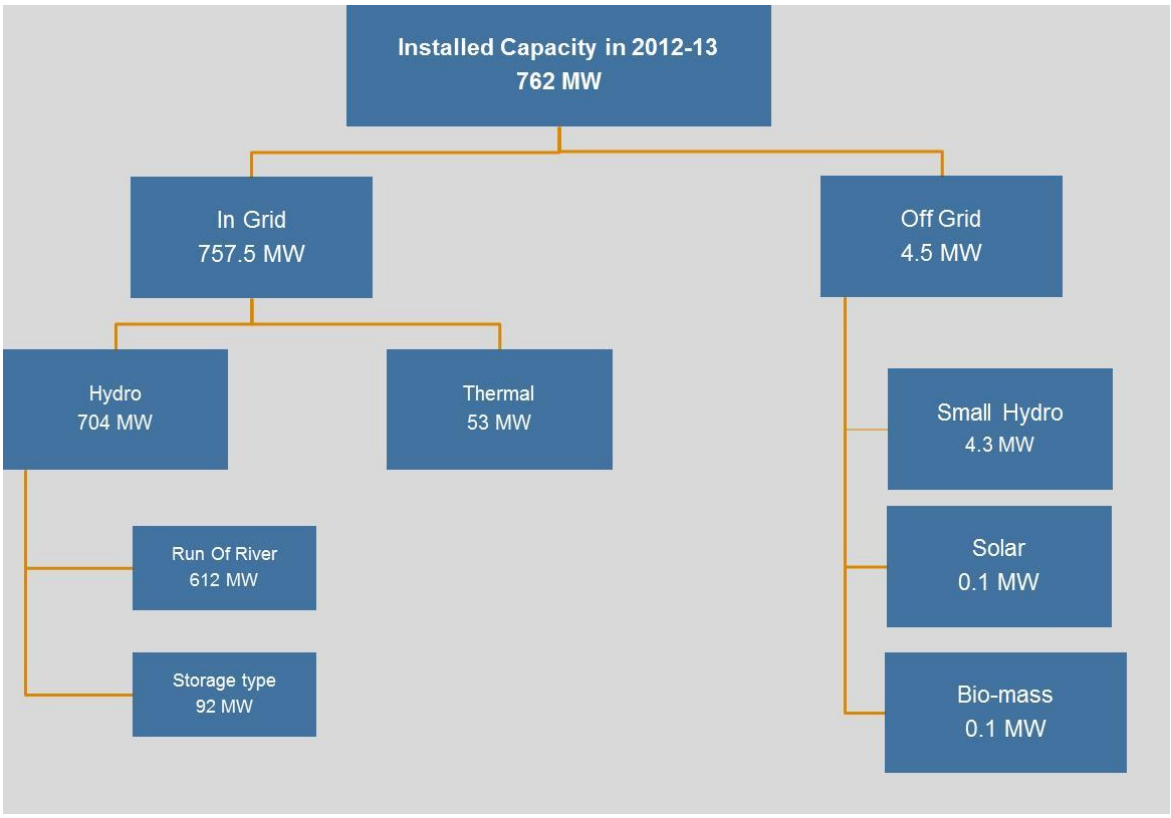
Figure 12: Energy value chain in Nepal for grid and off-grid power



Source: Intellecap Analysis, 2014

Of the total installed capacity of 762 MW for electricity generation in 2012-13 only 4.5 MW is installed in the off-grid segment and the remaining is grid power. Small scale Hydro, Solar and Bio-mass projects are the key contributor to the Off-grid power whereas Hydro and Thermal are the major contributors to grid power as shown in Figure 13.

Figure 13: Break-up of Nepal's installed electricity capacity



Source: NEA Annual Report 2012-13

Grid Power

Hydro and thermal are the key fuel sources of grid power in Nepal. The thermal power stations are government owned and there is no private sector activity. The hydropower generation landscape consists of private players or the IPPs (Independent power producers) and government owned

hydropower plants. The current installed capacity of hydropower stands at 704 MW out of which NEA contributes to 474 MW and rest 230 MW is accounted for by the private sector.[40]
The transmission and distribution sector is controlled by NEA that has monopoly in transmission and distribution landscape in Nepal.

Off-Grid Power
Small scale hydro plants, solar energy plants, wind energy mills and bio-gas plants are the key sources for off-grid power generation in Nepal. The generation, transmission and distribution systems for an off-grid system are usually combined and there are a few private companies as well as government agencies who are involved in this stage in Nepal.

Majority of the private sector activity therefore is in the grid hydropower generation space in Nepal.

2.4 Investment attractiveness of the hydropower sector in Nepal

The investment attractiveness of the hydropower sector in Nepal is driven by three key factors:

1) Majority of the private sector activity is concentrated in the grid hydropower generation
The present state of the energy sector in Nepal both for grid and off grid power can be analysed by comparing each against the value chain to see where significant private sector activity is seen. Most of the private sector activity in Nepal has been in the generation of grid electricity through the Hydro Energy sources. In case of off-grid however, solar energy segment has seen some activity but it still is in very nascent stages and not at commercially exploitable level to attract attention of private sector players' at large scale[41].The presence of organised private players in the grid hydropower generation makes for private investors

2) Private sector installed capacity is expected to increase to eight folds by 2018-19: The grid hydropower sector is an attractive sector for the equity investors given the high growth rate of the private sector activity and market potential. Driven by the high hydropower potential that is largely untapped, rising domestic demand fuelled by rising income levels and industrial growth and government focus and institutional support, the private hydropower generation space is expected to grow eight folds at 1750MW installed capacity in 2018-19 compared to 230 MW installed capacity in 2012-13[42]. This high growth of the private sector in the hydropower generation space makes the sector attractive for investors.

3) Cash flows are predictable and profitability margins are high compared to other sources of renewable energy in Nepal: The power deficit situation in Nepal is expected to continue till 2018-19 and most of the demand is likely to be met by grid electricity. Given assured demand of grid electricity till 2019, the steady stream of cash flow can be predicted for the private sector players in grid power generation in Nepal. In addition the operating margins (EBITDA margins) for existing listed hydropower companies in Nepal are in the average range of 50% to 90%. This resonates well with the 60% to 80% EBITDA margins in India for the listed hydropower enterprises. The EBITDA margins for hydropower companies are much higher when compared to companies utilising other renewable source of energy such as Solar and Wind. For instance the EBITDA margins for solar companies in Nepal were typically found in the range of 20%-30% and in India from 15-30%[43]. The high profitability margins of the hydropower sector compared to other renewable energy sources makes it more attractive for investors.

Active private sector participation, high growth potential and profitability margins in the hydropower generation landscape make it an attractive sector for equity investors in the renewable energy space in Nepal.

[40] A detail analysis of the hydropower generation landscape will be covered in section 3
[41] Refer section 2.2 for details
[42] Refer section 2.1 for details
[43] Intellecap primary research 2014

3. Hydropower sector in Nepal

The hydropower sector in Nepal consists of over 140 private enterprises (referred to as IPPs or Independent Power Producers) in the generation space[44] which is one of the highest in all SAARC countries. These private enterprises or IPPs are project based enterprises and own /operate 147 approved hydropower generation projects. Six enterprises own/operate two or more projects and the remaining 134 own/operate one project. Hence the investment for majority of the enterprises in the hydropower generation space could be viewed as project investment. NEA is sole buyer of all the grid power in Nepal and is the single player in the transmission and distribution space. All the IPPs in Nepal qualified above have the requisite purchase power agreement (PPA) in place with NEA.

All of the hydropower projects developed by IPPs in Nepal are run-of-river (ROR) type projects as the geographic topography of the country is most suitable for the natural flow and elevation drop of rivers for electricity generation. However ROR projects are entirely dependent on the river flow for generation of electricity and their output reduces by over 50% in the 'dry' months when flow of the river is inadequate for power generation.

3.1 Categorical breakdown of projects: small, medium and large

Hydropower projects in Nepal can be broadly divided into three categories in terms of installed capacity as small, medium and large projects.

- Small hydro projects: installed capacity from 100 kW to10 MW feeding into the grid
- Medium projects: installed capacity from 10MW to 50 MW feeding into the grid
- Large projects: installed capacity of over 50 MW feeding into the grid

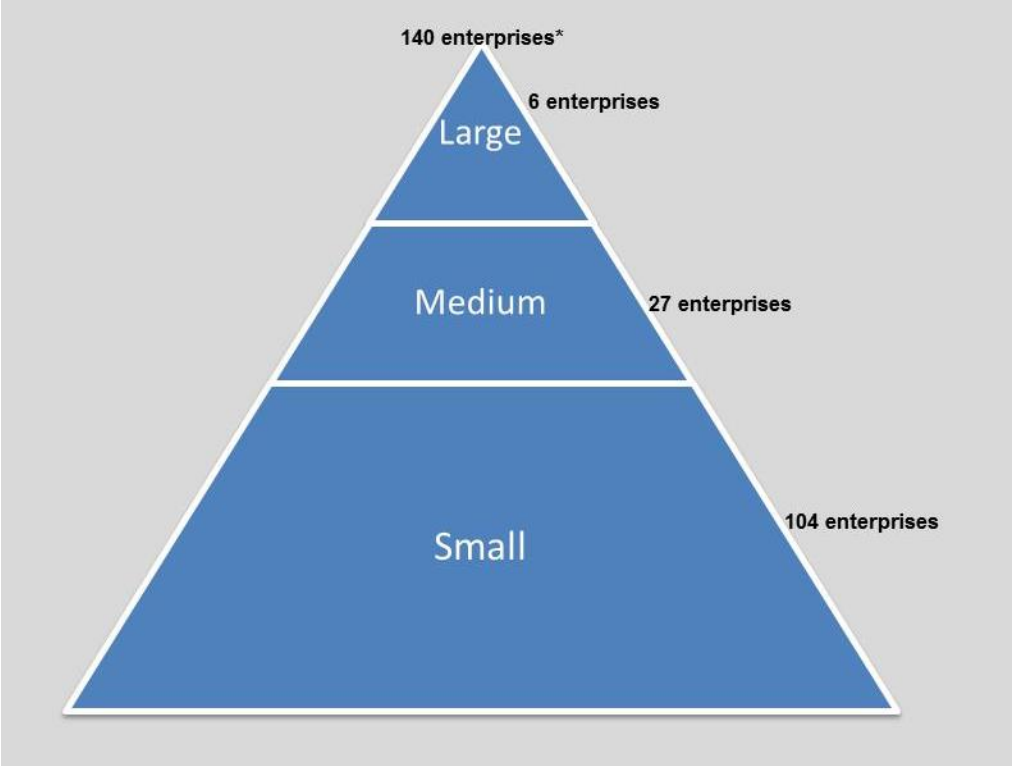
Enterprises that own/operate micro hydro projects of installed capacity less than 100kW have not been included in the above list as their power production is too less for supplying to the grid power.

The present enterprise activity in the hydropower segment in Nepal is dominated by IPPs operating small and medium size power generation projects

In terms of the break-down of the sector based on the size of the hydropower projects, 6 of the 140 enterprises fall under IPPs managing large projects, 27 of the enterprises would fall under IPPs managing medium projects and 104 of the enterprises would fall under IPPs managing small projects as shown in figure 14.

[44] These enterprises (IPPs) have PPA in place with NEA. IPPs without PPAs with NEA have been excluded

Figure 14: Enterprises managing large, medium and small projects in the hydropower segment



Source: NEA Annual report 2012-13, Department of Industry Nepal, Intellecap primary research, 2014
*Note: Enterprises with PPA in place with NEA have only been considered. 3 enterprises manage both small and medium projects

In terms of installed capacity the private sector is expected to contribute 1750 MW to the grid by 2020. The large projects are expected to contribute around 805 MW to the installed capacity, medium projects 580 MW and small projects 365 MW by 2020.

Though the maximum contribution to the installed capacity in grid power is through the large projects, the private sector activity is highest and more diversified in the small and medium projects in Nepal. This in turn means more options for investors and better chances of risk diversification.

3.2 Installed capital cost for different type of hydropower projects

Hydropower projects are capital-intensive with long lead times for development and construction compared to other sources of renewable energy[45]. There are three major cost components for hydropower projects[46]:

- Civil Works: Costs for the hydropower plant construction such as Tunnelling, Powerhouse construction including any infrastructure development required to access the site and the project development costs. This cost is typically 60-70% of the total installed capital cost
- Hydro Mechanical equipment cost: costs related to hydro mechanical equipment for the project such as turbines and valves. This cost is usually 15-20% of the total installed capital costs
- Hydro Electrical equipment cost: costs related to hydro electrical equipment for the project such as generators, cabling and control systems. This cost is usually 10-15% of the total installed capital costs

[45] Irena- Renewable Energy Technologies: Cost Analysis Series, 2012-13
[46] All the cost break-up data was obtained through primary research

In addition there are other costs such as labour costs, management costs etc. This cost is usually 5-7% of the total installed capital costs in Nepal.

Operations and maintenance costs are very low when compared to other sources of grid power

The operations and maintenance (O&M) costs are found to be very low in case of hydropower projects across a full project lifetime. Operation and maintenance costs of hydropower plants in Nepal were seen between 1.5% to 4% of the installed capital cost per year depending on the size, location and technology of the plant [47].

Based on the primary data from the companies met several hydropower projects were studied and analysed to collect data on the trends of installed capital costs for hydropower in Nepal. The total installed capital cost per MW of power generated in Nepal is dependent on the size, location, design technology and the cost of local labour and materials[48].

The capital cost per MW of power generation is a key factor that would affect the profitability and financial returns of the enterprises in the sector and economies of scale are required to lower the capital costs. Thus small power projects were found to have higher installed capital costs per MW ranging from US$ 1.5 million (NPR1.5 billion) to US$2.0 million (NPR 2 billion) whereas the large power projects had lowest installed capital costs at per MW ranging from US$ 1.0 million (NPR1 billion) to US$ 1.5 million (NPR1.5 billion) per MW in Nepal.

A brief analysis of the capital costs, O&M costs and capacity factors of different projects (small, medium and large) has been shown in Table 3.

Table 3: Cost break-up for hydropower projects in Nepal

S. No	Size of hydropower plant (MW)	Total installed Capital cost range (in US $)	Installed capital cost per unit range (in US$ / MW)	O&M costs (%/year of total installed cost)
1	Large (>50 MW)	>75 million	1 million – 1.5 million	2 - 2.5%
2	Medium (10-50 MW)	20 million- 75 million	1.2 million – 1.8 million	2 - 3%
3	Small (<10 MW)	<20 million	1.5 million – 2 million	2 - 4%

Source: Irena- Renewable Energy Technologies: Cost Analysis Series; NEA Annual report 2012-13 Intellecap Analysis, 2014

*Note: The cost estimates are valid only ROR projects. All the private sector hydropower projects in Nepal are ROR projects

The capital cost per MW for hydropower projects in India were found ranging from US$ 0.9 million to US$3.0 million depending on the size, location and type of the project (ROR, storage)[49]. However a granular detail of the breakup of the project size with respect to cost was not available.

Small and Medium size projects are in a better position for raising capital

The capital cost requirement of the large hydropower projects is very high and ranges from US $75 million to US$ 500 million in Nepal. In comparison, the capital costs in the medium and small projects

[47] Intellecap primary research 2014

[48] IPPAN report, IRENA report, Intellecap Analysis

[49] Irena- Renewable Energy Technologies: Cost Analysis Series, 2012-13

are much lower ranging from US$ 1 million to US$ 75 million. The local banks and financial institutions in Nepal are in a much better position to fund the debt portion for these small and medium size projects. For larger projects however, where the capital requirement is high, the local banks and financial institutions have their limitations on funding and large international financial institutions support may be required. The small and medium projects therefore provide first time investors in the sector a better opportunity to enter the hydropower investment market in Nepal with conscious pricing investment strategy.

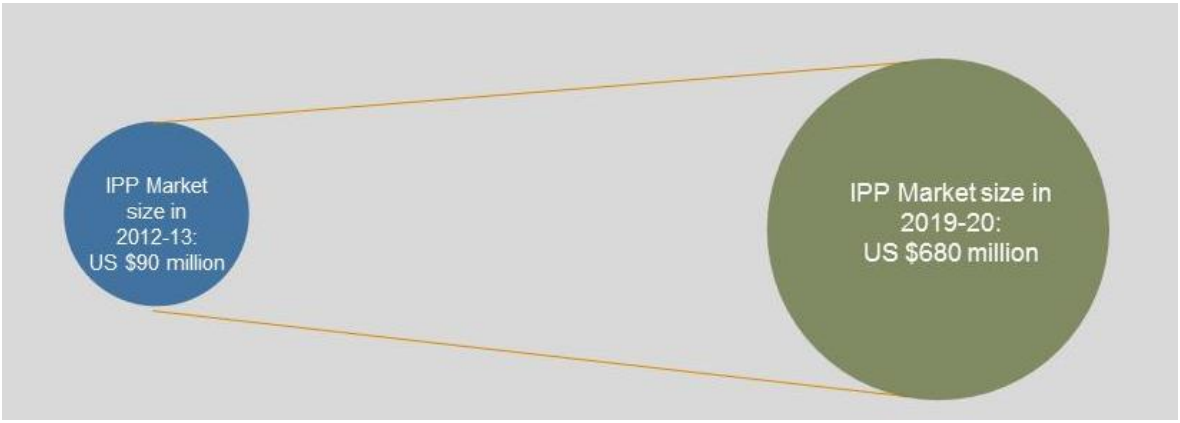
3.3 Market sizing of private enterprises in the hydropower sector in Nepal

The market size of the hydropower sector in Nepal can be estimated based on the expected revenues of all the private sector enterprises operating various hydropower projects and by considering the following factors:

- Capacity Factor of the plant: This is the ratio of actual power produced in the plant to its theoretical power in a year. Given all the hydropower projects developed by IPPs in Nepal are 'ROR' type; their capacity factor will fluctuate from the dry months to the wet months depending on the flow rate of river. In Nepal the capacity factors for hydro projects range from 0.15 to 0.3 in dry months to 0.7 to 0.85 in the wet months[50]. For the ease of calculations, the average capacity factor has been taken at 0.75 in wet months and 0.2 in dry months for ROR projects. For storage projects, the capacity factor has been taken at 0.35
- Tariffs & purchase agreement: This would again directly affect the revenues of a power plant. In Nepal the NEA has different tariffs for different capacity of Hydro plants. For plants up-to 25 MW, NEA has tariff rate of NPR 4.80 per KWh in wet months (typically from Apr to Sep) and NPR 8.40 per KWh in dry months for ROR type hydro energy projects. The PPA rate for storage projects is NPR 7 per KWh for all the months[51].

The market size in 2012-13 (in terms of revenues of the IPPs) for hydropower sector in Nepal is estimated to be at US$90 Million or NPR 9000 Million (Assuming 1 US$= 100 NPR). This market size is expected to grow to US$680 Million dollars or NPR 68,000 Million in 2019-20 at an impressive CAGR of 33%[52]. The installed capacity for the IPPs is expected to become eight folds at 1750MW in 2019-20 compared to 230 MW in 2012-13.

Figure 15: Market size and growth potential for hydropower sector in Nepal



Source: Intellecap Analysis, 2014 (figure not to scale)

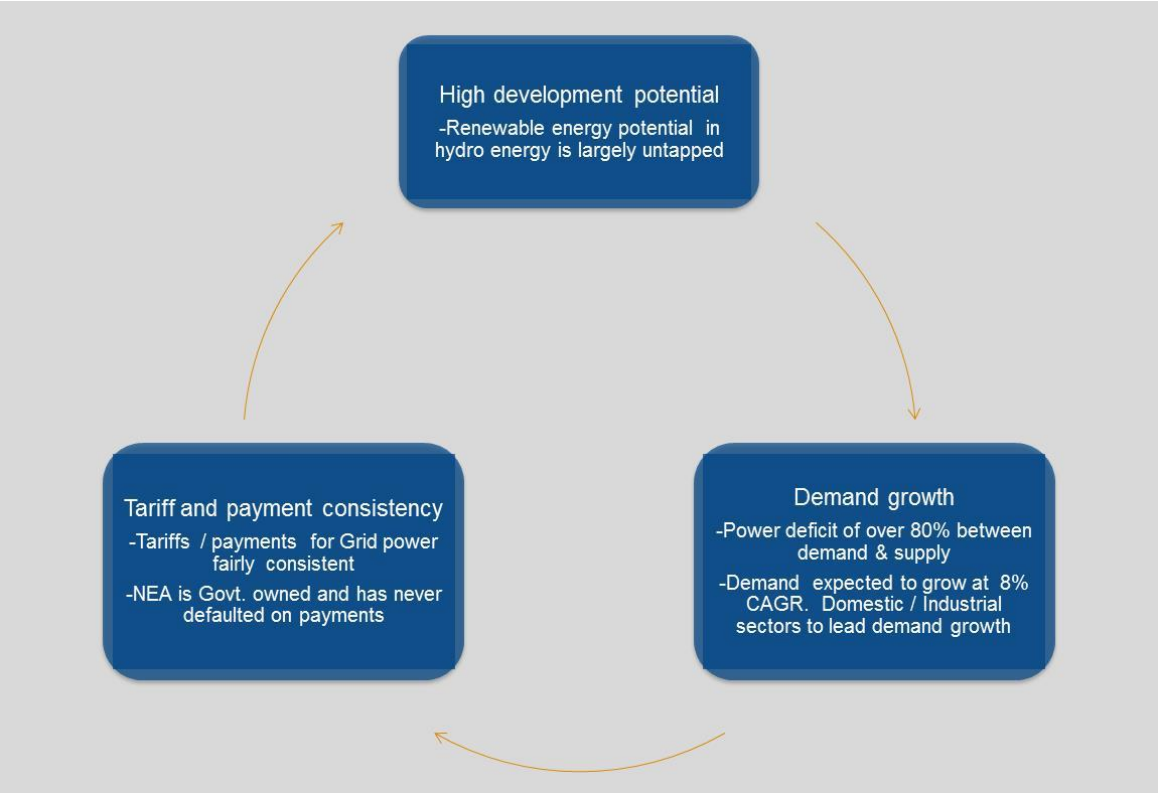
Given the high growth potential of the power and energy sector in Nepal, the next section of the report will briefly describe the key growth drivers in the sector.

[50] IEA statistics on Hydro Power, Intellecap primary research analysis
[51] NEA Annual report 2012-13
[52] Refer Annexure 10.3 for assumptions and calculations

3.4 Key growth drivers for the hydropower sector in Nepal

The key market drivers that would enable the growth of hydropower sector in Nepal in Nepal have been broadly classified into four main categories as shown in Figure 16:

Figure 16: Key market drivers for hydropower sector in Nepal



Source: Intellecap Analysis, 2014

- **High renewable energy development potential that is untapped**: As indicated earlier Nepal has an economically feasible hydro power potential of 42,000 MW of which at present only 2% is utilised. The availability of the water resources for hydro power that could be developed economically is a key market driver.
- **Rising Domestic demand fuelled by rising income levels and industrial growth** With load shedding for nearly 12 hours a day in 'dry months' , Nepal at present is experiencing power deficit of as much as 60% which itself is a very substantial growth driver for energy sector. Further the demand is expected to grow at a CAGR of around 9% from 2012-13. By 2020 peak demand and annual energy requirement is expected to grow to levels of 2052 MW and 10,000 GWh respectively. This rise in domestic demand is expected to be largely fuelled by industrial growth and rising income levels (GNI per capita) which have been growing at the CAGR of 4.7% and 9.3 % respectively in the last 4 years[53]
- **PPA rates and payment consistency**: NEA is the single buyer of grid power in Nepal and has never defaulted on the payment to the IPPs for the electricity supplied to the grid in the past 20 years[54]. The PPA rates for the grid energy in Nepal also have been fairly consistent and growing steadily for the past few years[55]. For IPPs, the future revenue streams and cash flows can thus be predicted to greater accuracy and transparency and acts as a significant growth driver.

[53] Economic survey 2012-13 ,Finance Ministry of Nepal
[54] Intellecap primary research, 2014
[55] Refer section 3.5.1 for detail discussion

3.5 Role of NEA in the hydropower sector in Nepal

NEA is a very important player in the hydropower landscape in Nepal and it is critical to understand its role in the hydropower sector in Nepal. The subsequent sections provide a brief analysis of NEA's role in hydropower sector in Nepal.

3.5.1 NEA as the sole buyer of grid power in Nepal

NEA, a 100% Government of Nepal owned utility, in place since 1985, is the sole buyer of all the grid power produced in Nepal and has a monopoly in the transmission and distribution of electricity. NEA is also responsible for energy exchanges with India and imports electricity from Indian grid as per its requirement.

As the sole buyer of grid electricity in Nepal, NEA has set out clear PPA policies for hydropower projects up-to 25 MW. However the PPA rates are not very clear for projects more than 25 MW and are negotiated from cases to case basis by the NEA. The present PPA rates for projects up-to 25 MW have been shown in Table 4.

Table 4: Current PPA rates in Nepal

S. No	Type of the project	PPA Rates per kWh (2013)		Price Escalation
		Wet Months	Dry Months	
1	ROR (< 25 MW)	NPR 4.80 /kWh	NPR 8.40 /kWh	Rate escalation of 3% every year up-to for 6 times
2	Storage type[56]	NPR 7/ kWh	NPR 7/ kWh	
3	ROR (> 25 MW)	Negotiated project by project basis with NEA		To be negotiated with NEA

Source: NEA Annual report 2012-13

NEA's preference for signing PPA's in Nepalese currency terms could be discouraging for foreign investors

The promoters of projects more than 25 MW historically have pushed to sign the PPA's in either dollars terms or hybrid (dollar + NPR) terms with NEA, citing the high dependency on foreign imports and foreign capital in the projects. However NEA recently has been reluctant to sign PPAs in US Dollar terms due to devaluation of Nepalese currency that has led to increased power purchase cost. NEA has also requested the IPPs with PPAs in US dollars terms to resign the PPAs in NPR[57]. NEA's decision on signing PPAs only in NPR may have long term implication for the foreign investors in the hydropower sector in Nepal as NPR being a weak currency, is extremely prone to currency risk fluctuation. Under a scenario where all the PPA's are signed in NPR could make the hydropower sector less attractive for foreign investors.

3.5.2 NEA's role in transmission and distribution landscape for grid power in Nepal

The transmission and distribution landscape in Nepal for grid power is controlled and operated by NEA. The main transmission line in Nepal is the 132 kV capacity line that runs for approximately 1200 kilometres parallel to the Indian border from east of Nepal (Anarmani)to west of Nepal (Mahendranagar) covering the key population and load centres in the Kathmandu valley[58]. However the present installed capacity of the transmission line is inadequate to meet the increasing demand of electricity in the next few years. NEA estimates that that the present transmission infrastructure has to be upgraded to 3272 kms or circuit to meet the increased demand in the next 3-4 years.

[56] At present there are no private sector activity in the storage hydropower projects in Nepal
[57] Intellecap primary research, 2014
[58] SARI/ Energy, Nepal Energy Sector Overview

Major investment required for the expansion of the transmission infrastructure in Nepal

To fulfil this requirement of almost tripling transmission infrastructure an expected investment of over 1.2 billion US dollars[59] is required. Though, NEA is sole developer and operator of the transmission infrastructure in Nepal at present but given its financial condition, it would need additional support from the government and international development agencies to finance the transmission landscape projects. The private sector could also play a very important part in developing this requisite infrastructure.

New high capacity transmission line would facilitate and enhance power exchange with India

For enhancement of cross border power exchange with India, first cross border 400kV Dhalkebar-Muzaffarpur transmission line project was initiated by NEA in 2012-13. This project is expected to be completed by 2015 and would facilitate the power exchange between India and Nepal. This may also open up doors for any future implementation of other cross border transmission line[60].

Distribution landscape

The distribution landscape in Nepal for grid power is controlled and operated by the NEA through its Distribution and Consumer Services Business Group (DCS). DCS is responsible for overall management of electricity distribution network of NEA including operation, maintenance, rehabilitation and expansion of the network up to the 33 kV voltage levels. It is also responsible for customer service activities like new connection, meter reading, billing, revenue collection and customer grievance handling[61].

Distribution system is concentrated in Central region (Kathmandu valley region) and the Terai region

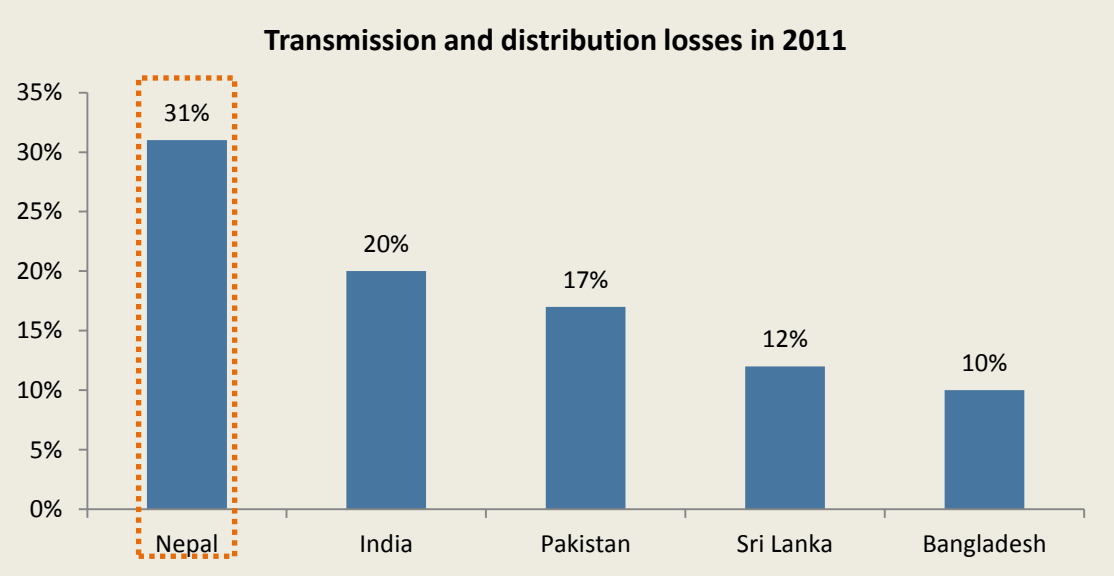
The concentration of the distribution system in Nepal is around the consumption centres in Central region (Kathmandu valley region) and the Terai region in Nepal mainly in the Eastern Western regions bordering India. These regions not only the highest population concentration but also have major industrial activity as well[62]. A number of hydropower projects tend to be closer to these demand centres to ensure the ease in the creation of transmission and distribution infrastructure.

High T&D losses are the major concern for NEA

High transmission and distribution (T&D) losses are a key concern for NEA that affects the entire energy value chain in Nepal. The T&D losses in Nepal are the highest in the SAARC region at around 31% of the total output from the generation stage. This is very high compared to India at around 20%, Pakistan at 17%, Sri Lanka at 12% and Bangladesh at 10%[63]. High T&D losses mean a direct impact on the unit sales of electricity in Nepal that would in turn affect NEA's sales and profitability. Better asset management of the T&D infrastructure could substantially reduce these losses.

[59] Transmission Line Challenges, Spotlight Nepal 2013
[60] NEA annual report 2012-13
[61] SARI/ Energy, Nepal Energy Sector Overview
[62] CBS, Nepal Statistics 2013
[63] World Bank Statistics, Electric power T&D losses

Figure 17: T&D losses in various SAARC countries

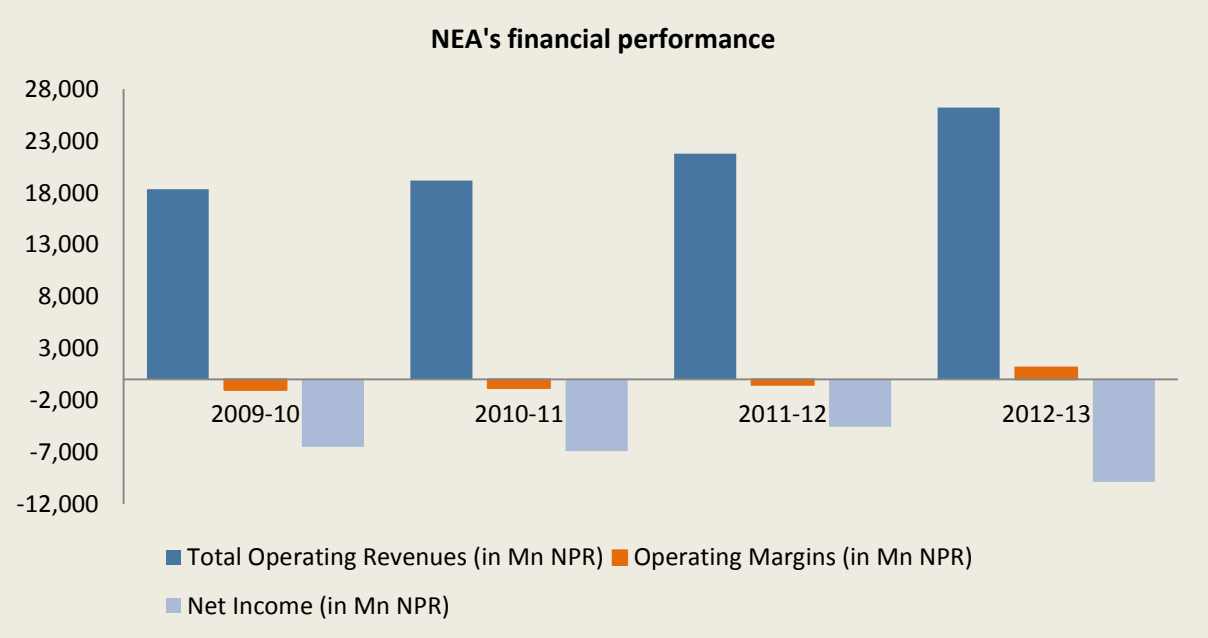


Source: World Bank Database- T&D losses (accessed in April 2014)

3.5.3 NEA's financial issues

NEA is the most dominant and important player in grid energy value chain in Nepal as the single buyer and seller of grid power in Nepal. NEA's financial health is thus critical for the proper functioning of the grid energy value chain in Nepal. However NEA has been running in loss for the past few years with operating expenses and interest payable dwarfing the increase in operating revenues shown in Figure 18.

Figure 18: NEA's financial performance in the past four years



Source: NEA Annual report 2012-13

Revised per unit price of electricity made NEA profitable in 2012-13

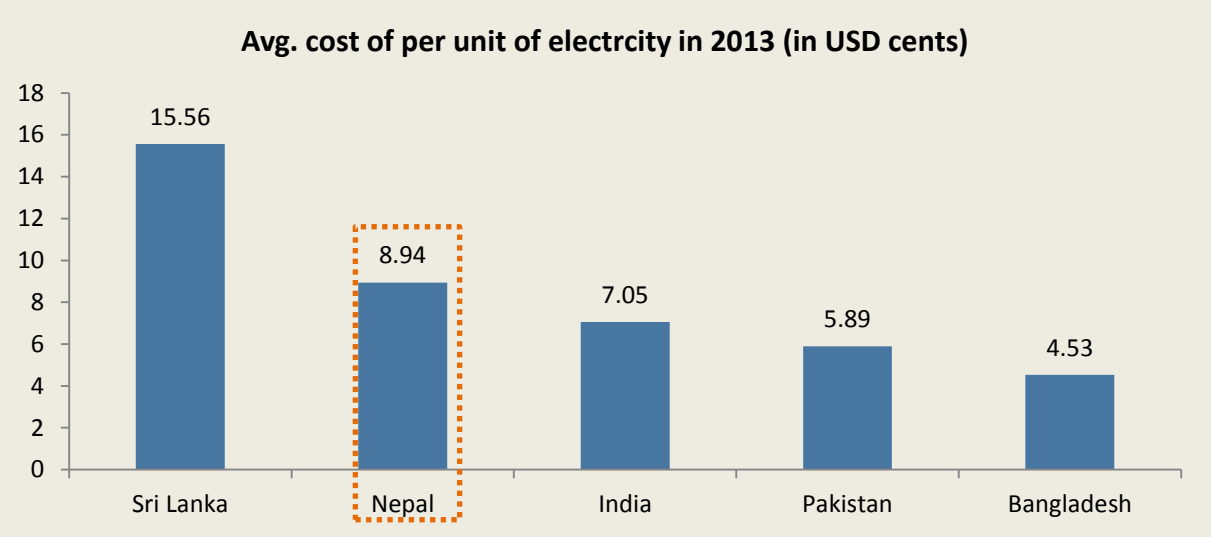
Average price of electricity per unit for consumption in Nepal was fairly constant for a period of almost 10 years from 2002 at around NPR 6.7 per KWh (or per unit). However with surmounting losses of NEA and increased pressure from the IPPs for higher PPA rates, the electricity unit rates were

revised in 2012-13 by around 15%. NEA thus made an operating profit in 2012-13 because of the increase in the price of electricity unit rates.

However average cost of electricity is on the higher side in Nepal in the SAARC region

The present average price of electricity is at NPR 7.95 per unit of electricity. This average cost of per unit of electricity is the second highest in the SAARC region with only Sri Lanka having more expensive electricity than Nepal. However this is on expected trends as PPA rates in Nepal are also one of the highest in the region. A better pricing model could thus relieve NEA's with some of its financial stress.

Figure 19: Average cost of per unit of electricity in SAARC countries



Source: Intellecap Analysis, 2014

3.5.4 NEA's role in private sector activity in hydropower generation

NEA has great influence on private sector activity in hydropower generation in Nepal.

Despite its financial problems, NEA so far has never defaulted in its payment to IPPs for electricity purchased which brings in a positive sentiment in the industry. In some recent cases NEA has stopped payments for a few hydro projects but the industry still views NEA's financial position as less risky given NEA's financial position is backed by the Government[64].

Being the sole buyer of grid electricity, NEA has complete discretion in signing new PPA's.

In a recent development in 2014, NEA decided not to sign any Power Purchase Agreement (PPA) for new projects due to the extreme demand supply mismatch post 2018-19[65]. NEA plans to sign PPAs for new projects, once market for electricity is ensured following construction of transnational transmission line. This implies that there will be restricted private sector expansion in Nepal in the hydropower sector. The companies that have existing PPAs in place with NEA would be in a better position to utilise the existing capital inflow in the market to fund their projects and consequently better placed for attracting equity investment

NEA has discretion in power procurement decisions.

NEA plans to procure electricity from new projects only from mid-November to mid-April but not during the rest of the year due to extreme supply demand mismatch post 2018-19[66]. This is a major risk for the IPPs as their cash flows will be severely affected due to this action of NEA. One way to mitigate

[64] Intellecap primary research, 2014
[65] This is line with the demand supply prediction shown in Figure 6
[66] This is line with the demand supply prediction shown in Figure 7

this risk is to increase the demand of electricity from the consumers so that excess supply can be utilised in the wet months. This in turn calls for enabling government policies to intensify electrification in Nepal and to increase electricity consumption.

3.6 Regulatory and Policy Landscape in the Hydropower Sector

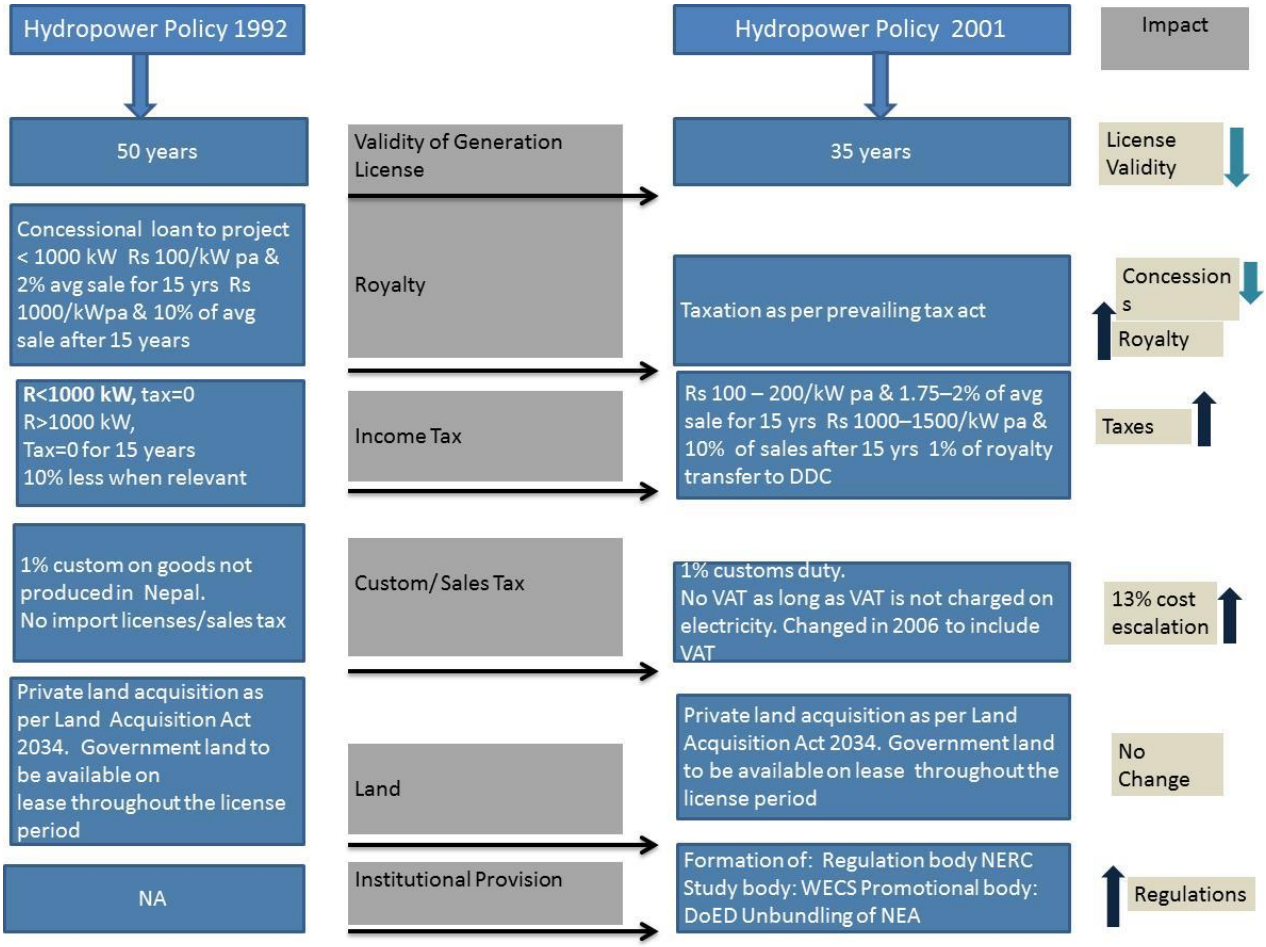
Broadly speaking, Nepal's policies in the hydropower generation sector are aimed at encouraging as well as incentivising activity by private sector firms. Policy-making and regulation are centralised in hydropower generation sector and follow a top-down approach. The ministry of Energy in Nepal is entrusted with the formulation, implementation, monitoring and evaluation of policies, plan and programs for production of energy including hydropower. On institutional level at-least five other different ministries, Ministry of Forests and Soil conservation, Ministry of Agriculture and Co-operatives, Ministry of Commerce and supplies Ministry of environment and Ministry of Industry are involved in framing or supporting the policy formulation in the sector. The Ministry of Industry, Commerce and Supplies in Nepal is entrusted with the formulation, implementation, monitoring and evaluation of policies for the foreign investment in the country. Besides inputs from Government agencies such as AEPC are also utilised to frame the policies of the sector.

3.6.1 Hydropower policies in Nepal

Hydropower development is highly influenced by government policy

Government policy and regulations critically affect the growth of hydropower development in Nepal. Favourable government policies promote the investment ecosystem in Nepal. At policy level two major policies have shaped the hydropower landscape in the past three decades: The Hydropower Regulations 1992 and Hydropower policy 2001. A comparison between the two policies and their impact on enterprise operations in the hydropower sector has been shown in Figure 20.

Figure 20: Comparison of hydropower policies in Nepal



Source: Intellecap Analysis, 2014

The Hydropower Regulations 1992 aimed to create an investment-friendly environment to encourage the rapid development of hydropower. However this policy did not attract significant investment because it particularly promoted small scale projects to meet the demand of hilly and remote areas where electrification was lacking. The policy did not focus on the promotion of medium or large projects to provide electricity for export.

The hydropower policy was amended in 2001 to attract private sector participation in the sector. This policy tried to address some of the challenges in the 1992 policy by allowing the developers to export hydropower to the neighbouring market such as India. The new policy however revoked some of the progressive provisions of the 1991 policy. For example, it reduced the validity of hydropower generation licenses from 50 to 35 years, introduced an incremental royalty payment, scrapped an income tax holiday and brought hydropower projects under the usual corporate tax net of 21.5%. In 2006 the government introduced an ordinance negating all previous relevant policies and making value added tax (VAT) applicable to all hydropower projects above 3 MW. This ordinance resulted in an immediate 13% escalation of the costs. The Hydropower policy 2001 was one of the reasons for the stymied growth of the grid power sector in Nepal in the last decade.

In order to improve the power generation situation and provide impetus to private sector participation, the government in 2009, brought out a 38-point Electricity Crisis Resolution Action Plan that provided for immediate, short-term and long-term programs. Immediate programs included determining a Power Purchase Agreement at a flat rate for power plants up to 25 MW and waiver of the provision for performing an Environmental Impact Assessment (EIA) for power projects to reduce the time in development stage[67]. This resolution has played a key part in growth of the private sector activity in Nepal in hydropower generation in the last 3-4years

3.6.2 Availability of subsidy and other tax benefits

Nepalese government has identified hydropower sector as a priority sector and provides tax benefits to the sector

Government support for Hydroelectricity sector includes initiatives like establishment of national, district, and community rural energy funds; provision of targeted subsidies; levy of concessionary or zero rated duty and taxes for selected equipment, and exemption of royalties and licensing requirements. The targeted subsidies are designed to suit financial needs of various types of investors; both domestic and foreign. The plans have various ramifications based on the per KW rate, per household, type of projects (rehabilitation projects) and based on end-user application.

The highlights of the tax-concession provisions and tax benefits (Income Tax, Customs, Sales Tax and Excise Duty) for hydropower projects in Nepal are summarised in Table 5[68].

Table 5: Tax-concession provisions and tax benefits for hydropower projects in Nepal

Type of entity/ Project	Tax exemption provisions
1. Income Tax	
1.1 Hydroelectric project (up to 3MW) in Electricity generation and distribution	Income Tax exemption to be given to the projects of private sectors
1.2 Hydroelectric project (> 3MW)	Exemption from income tax for a period of fifteen years starting from the date of its commercial production
1.3Electric substation by private entrepreneur	Income Tax exemption for a period of 10 years

[67] The resolution was passed only in 2013
[68] Hydroelectric Development Policy, 2001

1.4 Private companies taking contract or purchase of operation, management and maintenance of public hydroelectric plants/ T&D (Transmission and Distribution Lines)	Exemption from income tax for a period of five years
1.5 Repeat investors in Hydro-electric projects with motive of expanding the existing capacity by 25% or more.	Investor may deduct an amount of fifty percent of the new additional fixed asset, from the taxable income of such hydroelectric projects.
2. Customs, Sales Tax and Import Duty	
2.1 Import of Machineries and goods for operation	Customs duty and sales tax shall be levied at the prevailing rate on the import of construction equipment, m achinery tools and their spare parts required foroperation and maintenance if they are produced and sold by the local industries.
	Only 1% of the customs duty shall be levied on the import of goods if they are not produced in Nepal
	Import license fee, sales tax etc. shall not be levied thereto

Source: Hydroelectric Development policy 2001 (updated in 2011), Government of Nepal

Similarly Power Development Fund (PDF) was made as a component of Nepal Power Development Project (PDP) as agreed between Government of Nepal and the World Bank to finance private development of small and medium sized hydro schemes. The Power Development Fund is expected to provide long term financing for private sector hydropower developments in Nepal.

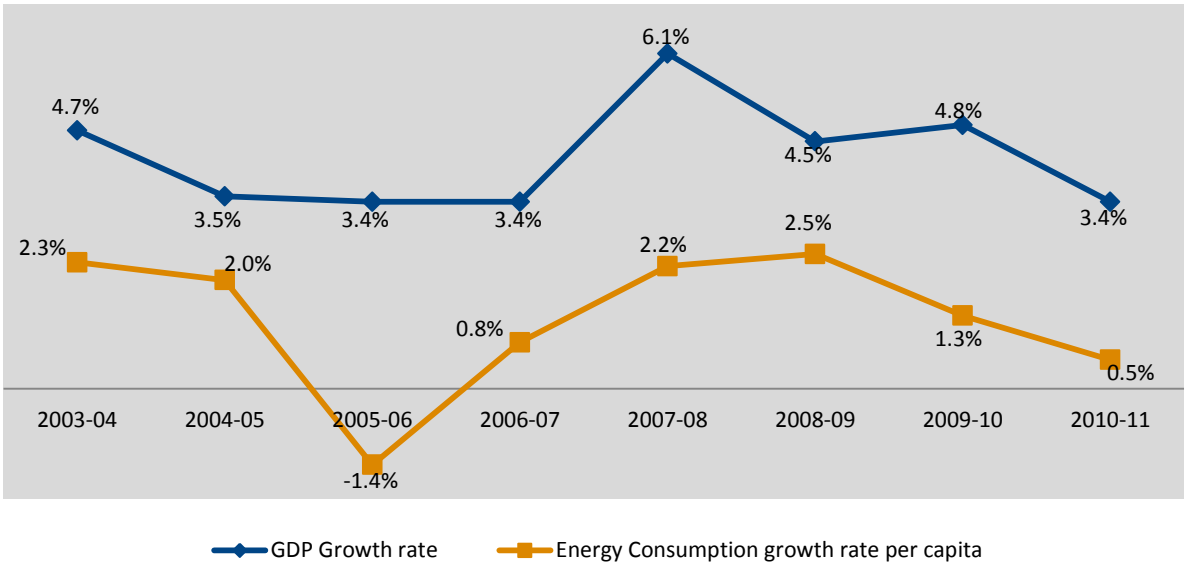
3.6.3 Government focus and priority lending for the hydropower sector

A rising trend in the consumption of energy could indicate a robust economic growth in Nepal

In a frontier market country such as Nepal energy consumption and access to reliable and clean sources of energy such as hydropower could be a key driver of growth of the economy. Though there seems to be a lack of consensus on the role of energy in economic development among various economists[69], in case of Nepal there seems to be a cross linkage between GDP growth and energy consumption. The energy consumption pattern in Nepal has generally followed the GDP growth rate apart from the aberration during the peak of economic crisis from 2008 to 2010 as shown in Figure 21. Thus a rising trend in consumption of energy could indicate a good economic growth in Nepal and hydropower sector is expected to play a major role in achieving this growth.

Figure 21: Link between GDP growth and energy consumption in Nepal

[69] Jia-Hai Yuan et al, Energy consumption and economic growth, 2008

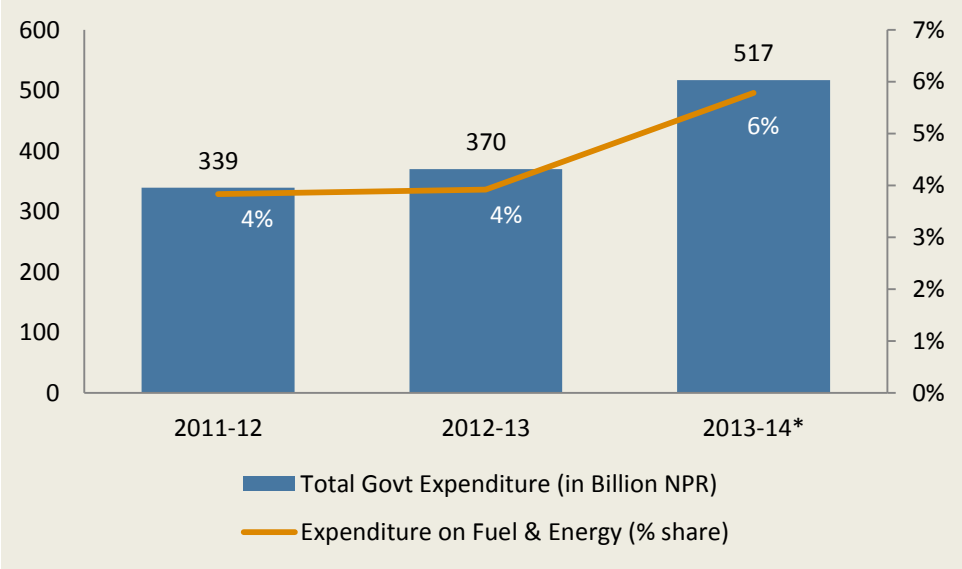


Source: Economic Survey Report 2012-13, Ministry of Finance Nepal; World Bank Database (accessed in April 2014)

Government's increased focus on the energy sector

The Nepalese Government has recently indicated to increase its spending in the energy sector so as to boost up the contribution of the sector to the GDP. Government spending on the energy sector, mainly in the generation of hydroelectricity, solar power, construction of transmission line, and distribution system is expected to be at US$ 300 million (or NPR 30 billion) in 2013-14. This represents around 6% of the total government expenditure of NPR 517 billion and is significantly higher than 4% in the previous two fiscal years as shown in Figure 22[70].

Figure 22: Government spending in the energy segment



Data Source: Expenditure Statistics, Budget Speech 2013-14, Ministry of Finance Nepal

Priority sector lending for hydropower sector

To bring policy alignment, focused and corrective policy actions were taken by Govt. of Nepal which involved; making Hydropower – a priority sector lending area and facilitating the creation of a domestic investment friendly ecosystem. In 2012, Nepal Rastra Bank (NRB) made it mandatory for

[70] Budget Speech 2013-14, Ministry of Finance Nepal

commercial banks to make 10 percent of their total lending to the agriculture and energy sectors within the next three years. NRB also provisioned that the commercial banks complying with the directive will be eligible to get credit facility at zero percent interest rate. All the commercial banks met during this study identified the hydropower sector as their focus sectors for investment.

Government's increased focus on the energy sector and the hydropower sector as well as its priority sector lending norms indicate that the hydropower sector is expected to achieve high growth in near future.

3.6.4 Provision of IPO during the construction of the projects

In 2010 government allows listing of the hydropower construction companies in the construction period

The operating margins of hydropower enterprises post hydropower policy 2001, have been affected as royalty payments, taxes and excise duty were increased. However in 2010, the government in a landmark policy change decision allowed listing of the hydropower construction companies in the construction period even before these enterprises has generated any revenues. The key rationale behind this decision was to provide requisite equity for medium to large projects in Nepal at the stage when capital requirement is maximum and in-turn to make their business model sustainable.

Listing of a hydropower company in the construction stage is attractive for the promoters but has some risks for the equity investors

Listing of a hydropower project company in the construction stage is very attractive for promoters in Nepal as the requirement of capital is highest in this stage. However a cautious approach has to be taken by the investors in valuation of companies following the model of listing their projects in the construction stage. Problem with the Engineering Procurement Construction (EPC) contractor , delay in supply of materials and labour issues could be well with in the control of the developer but could still cause delay in the construction of the hydropower plant. Any delay in the construction of the hydropower project can have serious effect on its future cash flows and hence the associated benefits with it for shareholders such as dividends.

For private equity investors interested in hydropower sector, listing of a hydropower enterprise at construction stage would be attractive as its opens an efficient way of exiting the investment. Given the unprecedented success of the hydropower enterprises in Nepal that have been listed and oversubscribed by more than 30 to 40 times, the IPO route provides an attractive option for exit. All the listing in the hydropower segment so far has been in the enterprises that own / operate small and medium size projects.

3.7 Equity investment attractiveness for small and medium hydropower projects in Nepal

For first time investors in Nepal (domestic and foreign) and mid to small ticket private equity investors[71], small and medium hydropower projects come across as most attractive targets for investments over a medium to long time period of 5-10 years.

Private equity investors interested in hydropower sector in Nepal have four options to choose from while deciding upon enterprises to invest in: enterprises that own/operate a) small size projects b) medium size projects c) large projects and d) a combination of small and medium size projects.

The attractiveness of the enterprises that own/operate small or medium size projects is driven by three factors:

[71] The typical investment size for an enterprise in the hydropower sector for first time investors in Nepal has been taken in the range of US$ 500,000 to US$ 2 million

1. Total installed capital costs for small and medium projects are low and lucrative for a variety of investors: Comparatively lower total installed capital costs for small and medium size projects makes it easier and for the local banks to provide debt finance compared to the larger projects. The financial closure for these projects in terms of debt and equity financing is more liquid and is expected to take less time. The larger projects will require capital support from government and from international banks for the debt financing and could take much longer time for closure. This makes large projects slightly less attractive for private equity investors.

2. Private sector activity is the highest in the small and medium size projects with proven track records of successful projects: The enterprise landscape is dominated by IPPs who own/operate small or medium size projects. At present there is only a single operational large size project in Nepal whereas there are 32 successful and operational small and medium size projects. Further all the listed hydropower enterprises in Nepal own / operate small and medium size projects thereby providing a viable exit option for the equity investors.

3. NEA has a clear PPA policy for projects up-to 25 MW. PPAs for large size projects in US Dollar terms could be a challenge: NEA has clear PPA guidelines for projects up to 25 MW (small and medium size projects)[72] and thus it's easier to predict the cash flows and expected IRR in the longer run. This makes it easier for equity investors to decide upon the most profitable and attractive business model for investment. However for projects larger than 25 MW, there is no clear PPA policy and each project has to be separately negotiated with NEA.

4. NEA's preference for signing PPA's in NPR makes large projects less attractive for equity investors

Given the possible requirement of foreign debt capital in US dollar for large projects, the IPPs would prefer PPA in US dollar terms. Given the present financial situation of NEA and depreciation in Nepalese rupee, NEA is reluctant to sign PPAs in US dollar terms. Thus for equity investors it is difficult to predict the future cash flows and IRR from the large size projects. This makes the small and medium size projects more attractive for equity investors.

Given the attractiveness of the enterprises that own/operate small and medium size projects, the report would focus on these two categories in the subsequent sections.

[72] Refer Table 4 for details on the PPA rates

4. Private sector landscape for small and medium hydropower projects

Understanding the uniqueness of the private enterprises in the hydropower sector (the IPPs) in terms of their business models, risks faced and operations strategy would be critical for identifying the attractive enterprises for investment. This section would analyse the present situation of hydropower generation in Nepal in terms of enterprise activity and their growth trends. Focus will be given to the enterprises that own/operate small and medium size projects given their attractiveness for equity investment. Various stages for a hydropower generation landscape: development stage, construction stage and operations stage will be discussed and enterprise business models, activity and risks at every stage will be identified. The section would conclude with the identification of the key success factors and specific challenges that these enterprises and enterprises in the hydropower segment.

4.1 History of liberalisation and private sector growth in hydropower

Major shift in the hydropower generation landscape in Nepal paradigm since early 1990s

The private sector participation in current installed capacity has increased both in volume and number since early 1990s when power generation sector was opened to private players. Starting with 2 private sector participation projects in early 1990s, the private sector activity in hydro power generation has come a long way with 140 private players (IPPs) having PPAs in place with the NEA at present. The IPPs that own /operate small and medium size projects in Nepal is estimated to be around 136[73].

Favourable Hydropower policies enabled private sector growth in generation landscape

Hydropower Policy 1992 [74] was the key enabler that paved the way for participation of the private sector in electricity generation in Nepal. The primary intension of this policy was to address growing demand for electricity, reduce the deficit in demand and supply and create an investment-friendly environment for the private sector companies to encourage the rapid development of hydropower in Nepal.

4.2 Private sector activity in the small and medium projects

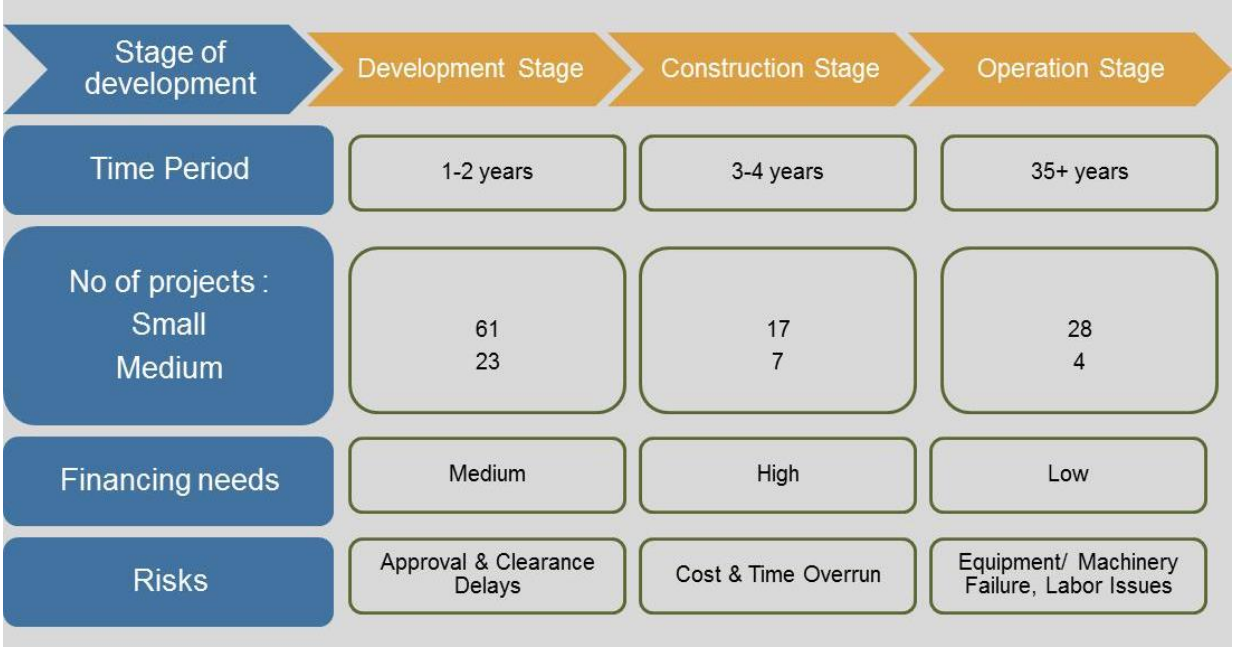
Hydropower projects can be categorised on the basis of project life cycle in three categories: projects that are under operations, projects under construction and projects under various stages of development[75]. These three stages have different risks, different financing needs, different technical expertise requirement and even different business models for enterprises. The value chain in terms of primary activities and support activities for different stages in the context of Nepal has been shown in figure 23.

[73] NEA annual report 2012-13

[74] Refer section 3.6 for more details

[75] NEA annual report 2012-13 defines hydropower projects with approved PPAs in these three categories

Figure 23: Small and medium hydropower projects in Nepal



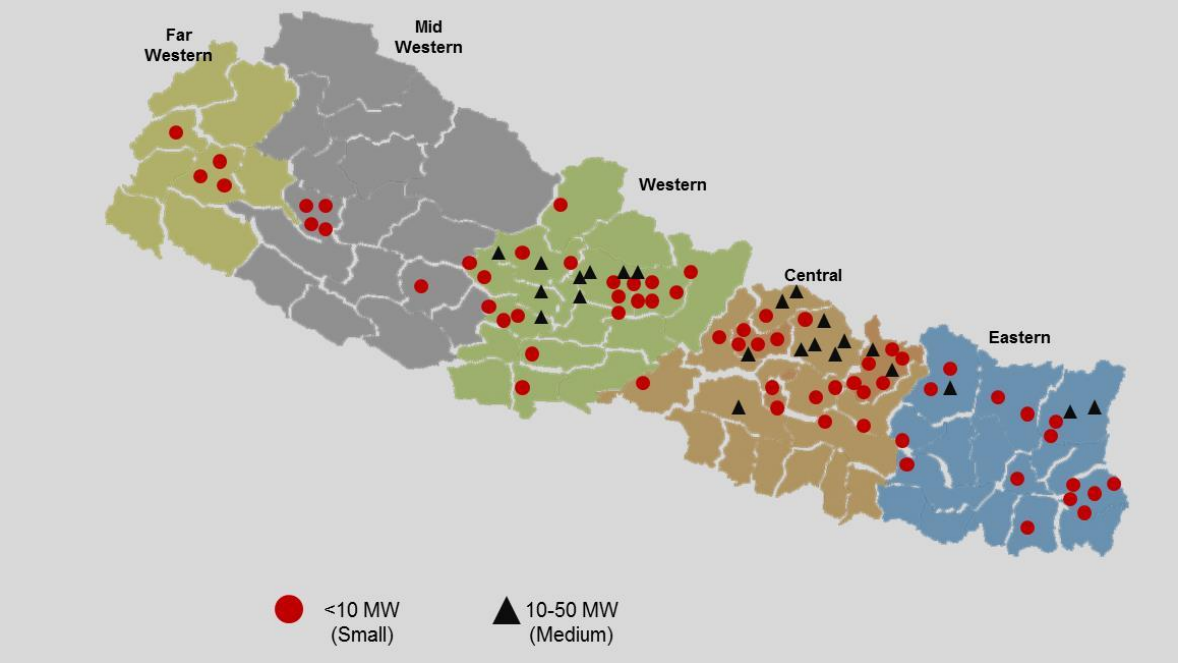
Source: NEA Annual report 2012-13; Intellecap Analysis, 2014

4.2.1. Development stage projects

Hydropower projects under development stage are relatively equally distributed across Nepal

The projects in development stage are located at several geographic areas in Nepal and show much better distribution pattern compared to projects in other stages. This in turn indicates the willingness and confidence of the private players to explore the hydro potential of Nepal given the growth drivers of demand in electricity and favourable government policies. However the Far-Western and Mid-Western regions, that have substantial economic hydro power potential, still seem to be less preferred by the power development companies. The terrain conditions in this mountainous region would make construction difficult and expensive and that could be the key deterring factor for private players to explore this region.

Figure 24: Projects in development stage (PPA Concluded Projects)



Source: NEA Annual Report 2012-13

The key activities in the development stage typically include identification of the project site, Detail Project Report (DPR) preparation and signing of PPA from NEA, obtaining clearances by the relevant ministry departments and finally the financial closure by securing the capital requirement for the project. It is estimated (based on the previous track record of hydropower projects in Nepal) that this stage could take 1 to 2 years for completion for the small and medium size projects category. This stage may also include the approval and buy-in of the local community for the project before moving to the construction stage.

This stage has the highest risk for the IPPs as majority of activities relating to signing of PPA, obtaining relevant clearances are beyond their control. Most of the hydropower projects in Nepal have been delayed in this stage[76].

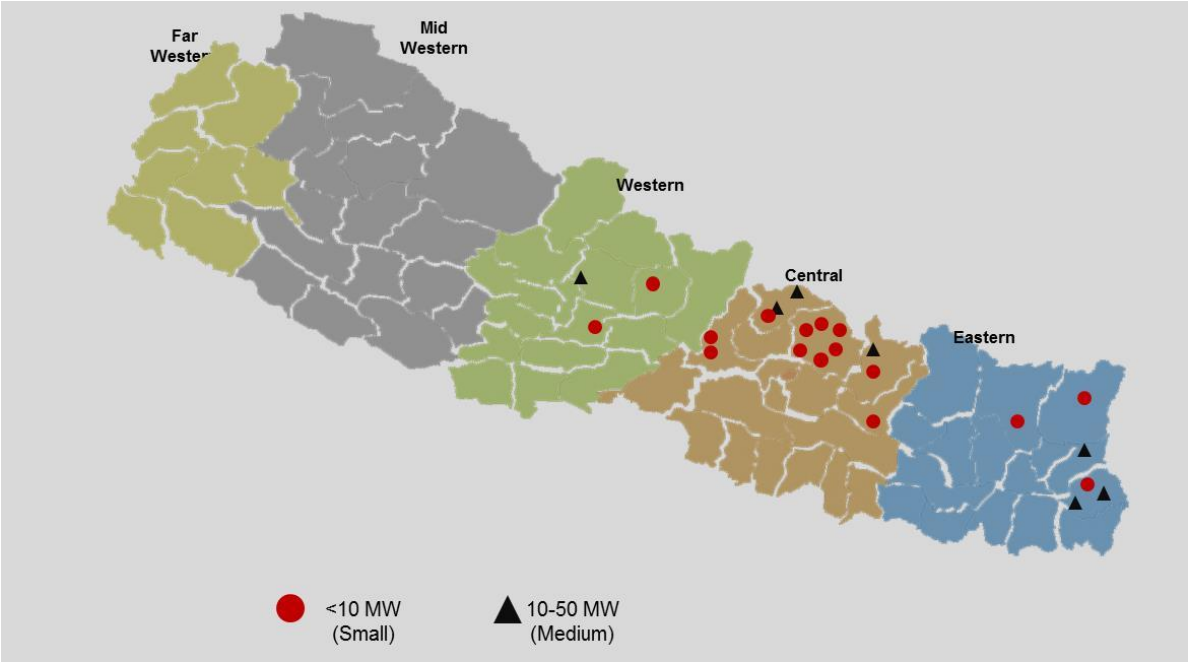
4.2.2. Construction stage

Hydropower projects under construction stage are concentrated in Central, Western and Eastern region in Nepal

In comparison with the projects in development stage, projects in construction stage are slightly less evenly distributed in different regions of Nepal and are very close to the demand centres of grid power so as to ease the transmission of power in the grid. Figure 25 shows under construction small and medium size projects across Nepal with Purchase Power Agreement (PPA) signed with NEA.

[76] Intellecap primary research, 2014

Figure 25: Projects under construction (PPA Concluded Projects)



Source: NEA Annual Report 2012-13

The key activities in the construction stage typically include Tunnelling works, Civil Works, Hydro-mechanical installation and Electro-mechanical installation. It is estimated (based on the previous track record of hydropower projects in Nepal) that this stage could take 3 to 4 years for completion for the small and medium size projects category.

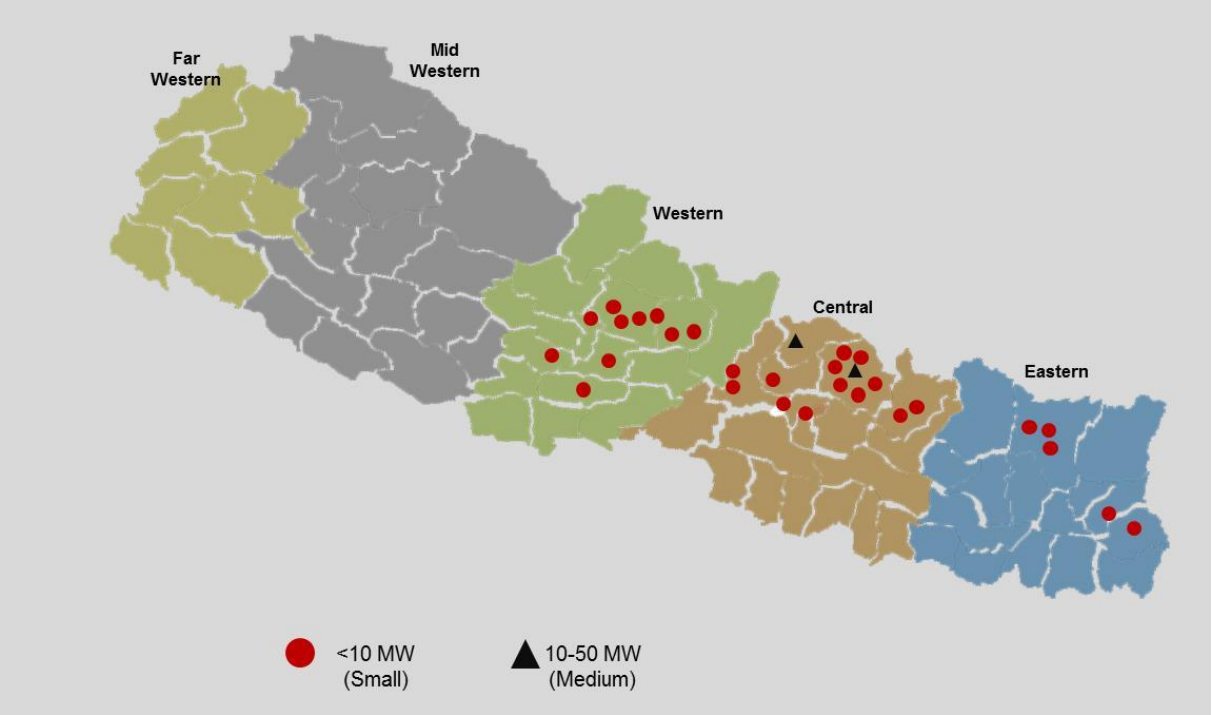
Most of the activities in this stage are in control of the developer /IPP and hence the risk at this stage for delays is lower than that of the development stage.

4.2.3. Operations stage

Hydropower projects under operation are concentrated in the Western and Central region

The present installed location of small and medium hydropower plants in Nepal is concentrated in the Western and Central region followed by the Eastern region as shown in figure 26. The key consumption centres (Households and Industry) for Nepal are in the Western and Central region where the transmission and distribution infrastructure is fairly well developed. Hence most of the projects in operation are near these centres to overcome the challenge of power evacuation network.

Figure 26: Projects in operation (Developed by IPPs)



Source: NEA Annual Report 2012-13

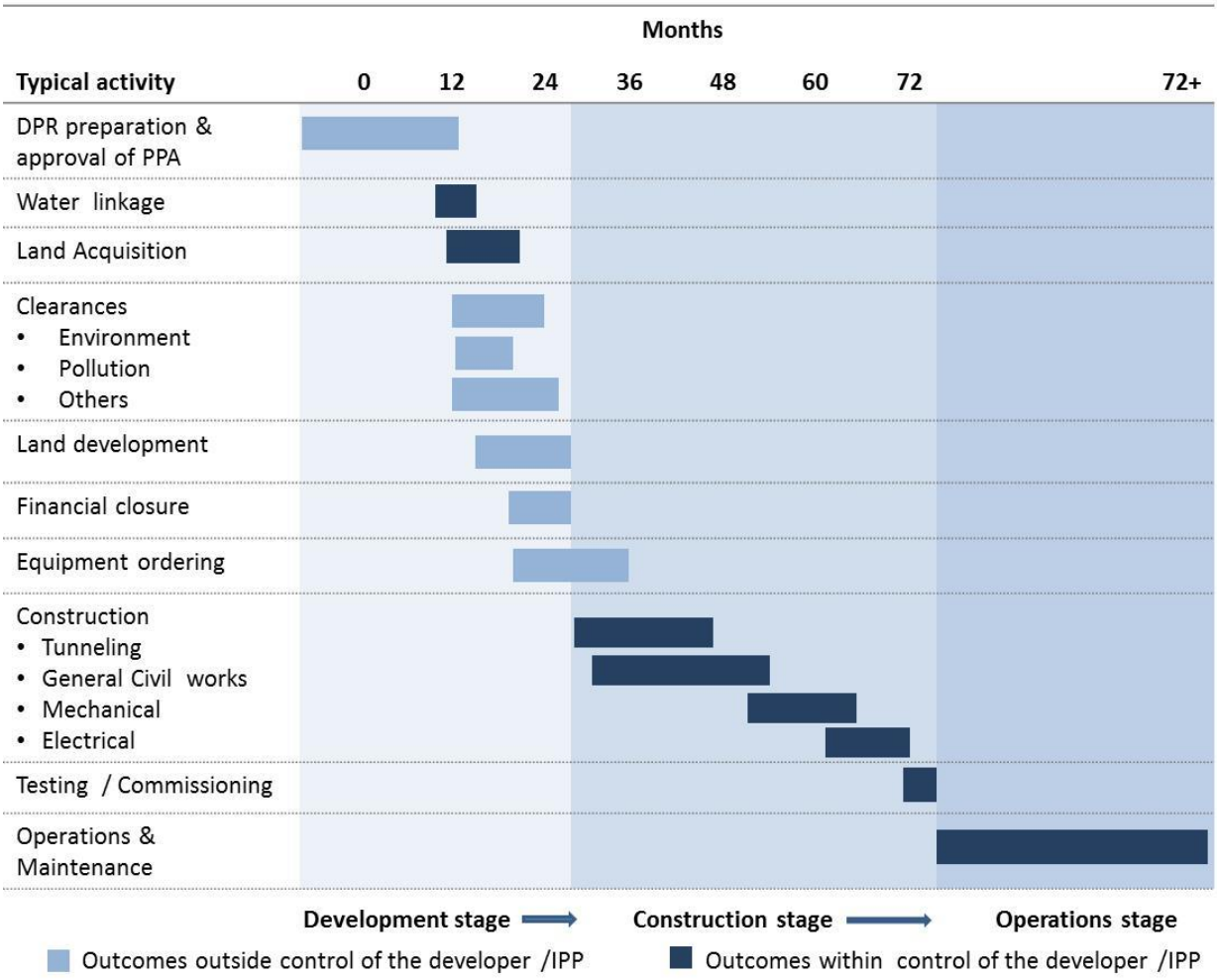
In the operations stage, the hydropower plant will start generating revenues by selling electrical power to the grid given the requisite evacuation infrastructure is present. The key activities in this stage are the general operations and maintenance activities. The life cycle of the small and medium projects in operations stage would typically be more than 35 years in Nepal.

The operations & maintenance (O&M) costs in operations stage are very low for a hydropower plant. The capital requirements are relatively low in this stage and are often fulfilled by the retained earnings of the project. Hence investment in this stage is not entirely driven by financial requirement. Strategic reasons such as enhancing management capacities and accessing better technology would also be the key drivers for investments

4.3 Analysis of hydropower projects at different stages in the project life cycle

Based on the typical activities at each stage of the project lifecycle and time taken to complete each activity, key outcomes that are within the control of the developer and outside the control of the developer can be analysed for hydropower projects in Nepal. The detail analysis of the three stages: development, construction and operations stage for small and medium size projects has been shown in Figure 27.

Figure 27: Analysis of various stages of hydropower projects in Nepal



Source: Intellecap Analysis 2014

Note: Average project cycle time for small and medium size projects in the development stage, construction stage and operations stage have been taken at 2 years, 4 years and 35 years respectively. Timeline shown in the figure is not to scale

Investors should be aware of the risks involved in each stage of project cycle

As the development stage has maximum activities that are outside of the control of the project developer this stage have the highest risk (in terms of delay of projects affecting the future cash flows) in the project life cycle. IFC estimates that nearly 50% of the projects in development stage are delayed due to inefficient surveys and delay in clearances[77].

The risk reduces as the project enters the construction phase and is minimal when the project is in operations stage. For investors it thus becomes imperative to identify the particular stage the hydropower project is in and based on the risk at every stage suitable investment decisions have to be made[78].

4.4 Access to finance and capital inflow in the sector

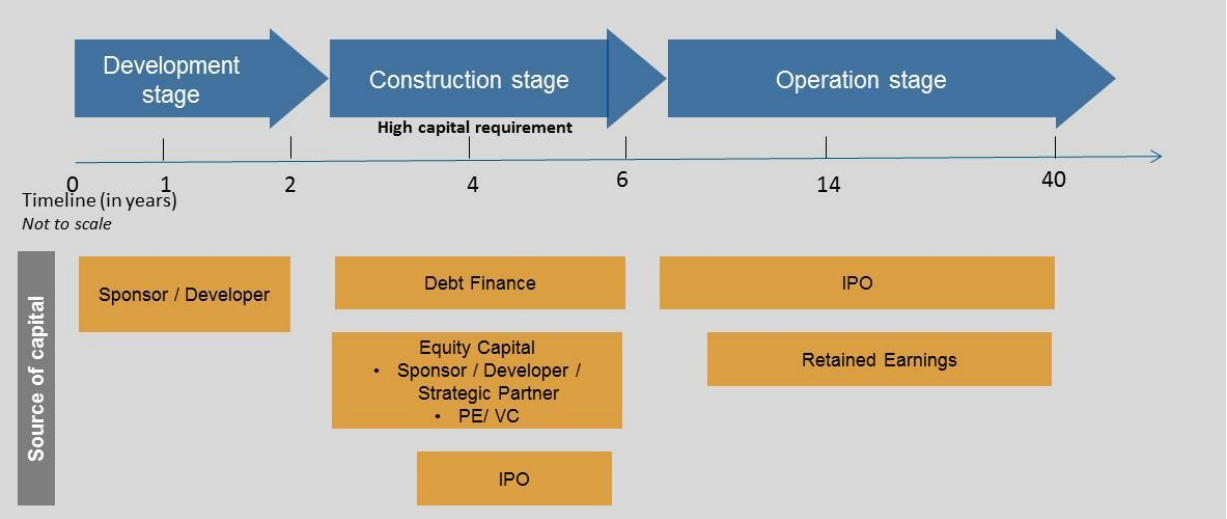
Hydropower projects are capital intensive and access to capital at various stages of the hydropower project is critical for the enterprises operating in this segment. An analysis of the requirement of

[77] Power Summit 13 report, IPPAN, 2013

[78] A detail analysis of the equity investment in various stages of hydropower projects in Nepal will be covered in section 6.1.2 of this report

capital in the project life cycle and sources of financing at various stages in the project life cycle has been shown in figure 28.

Figure 28: Requirement of capital in the project life cycle and sources of financing at various stages



Source: Intellecap Analysis 2014

The construction stage is the capital intensive stage and promoters would prefer equity investments in construction or development stage.

Figure 28 indicates that the requirement of the equity capital is highest in the construction stage and hence the developers in construction or development stage will be more inclined to look for equity partners for the project. When a project is in operations stage, the capital requirement is very low (given the lower O&M costs) and capital is usually available through retained profits of the project.

Given the high capital requirements in the construction stage for hydropower projects (that could range from 3 to 4 years) inflows of the capital at various sub-stages in the construction period is critical to manage the overall cost of the project. In-case there are cost overruns on project, the additional capital has be covered through equity provided by the developer[79].

As hydropower sector is expected to grow exponentially in near future, capital flow requirement in the sector is also expected to grow many-fold. This section provides an overview on the present and expected trends of capital supply in the hydropower sector.

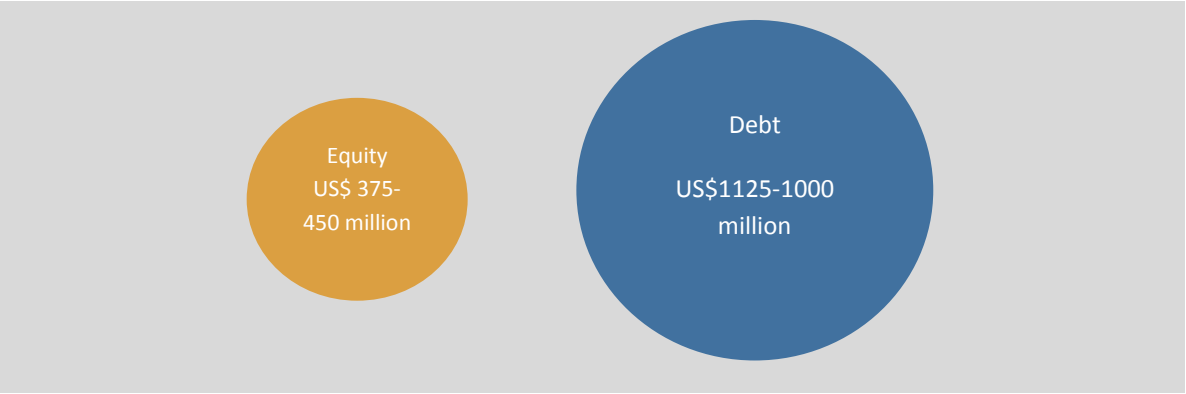
4.4.1 Capital requirement in small and medium size projects in Nepal

Demand of capital in the small and medium size hydropower project segment is expected to be around US$1.5 billion (or NPR 150 billion[80]) from 2013 onwards over a period of 5 years

The demand of capital in the small and medium size hydropower projects is expected to grow substantially as the most of the projects will move from the development stage to the capital intensive construction stage in the next 1-5 years (from 2013 onwards). The total capital requirement in the small and medium size hydropower projects is expected to be around US$1.5 billion or NPR 150 billion over a period of 5 years**.** The banks and the local financial institutions in Nepal alone will not be sufficient to meet this capital requirement. Private equity and foreign investment will have to play an important role to meet the capital requirements of the hydropower projects in the next 5 years.

[79] Intellecap primary research 2014
[80] Exchange rate assumed at 1US$=100 NPR

Figure 29: Capital requirement in small and medium size hydropower projects over a period of 5 years[81]



Source: Intellecap Analysis, 2014

Note: The capital structure for the small and medium size projects in Nepal has been taken at 70:30 and 75:25 (debt to equity) to arrive at the range of debt and equity shown in the figure above[82]

4.4.2 Typical capital structure of the enterprises

Drivers of debt and equity ratio in capital structure for hydropower enterprises depend on accepted international practices and the debt to equity ratio is usually 70:30 for new projects

Total capital expenditure incurred for commissioning of a hydropower project is the project cost and it is mainly funded by debt loan and equity investors. The standard capital structure (debt equity ratio) for a small and medium hydropower project is 70:30 in Nepal, similar to the typical capital structure for hydropower projects in India[83]. However higher debt equity ratios of 75:25 are also seen in a few medium size projects in Nepal.

4.4.3 Existing debt financing in the sector

The energy sector (primarily hydropower) is one of the priority lending sectors in Nepal. In 2012, Nepal Rastra Bank (NRB) made it mandatory for commercial banks to make 10 percent of their total lending to the agriculture and energy sectors within the next three years. NRB also provisioned that the commercial banks complying with the directive will be eligible to get credit facility at zero percent interest rate. All the commercial banks met during this study identified the hydropower sector as their focus sectors for investment.

NRB in 2012 reported that around NPR 11.92 Billion (representing 1.92% of all loan and advances) is towards electricity, gas and water. However, many hydropower enterprises would also fall under the category “Manufacturing” that received 23% of loan and advances funding in 2012[84]. Data with further granularity giving the details of hydropower investments is not available[85].

Debt capital for a hydropower project is funded through a consortium of banks

Given the high capital requirements in the hydropower sector for funding a project and risks involved at various stages of hydropower project lifecycle, consortium funding is preferred in Nepal for small and medium size projects. The number of banks for consortium financing ranges from 3 to 10 depending on the size and capacity of the hydropower project. The interest or lending ranges were found to vary from 10% to 13% for different projects. A combination of factors such as management profile, costs of generation were looked into for deciding the rate of interest

[81] Starting from 2013 onwards
[82] Refer Annexure 10.3 for detail calculations
[83] Power Ministry, GOI; Intellecap primary research 2014
[84] NRB, Bank Supervision Report, 2012
[85] NRB provided NPR. 1.28 billion refinance to hydropower projects in 2011/12

4.4.4 Equity financing in the sector

Equity financing in hydropower primarily consists of public listing, HNI funding and FDI; very little organised private equity investing activity exists

There has been little or no public information on equity investments made by organised private equity firms in hydropower sector. However, the market capitalisation of listed companies and FDI in this space are good indicators to analyse the flow of capital.

There are 5 listed hydropower companies in Nepal stock exchange that represent 2% of all listed entities in Nepal. The market capitalisation for these companies is around NPR23 billion (approx. US$ 230 million) and paid-up value of NPR 47 billion (approx. US$ 470 million) representing 3.75% of the total market capitalisation and 3.2% of the paid-up value. However only three companies are actively traded on the stock exchange and only two have published annual reports available in public domain.

Promoters are looking beyond equity capital for investment decision and strategic reasons like enhancing management capacities and accessing better technology are also critical

Though promoters look for PE/VC equity investment in their projects, the preference for domestic or foreign investors varied based of awareness levels of promoters. More savvy promoters seemed to prefer foreign equity for the "non-financial" value-add it created; and sought management expertise access to technology as key contributions expected from an equity investor[86].

4.4.5 Grants and Resources

There are several international financial and non- financial assistances available to businesses which Nepal can explore to bring in measurable operational efficiency and success within a company. Some of the relevant grants and resources along with their criteria have been listed below:

1. **Austrian Development Co-operation – Business Partnerships**

In cooperation with the Oesterreichische Entwicklungsbank (OeEB) the Austrian Development Agency (ADA) promotes Business Partnerships.

Activities that can be undertaken with the support of ADA:

- Improvement in initial training and vocational training
- Know-how transfer
- Use of renewable energies or increase in energy efficiency
- Improvement in water supply and waste water treatment
- Improvement in waste disposal and/or recycling
- Promotion of rural development and responsible management of natural resources
- Increase in production, competitiveness and quality
- Consolidation of supply chains
- Improvement in social standards and working conditions
- Improvement of the health of workers and their families, fostering gender equality

These measures can be supported as part of a business partnership with a non-repayable grant. Funding amounts to up to 50% of direct project costs (not exceeding EUR 200,000), which must total at least EUR 100,000. The term of a Business Partnership is limited to three years. The programme is open for applications all year round.

[86] Intellecap primary research, 2014

Criteria

ADA is interested in innovative and sustainable projects. To be eligible for funding, a project must meet the following conditions:

- Applicant is a European company in partnership with a company from a developing country.
- Generation of local added value, turnover and profits.
- Long-term commitment in developing country.
- Benefits for local population beyond the applicant's core business.
- Compliance with national laws and internationally recognised environmental and social standards.
- The project includes flanking measures that contribute both to improving the local social, ecological or economic environment and the success of the company.

Eligible costs

The application includes a budget according to ADA format. The following costs can be included:

- Time spending of project partners.
- Salaries of staff hired for the project.
- Local and international travelling and accommodation costs.
- Capital goods investments (only the annual depreciation costs are covered for the duration of the project).
- Costs of training, advisors, certificates, marketing, studies etc.

2. German Development Co-operation - DeveloPPP

The develoPPP.de programme provides up to 50% grant (maximum of Euro 200,000) to selected projects proposed by a European company or a company in a developing country in which European companies or nationals own at least a 25% share. The programme is funded by the German government and administered by its agencies DEG, GIZ and Sequa. These agencies hold ideas competitions four times a year for the develoPPP.de programme with the following closing dates: 31 March, 30 June, 30 September and 31 December.

Criteria

To qualify for develoPPP.de grant funding under the ideas competition, a project needs to have the following features:

- The applicant is a company registered in Europe or a company registered in a developing country with at least 25% European ownership.
- The applicant is at least 3 years active, has at least 10 employees and a turnover exceeding Euro 1 million.
- The applicant has a long-term entrepreneurial commitment in the target country and demonstrates a commercial interest in the project.
- The project should be completed within 3 years from contract signing.

Activities

DeveloPPP will co-finance exclusively projects that prepare or accompany long-term private sector commitments, like:

- Design and introduction of new products, technologies and services relevant to development; demonstration or pilot projects.
- Improvement of range of courses offered at training institutes.
- Improvement of energy and water supply.
- Improvement of healthcare.
- Job creation.
- Improvement of labour and social standards.
- Measures to boost environmental and climate protection.
- Supply chain management.
- Economically and socially responsible value chain management.

Eligible costs

The application includes a budget according to DeveloPPP format. The following costs are eligible:

- Time spending of project partners.
- Salaries of staff hired for the project.
- Local and international travelling and accommodation costs.
- Capital goods investments (only the annual depreciation costs are covered for the duration of the project).
- Costs of training, advisors, certificates, marketing, studies etc.

3. German Development Co-operation – Up-scaling

With the special programme "Up-Scaling", DEG finances pioneer investments of small and medium enterprises (SME) in developing and emerging countries that intend to scale up innovative business models. The programme addresses companies whose financing needs lie somewhere between micro financing and the traditional financing by commercial banks.

Target group

SMEs that are registered in the developing country- This may also be local subsidiaries of German or European companies. The applicant company has to provide the resources in terms of finance and manpower as well as the relevant know-how to implement the project and needs to be able to present at least one annual financial statement.

Funding

DEG finances a maximum of 50% of the total investment volume (max. EUR 500,000) under the condition that there are private sponsors who contribute a substantial share of equity (at least 25%). The DEG share must be repaid in the event of success of the project (depending on pre-defined financial criteria such as cash flow, revenue or profit).

Conditions of co-financing

- The project is based on an innovative business approach.
- A pilot phase has already been successfully completed with proof of concept as regards technology and business model at local level.
- The project must generate profit (proof by means of business plan and financial projections).
- The project shows high growth potential owing to the size of the market and the target group.
- The project may generally be planned in all developing or emerging-market countries, with individual limitations owing to political or other risks. Projects in Africa and in LDCs (least developed countries) will be considered preferentially.

Interested companies may deliver their proposals for the co-financing to DEG at any time.

4. Dutch Development Co-operation – Food security and private sector development programme (public-private partnership)

The programme aims to stimulate public/private partnerships of Dutch and local partners within the sphere of food security and private sector development in developing countries. There is one tender round in 2014, closing on 1 December 2014.

Target group

Grants are available to public institutions, businesses, NGOs and knowledge institutions, within a cooperative partnership which encompasses at least one business. The public component in the partnership will, in every case, comprise the Dutch Ministry of Foreign Affairs. Participation by an NGO is mandatory. Preferably, other public institutions will also form part of the cooperative partnership.

Sub-themes

For food security:

- Improved local/regional availability of affordable and qualitative good food.
- Efficient markets and sustainable chain improvement in local/regional markets.
- Not eligible: projects exclusively aimed at non-food crops

For sustainable entrepreneurship:

- Inclusive business proposals with demonstrable impact on low income groups
- Improvement of female entrepreneurship
- Not eligible: proposals aimed at the financial sector (excluding insurance)

Grant

Maximum 50% of budget with project budget of minimum EURO 2 million. Minimum 25% of project budget must be financed by private enterprise.

5. Norwegian Development Co-operation – Application-Based Support for Private Sector Actors

Activities

The programme is primarily aimed at businesses / commercial companies seeking funding for:

- **Feasibility studies** (maximum 50% of budget with maximum grant of EURO 60,565). Norad primarily covers the costs made in the development country.
- **Preliminary studies** may include market, technology, legislation, etc.
- **Training** related to establishment (maximum 50% of project budget with maximum grant of EURO 60,565). Support can be given to training of local employees for a limited time in connection with establishment, in cases of major expansions or restructuring.
- **Pilot production/demonstration** in connection with private investment projects / business establishment (maximum 50% of total costs wit maximum of EURO 121,000). In the starting phase of production in a developing country, there may be doubt on whether the chosen technology is appropriate to the local conditions.

The purpose of the programme is to reduce the risks present before an investment decision is made and to secure the sustainability and feasibility of the investment project.

For companies seeking funding it is important to note the following:

- Some sectors are prioritised (renewable energy, climate and environment-related technology, agriculture, forestry, marine and maritime sector).
- Requirements of at least EURO 1.2 million in turnover for the last year.
- The applicant should normally have, or plan for, an ownership of at least 25% in the established/ planned company.
- The applicant must show a high development effect to be probable.
- Sales and representation offices will not be supported.

Applications can be submitted continuously.

6. Swedish Development Co-operation – Innovation Against Poverty (IAP)

Applicants can be based in any country, but their inclusive business must be in a low-income country (OECD/DAC list). The programme functions as a risk sharing mechanism for sustainable business ventures (commercial companies or market oriented organisations) which have a strong potential to reduce poverty. Companies can be active in all sectors where innovation leads to poverty reduction, from agriculture and infrastructure to health and education.

Grants: Innovations Against Poverty has two parallel application processes:

- **Small grants** (maximum 50% of project costs with maximum of EURO 20,000) for the purpose of exploring an innovation or a new market. The grant can be used for travel and pre-feasibility studies; stakeholder needs assessments, and networking with local organisations. This programme focuses on smaller organisations which have a wealth of good ideas with great potential, but need the support of their business strategy and resources to penetrate new markets.

- **Large grants** (maximum 50% of project costs, in the range of EURO 20,000 – EURO 200,000) for the purpose of undertaking a development project aimed at a product, service, system, business model or a concept ready to be put to market test, or adaptation of existing products to be affordable and accessible by the poor. IAP also seeks to work with larger companies, to help support the development of "inclusive business" models for these markets, which expands opportunities for the poor and disadvantaged in developing countries. Such business models can engage the poor as employees, suppliers, distributors and consumers.

Key criteria: development effects, commercial viability, innovation, cost sharing and additionality.

The process is of a competitive nature, where grants are awarded to the best business plans which meet the criteria of the programme. The programme works with 1-2 tender rounds per year. No tender round has been announced at present.

7. USAID

There are several programmes under USAID that are applicable for Nepal such as:

- Powering Agriculture
- Development Innovation Ventures
- Partnering for Impact
- Partnering to Accelerate Entrepreneurship
- Partnering for Innovation

4.5 FDI Trends and policies

4.5.1 FDI policy in the hydropower sector

Nepal reviewed and reformed its Hydropower Development Policy in 2001 which allowed private sector entry into the full range of power sector activities — generation, transmission and distribution (which was earlier limited to Power generation only) — with the objective of facilitating improved access to underserved areas and attracting FDI in the hydro-power sector.

In Nepal, foreign Investments can be made in Hydropower sector in the following ways; (a) Investment in shares (equity); (b) Reinvestment of the earnings derived from equity; (c)Investment made in the form of loans or loan facilities; and (d) Investment in kinds, e.g. machineries and equipment[87]. For Hydro-power generation, the maximum FDI permissible is 100% and any foreign investment will need approval from Department of Electricity Development, Nepal.

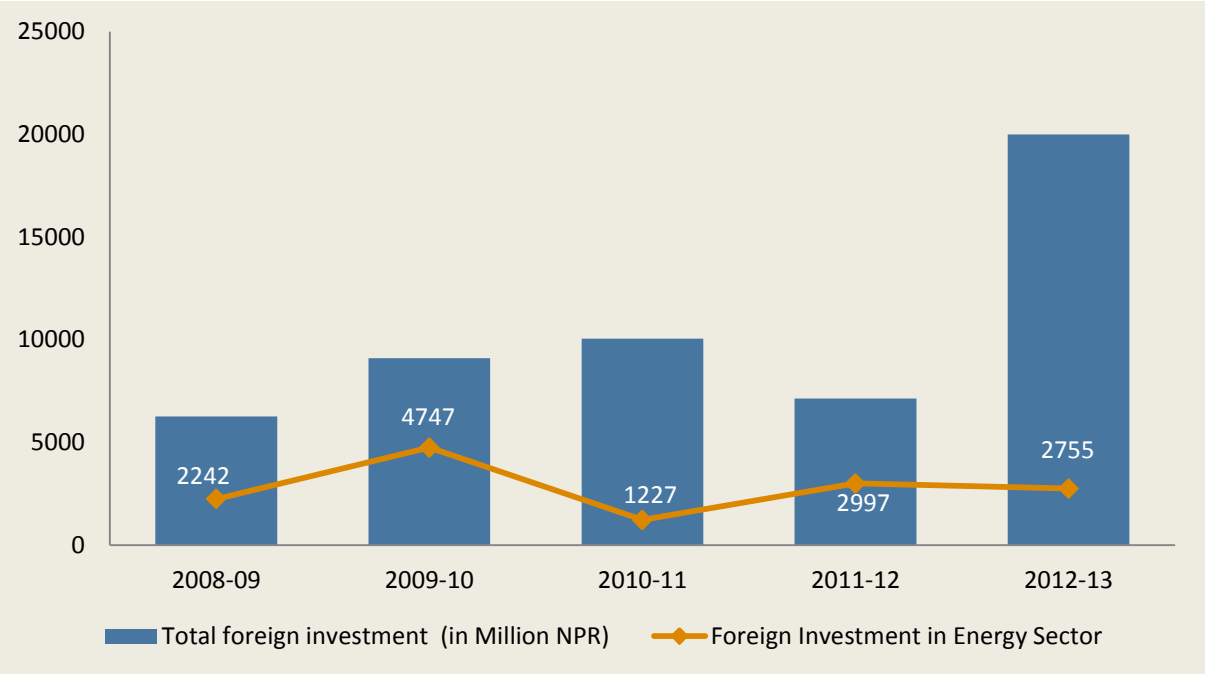
4.5.2 FDI commitment in the hydropower sector

Foreign investment in the hydropower sector is concentrated in the small and medium size projects

Department of Industry Nepal estimates that energy based sector attracted a total Foreign Investment of over US$ 200 million (NPR 20,000 million) till 2012-13. The hydropower sector has dominated the investment portfolio but recently there has been some activity in the Solar Energy segment as well. Looking at the investment value and trends in the past three years almost all of the investment in the hydropower segment has been in the small and medium size projects with foreign investment ranging from US$ 1 million (NPR 100 million) to US $20 million (NPR 2000 million) from project to project basis[88]. Figure 30 shows the trend in total foreign investment and the contribution of the Energy sector in the total investment space for the past five years.

[87] http://www.investnepal.gov.np/, Accessed on April 2014
[88] Industrial Statistics 2012-13, Department of Industry , Nepal

Figure 30: Foreign investment in the Hydropower sector in Nepal



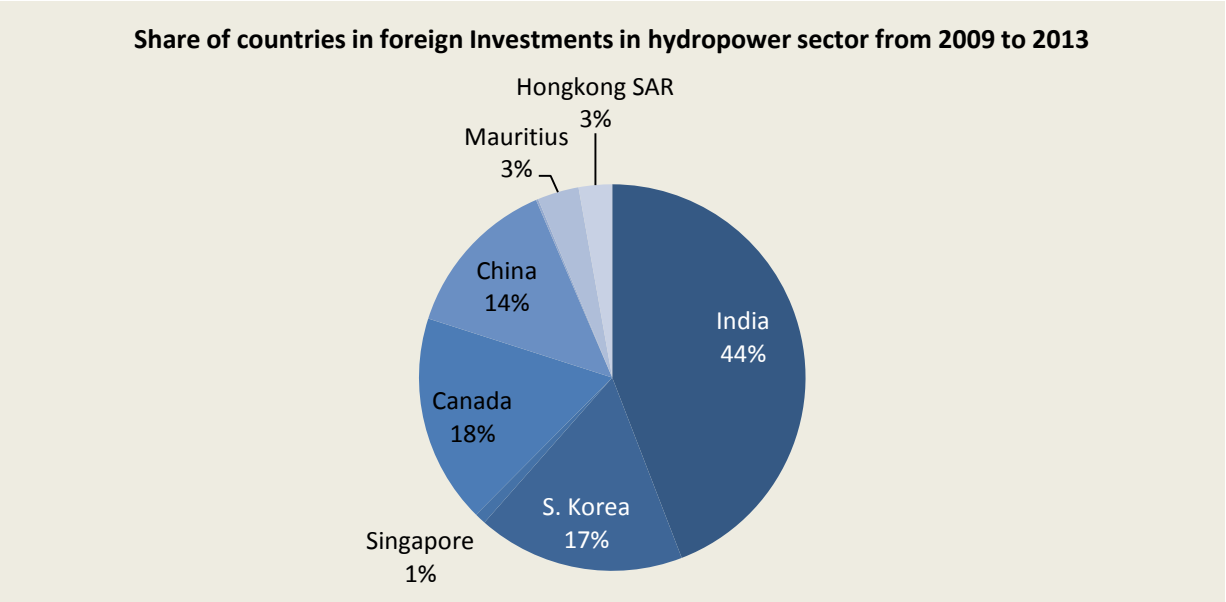
Source: Industrial Statistics Department of Industry, Nepal (accessed in April 2014)

India is the major FDI contributor in the hydropower sector in Nepal over the past 4 years

India is the major contributor to the FDI in the hydropower sector in Nepal in the past 4 years. Off late China has increased presence in Nepal and Chinese companies have made major investments in the hydropower sector in Nepal in 2012-13.

The foreign investment in Hydro-sector is estimated to be at US$25 million (NPR 2.5billion) in 2012-13. Total cumulative authorised foreign capital in the sector is estimated to be around US$115 million (NPR 115 billion) for a period from 2009 to 2013[89]. Figure 31 gives a comparative share in authorised capital for investment in Hydro-sector for various countries in Nepal for the period from 2009 to 2013.

Figure 31: Cumulative authorised capital investments in hydropower sector from 2009 to 2013



Source: Industrial Statistics Department of Industry, Nepal (accessed in April 2014)

[89] Industrial Statistics report 2009 to 2013, Department of Industry, Nepal

4.5.3 Challenges to FDI in the sector

Attracting FDI in the hydro sector in Nepal requires long-term commitment from the government in terms of providing secure industrial landscape and complimentary physical, technological, industrial, social, legal and regulatory support infrastructures. These dimensions form a major component of investor perception about investing in a country and the conditions are unfavourable for recouping the initial investment made in the sector, these investors will be reluctant on future investments.

FDI also requires consistent policy making and planning along with a transparent, simple and dependable legal framework. The policies and act are not compatible with international commitments, which again at times become hindrance for FDI in Nepal.

In a recent development in 2014, the Nepalese government is planning to raise the minimum amount of capital foreign investors in the hydropower sector in Nepal as per the draft of the new Foreign Investment Policy 2013. This policy proposes that foreign financiers in the hydropower sector will not be allowed to invest in projects smaller than 30 MW[90]. As indicated in this report, the small and medium size projects present the best opportunities for first time foreign equity investors in the hydropower sector. The proposed policy if implemented could severely affect the attractiveness of the hydropower sector for foreign investments.

4.6 Private sector view on the growth drivers and challenges in the hydropower sector

The small and medium hydropower companies met in the primary research were asked to identify the key success factors (KSFs) and challenges they faced in Nepal. The subsequent sections provide a brief synopsis of the KSFs and challenges faced by these companies in Nepal.

4.6.1 Key success factors for hydropower generation companies

Some of the key success factors that the hydropower companies in Nepal identified to be competitive and successful in the marketplace have been described briefly:

- Reduction in installed capital costs of the project through efficient project and technical management of the project. Prior experience of the management team in handling power projects in all stages: development, construction and operations is key to control costs and on time completion of the project.
- Maximise the capacity factor and output of the hydropower plant through latest technology innovation or collaboration. A hydropower plant with better capacity factor will produce more power and hence would generate more revenues. In addition this would result in lower shutdowns or maintenance of the plant thereby reducing costs and improving the output
- Presence of the power evacuation infrastructure in the vicinity of the hydropower is very important for selling the power generated to the grid

4.6.2 Key Challenges for the hydropower generation companies

Access to finance may be a key challenge in future as many projects come to the construction stage

Access to capital for small and medium size projects could be a major challenge in future as the sector would require around US $1.5 billion investment in the next 5 years that the local banks and equity capital providers would find difficult to fulfil.

Power evacuation infrastructure is a key challenge for many new hydropower projects

One of the key risks for the power generation companies or IPPs in Nepal power evacuation due to lack of adequate transmission infrastructure in place. As a result the hydro power plant may generate electricity but not supply it to the grid due to the unavailability of the transmission infrastructure and hence may not generate any cash flows. There is a provision for the connection of generating station to the transmission network upon signing of the PPA. However NEA has to pay only 5 percent of

[90] Intellecap primary research 2014

compensation in case it fails to construct the transmission line at the time of generation. This is a key concern for many upcoming hydro projects in Nepal as majority of them do not have the requisite transmission infrastructure in place for power evacuation.

The case of Sipring Khola Hydropower project in Dolkha District in Nepal

Lack of the power evacuation infrastructure due to the delay in construction of transmission line has severely affected the 10MW Sipring Khola Hydropower project in Dolkha District of Nepal. The ROR type project that was completed in 2012 is wasting around 8 MW of energy due to the delay in construction of the Singati-Lamosanghu transmission line. The construction of the transmission line was scheduled for completion in 2008-09 but has been delayed due to 'unforeseen' reasons leading to heavy losses for the promoter group.

Limitations on accessibility to latest technological innovations in the sector

Many existing owners in Power Development Companies have limitations in the technical know-how and the latest technological innovations in the sector[91]. Hence critical aspects such as technical feasibility studies for long term operations and improving the capacity factor for the hydropower plant may be neglected. This may result in high capital costs and hence high Cost per kW of power generation that would in turn affect the returns from the project.

[91] Intellecap primary research, 2014

4.7 Donor and development Financial Institutions in the Sector

Donors and Development Finance Institutions (DFIs) are playing an important role in shaping up the hydropower sector in Nepal, with a specific focus on improving power access in rural areas and investing in the developing the transmission landscape in Nepal.

Key donors operating in the region with renewable energy as a focus area include the International Finance Corporation (IFC), Asian Development Bank (ADB) and World Bank.

An overview of some specific programs is presented in Table 6 .

Table 6: Examples of donor activity in hydropower sector in Nepal[92]

Donor	Project	Project Description	Amount
World Bank	Nepal Power Development Project	The key objectives of this program are (a) develop Nepal's hydropower potential in an environmentally and socially sustainable manner so as to help meet electricity demand; (b) improve access of rural areas to electricity services; and (c) promote private participation in the power sector as a way to improve sector efficiency and to mobilise financing for the sector's investment requirements	$75.6 Million (Approved in 2003)
World Bank	Village Hydro Development	To reduce global emissions of carbon dioxide and to increase access to modern energy from renewable energy sources	$1.9 Million (Approved in June 2007)
Asian Development Bank	Electricity Transmission Improvement Project	The project will make electricity supply more reliable, allowing Nepal to make greater use of its vast hydropower resources, and a cross border transmission line for energy trading with India.	$56 million equivalent loan, and $19 million grant (Approved in Nov 2011)
International Finance Corporation (IFC)	Upper Marsyangdi-II hydro-power project	Development of the 600 MW Upper Marsyangdi-II hydro-power project in Nepal. Targeted for commissioning by the financial year 2021. Joint Development Agreement (JDA) signed with GMR.	IFC investment estimated at $100 million by 2020
ADB	Seti- river Tanahu Hydro-power project	The project has three main components: (i) a medium-sized hydropower plant of 140 megawatts (MW) with significant water storage facilities and associated transmission lines to evacuate the generated power; (ii) rural electrification and community development in the project area, and (iii) a reform and restructuring plan for the national utility, the Nepal Electricity Authority (NEA).	$150 Million (Approved in Feb 2013)
ADB	Project Preparatory Facility for Energy	The Project Preparatory Facility for Energy (the Facility) is intended to prepare a series of hydropower projects and related transmission infrastructure for development in Nepal, emphasising private sector participation and regional Integration.	$21 Million (Approved in Sep 2013)

Source: World Bank, ADB, IFC websites and reports (accessed in April 2014)

[92] World Bank, ADB, IFC websites

In their current models, most DFI programs operate at 3 levels – infrastructure level, value-chain level and individual organisation level. At the ecosystem level, donors like ADB and World Bank provide long term subsidised loans to the Government of Nepal for developing the power infrastructure in transmission and distribution for the markets to thrive. At the individual organisation level, funds like Ventures Nepal and Dolma Impact Fund invest in individual businesses and handhold them as they grow towards scale.

The public sector agencies in Nepal such as the central Nepal Rastra Bank (NRB); Hydropower development agency: Hydroelectricity Investment and Development Company, Nepal (HIDCIL); International development financial institutions (DFIs) such as IFC and bilateral donors such as ADB can play a critical role in developing a sustainable eco-system for investments in the hydropower sector from private sector. Some of the key enablers for creating this eco-system have been discussed in section 8.2 of this report.

5. Valuation for Hydropower Enterprises in Nepal

Enterprise valuation in Nepal is challenging due to limited historical financial data, less developed capital markets and lack of adequate industry benchmarks[93]. Sparse research coverage of capital markets in Nepal has resulted in limited availability of historical data and limited access to updated industry benchmarks. The lack of data is primarily due to infancy of the investment value chain and support infrastructure such as research and ratings. However, the investment landscape is witnessing brisk activity, with 2-3 institutional investment funds and one rating agency were set-up in Nepal over the last three years. The current status of investment landscape in Nepal presents an opportunity for early entrants into the venture capital space to make investments at lucrative valuations.

In absence of adequate industry benchmarks relevant proxy, comparable data must be used to value companies. Valuation of the hydropower enterprises in Nepal will be carried out using two different models and methods: a) valuation of the listed hydropower companies at Nepal Stock Exchange (NEPSE) b) Valuation of the hydropower companies based on the hurdle rate for the hydropower sector in Nepal. Comparable multiples from India for listed and private placement companies have been presented for identifying similarities in the valuations of the hydropower companies in these two countries.

5.1 Valuation of the NEPSE listed companies in hydropower sector

The valuation matrix for the hydropower companies in Nepal can be developed based on the available public information on the financial data for the listed companies.

There are five listed companies on the Nepal Stock Exchange in the hydropower sector but only three are actively traded and have published financial information in the public domain. A brief snap shot of the five listed hydropower companies in Nepal has been given in Table 7

Table 7: Listed Hydropower companies in Nepal

S. No	Name of the enterprise	Hydro Power Projects	Closing Market Price[94] (in NPR)	Market Capitalisation (in million NPR)[95]	Public financial information
1	Arun Valley hydropower development company ltd (AHPC)	• Piluwaa Khola (3 MW) in operation stage	450	1372	Available for last two years through a third party source[96]
2	Butwal Power co. ltd.	• Jhimruk Khola (12 MW) in operations stage • Andhi Khola (5 MW) in operations stage	780	7919	Annual report available
3	Chilime Hydro power co	• Chilime project (22 MW) In operations stage[97] • RaswuaGadi (111 MW) in construction stage	1890	42928	Annual report available

[93] Of the 5 listed companies in hydropower sector in Nepal, annual reports are available for only 2 companies
[94] Close price as on 23 April 2014
[95] Market capitalization as on 23 April 2014
[96] Information available through Nabil investment research data
[97] The company got listed during the construction stage of the project

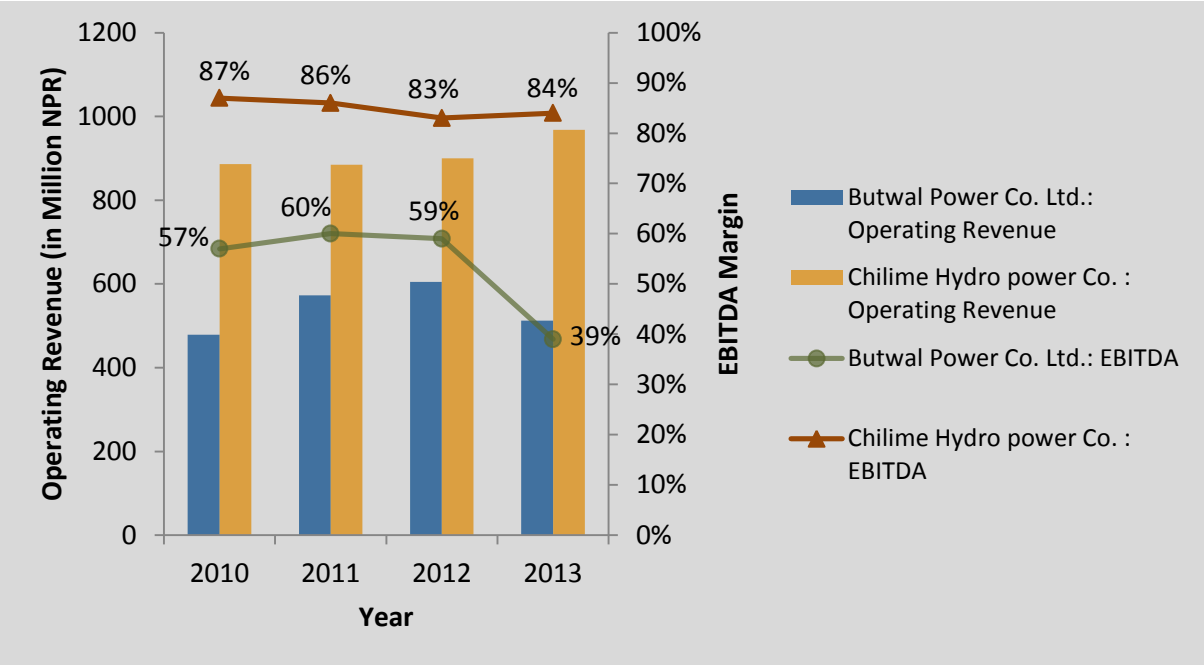
4	National Hydro Power Co	• Indrwati III (7.5 MW) in operations stage	137	1897	Annual report not available
5	Sanima Mai Hydropower ltd	• Sunkoshi Khola (2.5 MW) in operations stage • Mai Khola (22 MW)in construction stage[98] • Mai Cascade (7 MW) in development stage	677	7142	Annual report not available

Source: Nepal Stock Exchange Website (http://www.nepalstock.com/) (website accessed in April 2014)

Chilime Hydro power co is the biggest player (in terms of market capitalisation) in Nepal and was the first company in the sector to be listed when its project was still under the construction stage.

Key financial details and the Valuation multiples for the two listed companies whose financial data was available in the public domain have been shown in figure 33 to figure 38[99].

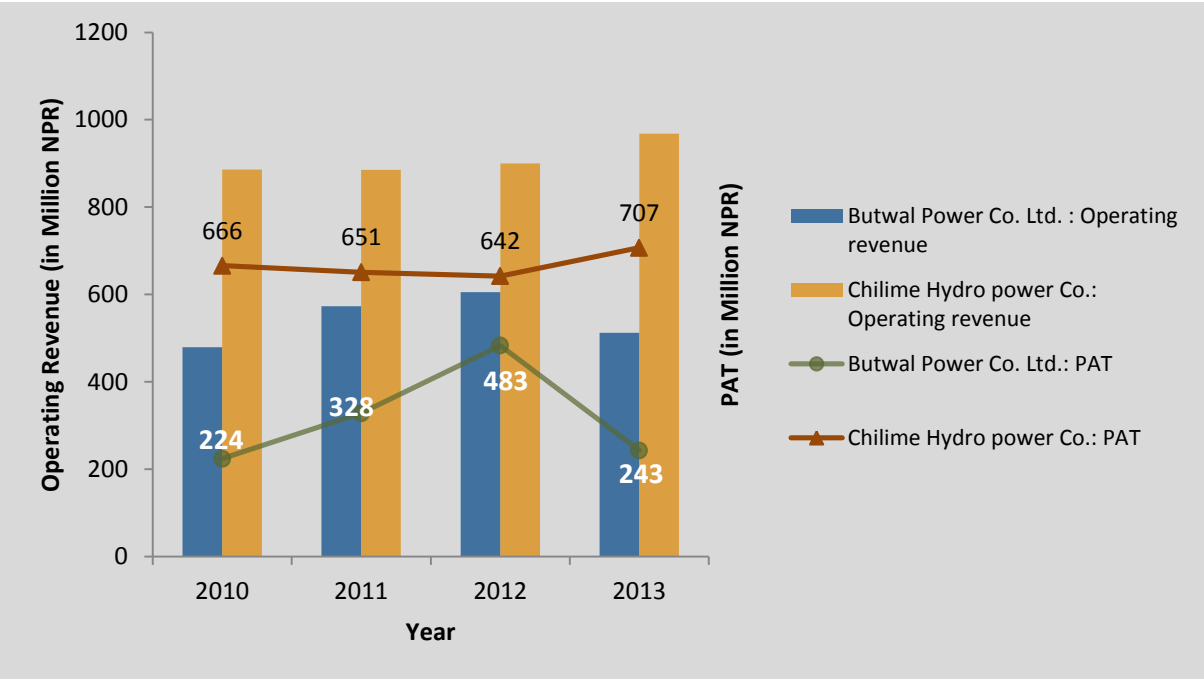
Figure 32: Operating Revenues and EBITDA margins of listed hydropower companies in Nepal



Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

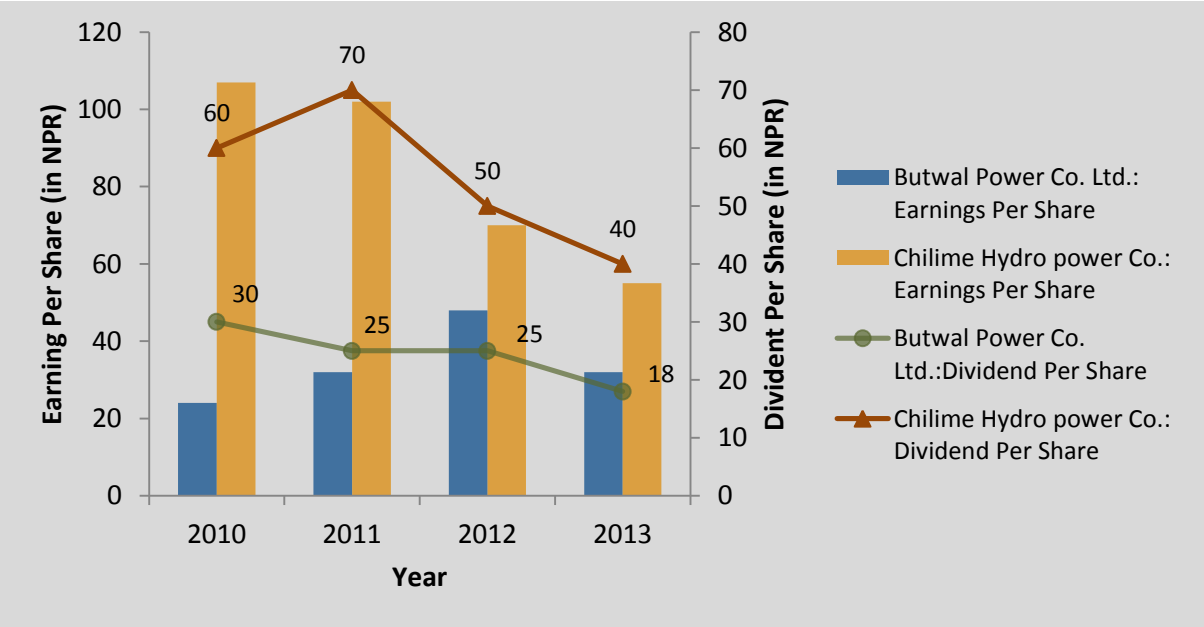
[98] The company got listed during the construction stage of the project
[99] Please refer Annexure 10.6 for key financial data numbers and valuation matrix of these two companies

Figure 33: Operating Revenues and Profit after tax for listed hydropower companies in Nepal



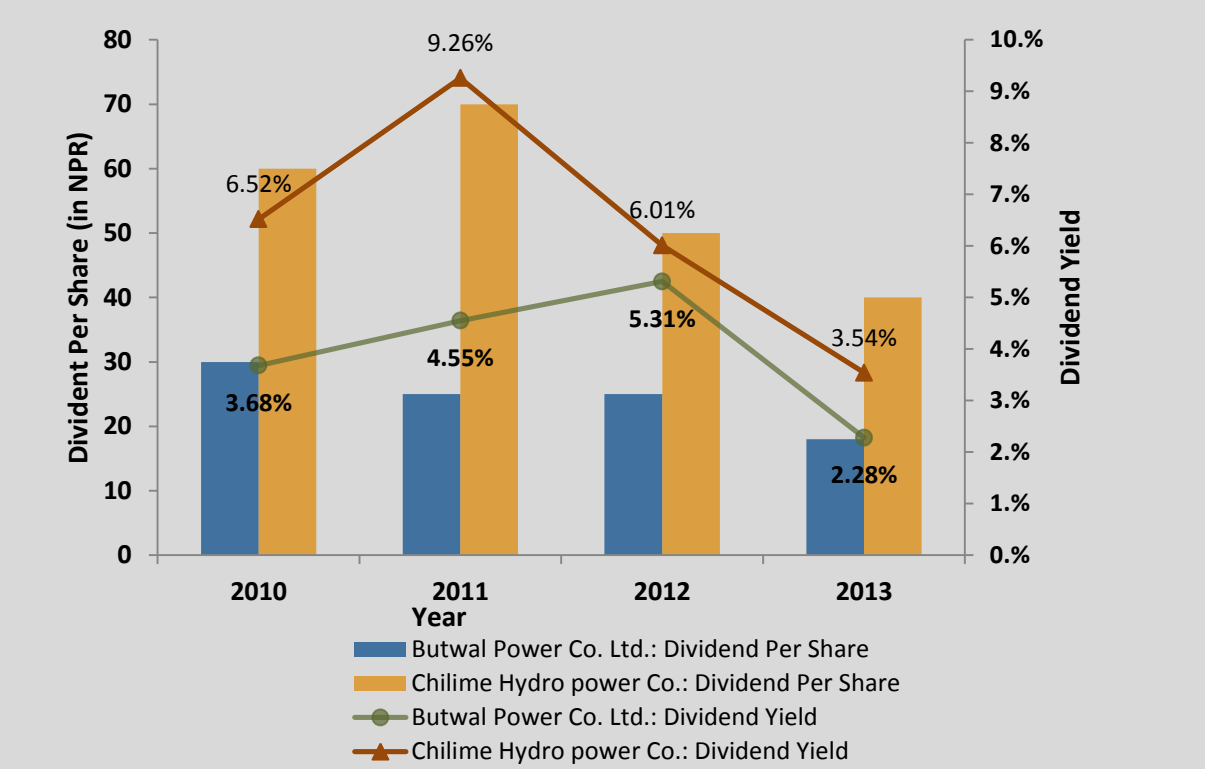
Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

Figure 34: Earning per share and Dividend per share for listed hydropower companies in Nepal



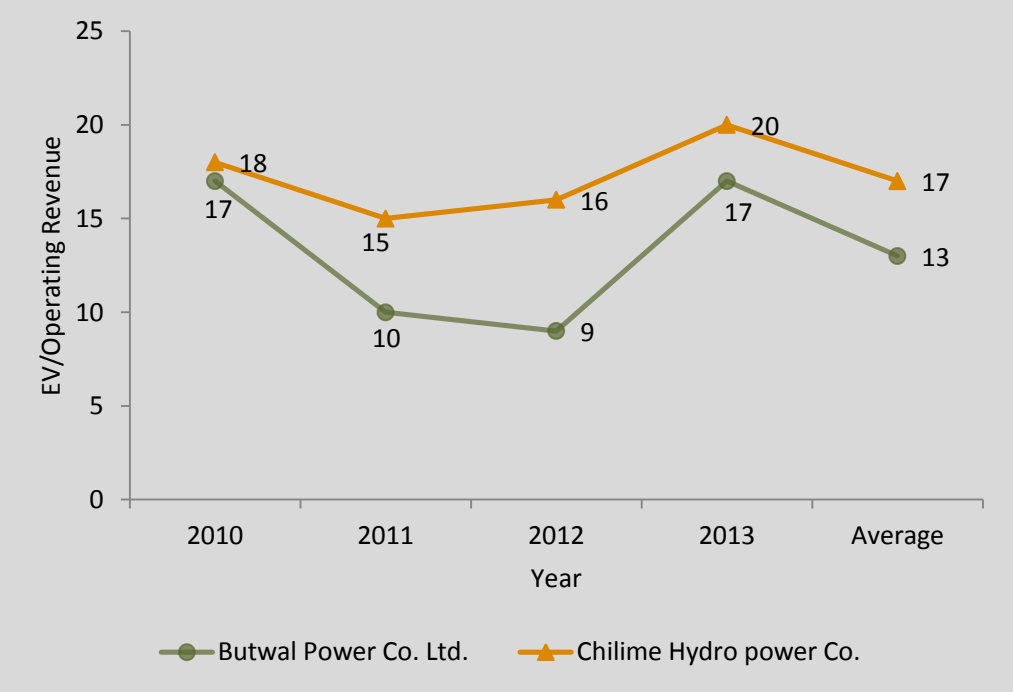
Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

Figure 35: Dividend per share and Dividend Yield for listed hydropower companies in Nepal



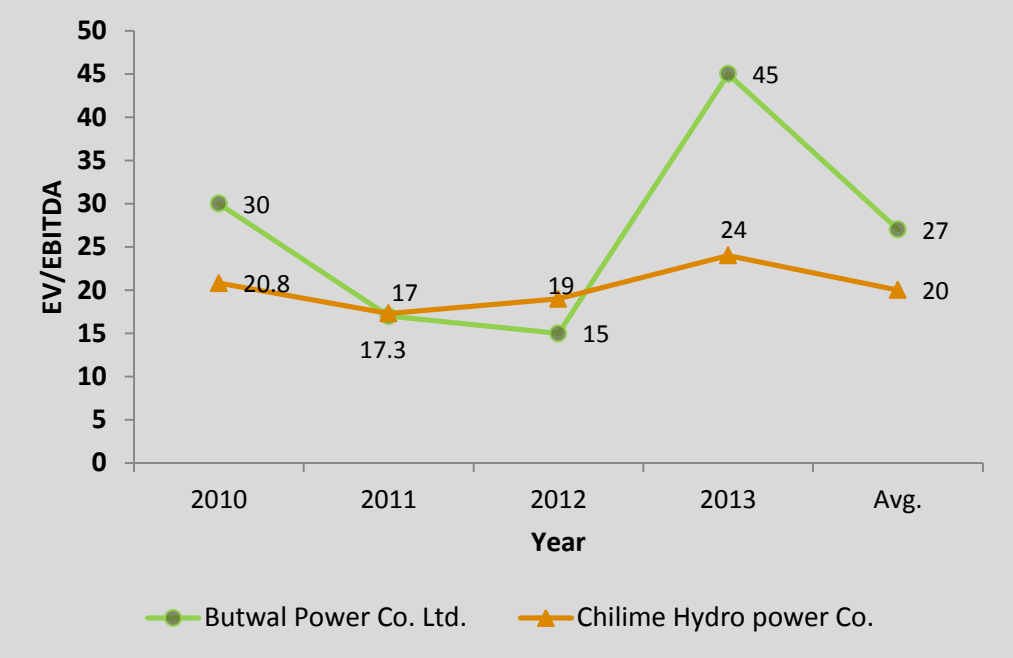
Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

Figure 36: Valuation multiples EV/ Operating revenues for listed hydropower companies in Nepal



Source: Annual reports for Butwal Power and Chilime Hydropower, Intellecap Analysis 2014

Figure 37: Valuation multiples EV/ EBITDA for listed hydropower companies in Nepal



Source: Annual reports for Butwal Power and Chilime Hydropower, Intellecap Analysis 2014

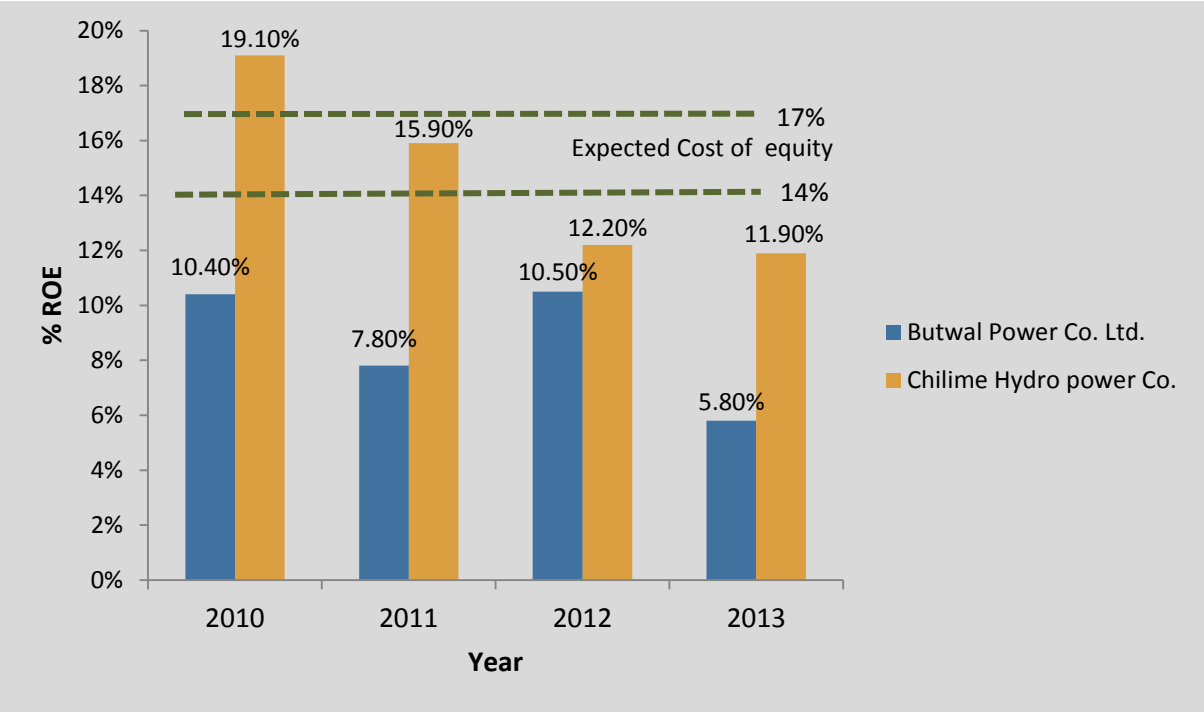
Chilime's financial performance in terms of operating profit margins and return for equity investors has been fairly constant over the past four years whereas fortunes of Butwal have fluctuated heavily during the same period. This is indicative of the better stock performance and much higher market capitalisation of Chilime over Butwal.

A comparison of ROE and cost of equity could be utilised to identify if the firm is adding value

A comparison of the return on equity and the cost of equity can be utilised to access if an enterprise is adding value for the shareholders. A comparison between the two listed companies in Nepal in the hydropower sector has been shown in figure below[100].

[100] Cost of equity for Butwal and Chilime is low as these companies have negligible debts

Figure 38: ROE and cost of equity analysis of the listed hydropower companies in Nepal



Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

Based on the comparison Chilime is expected to add more value to the investors as its ROE is better than the expected cost of equity.

5.2 Comparable valuations for listed hydropower companies in India

Even though some comparable valuation ratios can be used from countries like India, Sri Lanka, Bangladesh and Pakistan; these can at best be broad guides since the regulatory regimes, banking infrastructure, market capitalisation and other macro-economic indicators vary widely from country to country.

The key valuation multiples for the only listed hydropower company in India, NHPC has been shown in table 8 and table 9. Other companies in the power domain are highly diversified and hence have not been considered for comparison in valuation multiples. It is interesting to note that the EBITDA margins of NHPC are quite similar to Chilime in Nepal. However the valuation multiples and RoE of NHPC and Nepalese companies are hugely different given the high volatility and risks perceived in Nepalese capital markets. In addition NHPC is government owned and has been running several hydropower projects in the past few decades.

A stable dividend pay-out ratio indicates a solid dividend policy by the company's board of directors. NHPC and Chilime have relatively stable dividend pay-out ratios indicating the relative stability of these companies in terms of constant dividend pay-outs for the investors.

Table 8: Key financial data for listed companies in Hydropower sector in India

Name of the company	Revenue(in Million INR)				EBIDTA (in Million INR)				PAT (in Million INR)				EBITDA Margin			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
NHPC	2721	4332	4225	5655	2372	3709	3560	4741	1227	1805	1446	2761	87.2%	85.6%	84.3%	83.8%

Name of the company	Earnings Per Share (in NPR)				Dividend Per Share (in NPR)				Pay-out ratio				Dividend Yield			
Year	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*
NHPC	1.7	1.76	2.25	1.91	0.55	0.6	0.7	0.6	0.32	0.34	0.31	0.31	2.04%	2.62%	3.83%	3.14%

Source: Annual reports of NHPC from 2010 to 2013

Table 9: Valuation multiples for Hydropower companies in India[101]

Name of the company	ROE %				EV/ EBITDA				EV/ Sales			
	2009	2010	2011	2012	2009	2010	2011	2012	2009	2010	2011	2012
NHPC	8%	11%	9%	9%	18.1x	21.4x	9.4x	14x	7.5x	7.4x	4.3x	5.6x

Source: Intellecap Analysis 2014

5.3 Valuation of hydropower companies through private placement in India

There is little private placement activity in the hydropower segment in India. Of the publicly available information on private deals in India, Mergers and Acquisitions (M&A) is the most preferred way for many private enterprises. Some of the major cases of private placement deals have been presented in Table 10.

Table 10: Private deals in the hydropower sector in India

Target Company	Acquirer	Amount paid (US$ Million)	Project Details	Stake (%)	Deal Year	Investment method	Acquisition Cost per MW (in US$ Million)
Indiabulls Group (U)/ India	CESC (L)/ India	-	2 storage projects with installed capacity of 146 MW	100	2012	M&A	-
Jaiprakash Power Ventures (U)/ India	TAQA (U)/ UAE	645	2 storage projects with installed capacity of 300 MW and 1091 MW	100	2014	M&A	0.46
Kangra Hydel Power Projects (U)/ India	Greenko Group (L)/ India	23.4	3 ROR projects with total installed capacity of 15 MW	100	2012	M&A	1.56
Lanco Hydro Power (U)	Greenko Energies (U)	104	3 ROR projects with installed capacity of 70MW and two 5MW projects	100	2014	M&A	1.3
Regency Yamuna (U)/ India	Pan Global (L)/ USA	6.3	ROR project with installed capacity of 5.7 MW	100	2013	M&A	1.1

Source: VC Intelligence database, VC Circle (accessed in April 2014)
Note: U- Unlisted, L- Listed

The acquisition cost per MW could give an indication on the premium that was paid for each project based on the expected installation cost of the project. For example a small capacity ROR project (less than 10 MW) supplying to the grid in India will have its capital cost in the range of US $1.2 million and

[101] Market cap value was taken as on 1st April of the year

US$ 1.5 million[102]. An acquisition cost of $1.3 million per MW would indicate that the acquirer paid a premium over the installed capital cost of the project

As most of the deals are through the M&A route, the companies in the hydropower space in India are more likely to benefits from economies of scale and scope, increased revenue and market share and cost reduction through consolidated operations.

5.4 Estimating Hurdle rate for the hydropower sector in Nepal

It is important to note that both the listed companies in Nepal: Butwal and Chilime have their projects in operations stage now and hence their valuation multiples may not truly indicate valuation of a hydropower enterprise if its projects are still in development or construction stage. In addition given the limitation of historical data in Nepal, lack of adequate industry benchmarks and valuation multiples comparable with India and a small sample size of two companies in Nepal for estimation, the valuation multiples should not to be seen as an industry benchmark for others.

Hurdle rate could be utilised to overcome these challenges and be used for valuation of hydropower firms in development and construction stage in Nepal.

Equity investors in India see hurdle rate as a good indicator of minimum expected return from investments in a frontier market

Equity investors in India were asked the different methods they used for valuation of companies in frontier markets given the challenge in consistent and sufficient data for valuation ratios. Hurdle is viewed by many of these equity investors as a good indicator of minimum expected return from investments in the hydropower sector in Nepal.

The two benchmark rates considered for the analysis include (a) Cost of Equity and (b) Weighted Average Cost of Capital (WACC) for a given financing mix of equity and debt. Finance literature offers multiple methods of calculating the hurdle rates[103]. As Nepal's investment value chain is in early stages of its development, investors may seek premium for illiquidity and size of the investments.

Estimated cost of equity for the hydropower sector ranges from 27% to 30% for projects in development & construction stage and from 14% to 17% for projects in operations stage; WACC for the hydropower sector ranges from 13% to 16% for projects in development & construction stage

Based on the data from the sector and comparable proxies, the cost of equity for investments in hydro sector is estimated to range from 27% to 30% for projects in development & construction stage and from 14% to 17% for projects in operations stage. The Weighted Average Cost of Capital for projects in development & construction stage in Nepal is estimated to range from 13% to 16% and is an indicator of the hurdle rate. The key assumptions for the estimations of cost of equity and WACC are listed in Table 11. Cost of equity and WACC estimations have been shown in Table 12.

Table 11: Key assumptions taken to calculate WACC in hydropower sector

Parameter	Assumptions
General	The hydropower projects to be valued have been considered either in a) the development or construction stage b) operations stage
Market value of Debt (D)	The capital structure of hydropower business is typically 70:30 (debt to equity) for projects in development and construction stage. Projects in operations stage will not require long term debt and their retained earnings could be utilised for capital requirement

[102] Intellecap primary research, 2014

[103] The current report uses the Damodaran Model

Parameter	Assumptions
Market Value of Equity (E)	The capital structure of hydropower business is typically 70:30 (debt to equity) for projects in development and construction stage.
Tax rate	Corporate tax rate of 25% has been taken[104]
Cost of debt in Nepal	The data from major banks in Nepal has been utilised to obtain the cost of debt. The range of cost of debt has been taken at 10.5% to 12.5%[105].
Risk Free Rate	The data from major banks in Nepal such as SBI Nepal Rastra Bank and Bank of Kathmandu has been utilised to obtain the risk free rate. The risk free rate has been taken at 9% that most of banks yield on bonds
Market Equity Risk Premium	For mature markets country ERP is taken at 5%.
Beta estimation	• Beta for different hydropower sector in emerging and frontier markets has been estimated to be at 0.5 based on data analysed • The beta has been levered using Debt equity ratio for hydropower projects in Nepal. The levered beta value is 1.38
Market Risk Premium (Rm)	The market risk premium ranges from 13.66% to 16.25%[106]

Source: Damodaran on valuation (accessed in April 2014), Intellecap primary research, 2014

Table 12: Proposed valuation model for Hydropower projects in Nepal

	Hydropower projects in development and construction stage	Hydropower projects in operations stage
D/E	2.33	0[107]
Beta Unlevered	0.5	0.5
Beta Levered	1.38	0.5
Total Equity Risk Premium	13.66% to 16.25%	13.66% to 16.25%
Risk Free Rate	9%	9%
Cost of Equity (min)	27%	14%
Cost of Equity (max)	30%	17%
Cost of Debt (min)	10.5%	10.5%
Cost of Debt (max)	12.5%	12.5%
Tax Rate	25%	25%

[104] Inland Revenue Department, Nepal statistics
[105] Intellecap primary research, 2014
[106] See calculations in Annexure 10.5.3
[107] It has been assumed that projects in operations stage will not require long term debt and their retained earnings could be utilized for capital requirement

	Hydropower projects in development and construction stage	Hydropower projects in operations stage
Weighted Average Cost of Capital (min)	13%	14%
Weighted Average Cost of Capital (max)	16%	17%

Source: Damodaran on valuation (accessed in April 2014), Intellecap primary research 2014

Companies in the hydropower sector are expected to trade at 27% to 30% cost of equity. The hydropower companies can trade at a discount to the maximum range of Cost of Equity by controlling their capital costs, improving their capacity factor and output of the plant to improve cash flows. Management profile and experience is critical for controlling the project on capital costs and time overruns. Technological collaboration and innovation in project design could significantly reduce capital costs as well as improve the output for a hydropower project.

However, businesses that do not take specific measures to tackle prevalent issues in the sector are likely to be closer to the maximum range of Cost of Equity. Some of these issues include time and cost overruns in the project primarily in the construction stage, lower capacity factors due to inefficient design of the project, management profile and experience of running the projects for a longer duration of time.

5.5 Other value drivers for hydropower enterprises in Nepal

Valuation of hydropower businesses especially in frontier market economies and less established sectors must take into account both quantitative and qualitative indicators of firm value. These include "hydropower business level" criteria and "macro-economic and market-level" criteria. A snapshot of key valuation drivers grouped by these two categories is represented in Table 13.

Table 13: Valuation drivers for hydropower businesses in Nepal

Hydropower Business Drivers
Internal Drivers
1. Management team (Governance and capacities)
2. Stage of the operational model
3. Geographic location in Nepal
4. Market linkages with NEA and suppliers
External Drivers
5. Regulation – sector-level policies, legal structures, taxation
6. Power evacuation infrastructure
7. Infrastructure like roads for access to site
8. Exit options
Macro-Economic and Market-Level Drivers
9. Political stability
10. FDI policies

Source: Primary interviews and Intellecap analysis, 2014

A small group of early stage equity investors from India were asked to evaluate relative importance of various valuation drivers to understand investor sentiments on this issue. Not surprisingly, investors rated management team, strength of operational model, and power evacuation infrastructure as most critical aspects of a hydropower business and favourable metrics against these were likely to drive up valuation. More "systemic issues" like regulation issues were not considered very critical and investors were likely to make more concessions here unless there was a direct impact on revenues and profitability. Figure 39 shows a "high", "moderate", and "low" sorting of these criteria.

Figure 39: Investor Sentiment on Valuation Drivers in hydropower

Valuation Drivers	Investor Sentiment on Relative Importance		
	High	Moderate	Low
Internal Drivers			
Management team (Governance and capacities)	✚		
Stage of the operational model	✚		
Geographic location in Nepal		✚	
Market linkages with NEA and suppliers		✚	
External Drivers			
Power evacuation infrastructure	✚		
Regulation – sector-level policies, legal structures, taxation		✚	
Infrastructure like roads,			✚
Exit opportunities – like secondary sale, promoter buy back and IPO		✚	
Macro-Economic and Market-Level Drivers			
Political stability		✚	
FDI policies			✚

Source: Primary interviews and Intellecap analysis, 2014.
Note: A rating of "high" indicates that investors do not compromise on these drivers, of "moderate" indicates that they sometimes compromise if all other critical drivers seem favourable, and "low" indicates that investors compromise almost always because they expect these drivers to improve in the short-to-mid-term.

1. Management team and governance

Quality and experience of the management team is the most critical aspect for private equity investors since they are mostly betting on the team's ability to turn a business plan into a profitable venture. This is especially true in Nepal where the larger supporting environment for businesses is missing; and the ingenuity, networks and skills of founding team members are called upon to bridge this gap. Presence of a 2-3 person management team with diverse skillsets including managerial track record, expertise in sector and technical know-how will help to drive up valuation.
Good governance practices like maintaining audited financials, good book-keeping, and presence of a few external and well-reputed individuals on the Board of Directors or Advisors help to drive up valuation.

2. Stage of the operational model

The strength of operating level cash flows help to determine financial state of a hydropower project, and investors analyse these to estimate the predictability of revenue. Hydropower projects in the operations stage are seen as least risky and projects in development stage are seen as most risky as it is difficult to predict their revenues in the long term. For investors it thus becomes imperative to identify the particular stage the hydropower project is in and based on the risk at every stage suitable investment decisions have to be made.

3. Geographic location of the project

Operational efficiency of hydropower sector is seen linked to a delicate balance between proximity to generation centres and consumption centres. This is because the transmission and distribution infrastructure is well-developed near to the consumption centres. Optimal geographic location to mitigate location-related risks will drive up valuation.

4. Market linkages with customers and suppliers

Value chain linkages are critical for hydropower business for predictable procurement of raw materials such as cement and steel at optimal prices. Strategies to ensure this such as partnerships with

aggregators of raw materials can help to secure procurement channels. Further, relationship of the hydropower company with the main buyer of electricity is very important for timely and consistent payments.

5. Power evacuation infrastructure

Availability of the power evacuation infrastructure is very important as it affects the cash flows of the enterprise. Investors prefer projects where the power evacuation infrastructure is present or is under construction.

6. Regulation – sector-level policies, legal structures, taxation

Facilitative government policies like encouraging FDI and ease of doing business increase hydropower valuation, while inhibitory policies like higher VAT and subsidies that distort markets, decrease valuation.

7. Presence of infrastructure such as roads

Availability of infrastructure like road networks also impact valuation of hydropower projects. Given that the hydropower projects are often located on project sites that have difficulty in accessibility, transport of heavy equipment and raw materials such as cement and steel could be a major challenge that could lead to delay in the construction of projects.

8. Exit opportunities – like secondary sale, promoter buy back and IPO

Clarity on potential exit opportunities is important as well. So far, only three cases of secondary PE/VC exits are available in Nepal, and early entrants in the PE/VC field in Nepal may have to plan for longer investment time-period than in more mature markets. This could drive down valuations due to higher risk perceptions, especially in sub-sectors like seed and dairy which are solely driven by domestic demand and hence have the risk of geography concentration.

9. Political stability

Confidence in the macroeconomic environment and political stability drives up firm's valuations as it gives financiers confidence that the business environment for their portfolio will remain reasonably conducive, and at the same time their investment will be protected. Since Nepal has only regained political stability over the past 4-5 years, investors are likely to attach greater risk premium to opportunities they evaluate.

10. FDI policies

Long-term regulatory stability around FDI policies is likely to drive investments at greater valuation since investors can be confident that they will have the freedom to exit a business when it's most lucrative for them. The recent decision by NRB to disallow FDI in commercial banking could potentially drive investors to attaching a higher risk premium. However, on the flipside the government and regulator have stated their intention to support greater FDI inflows, and in a March 2014 address, NRB Governor indicated that domestic banks and financial institutions are able to provide supplementary capital to foreign investors. Approaches like this would give more confidence to investors and drive up valuations.

6. Project attractiveness framework for equity investors

6.1 Key Value drivers for project attractiveness

Five key factors that an equity investor[108] should look for deciding attractive businesses for investment in hydropower sector in Nepal have been identified. It is important to note that most of the promoters / IPPs in Nepal would prefer equity investment in construction or development stage. Hence the focus of these parameters is on the projects in development and construction stage.

- Installed capital cost of generation per MW
- Stage of the project in the project life cycle
- Presence of evacuation infrastructure
- Signed PPA rates and payment consistency
- Credentials of management team

A detail discussion on these five key parameters has been discussed in subsequent sections.

6.1.1. Capital cost of generation

Projects in the development and construction stage with installed capital cost of generation less than US$ 1.5 million per MW are expected to create value for the PE/VC investors

Given the challenge of inconsistent and insufficient data for valuation ratios in the hydropower sector, hurdle can serve a good indicator of minimum expected return from investments in the sector. Weighted average cost of capital (WACC) is proposed as the benchmark hurdle rate for valuation and its range for the hydropower sector in Nepal is estimated to be in the range of 13% to 16% for enterprises that have projects in the development or construction stage.

As most of the hydropower companies in Nepal are project based enterprises, internal rate of return (IRR) of the project could be used as a tool for valuation of an enterprise to know is a project is expected to create value for investors. Cost of generation is the key driver for hydropower projects that affects their IRRs as other cash flows such as revenues would be similar for similar capacity projects.

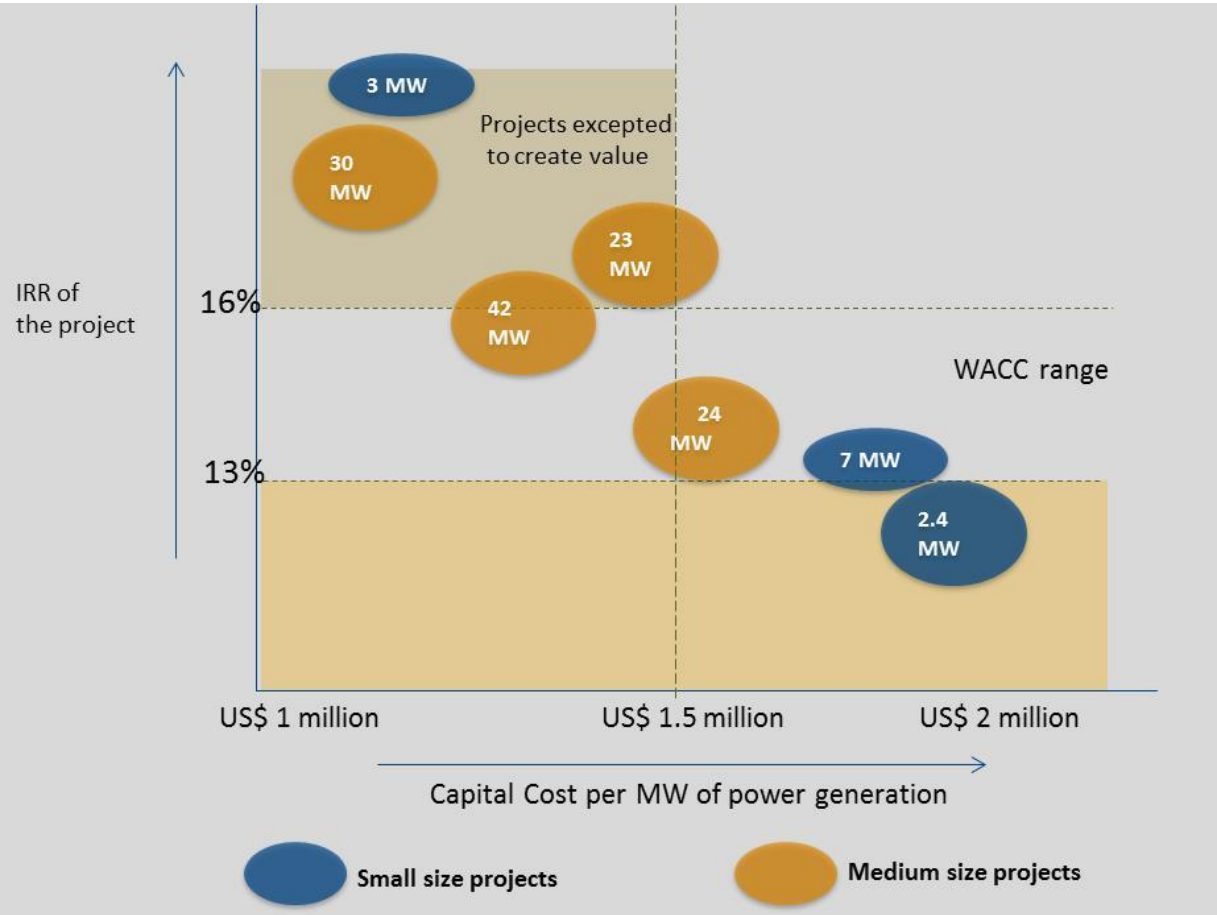
The benchmark hurdle rate (WACC in this case) for sector indicates that hydropower projects with an internal rate of return (IRR) of 16% or more may create significant value for the investors, while projects with IRR of less than 13% may not create adequate financial value for the investors. As Nepal is developing country some projects have a larger developmental impact and necessary for development than is indicated by the IRR.

Data on the cost of generation of power (in terms of US$ or NPR per MW) and the expected IRR of the projects was available for three small and four medium size projects in various stages of development and construction[109]. Analysis of these seven cases to identify the projects expected to create value (and in turn enterprises owning these projects) has been shown in the framework in Figure 40.

[108] Equity investor in this project context refers to private equity (PE) or venture capital (VC) investor

[109] Intellecap primary research,2014

Figure 40: Analysis of projects in development and construction stage on value creation



Source: Primary interviews and Intellecap analysis, 2014

Note: The IRR values mentioned above have been estimated in terms of Nepalese Rupee (NPR)

It can be observed that the IRR of the project has significantly improved as the cost of generation has decreased. Cost per kW is a key factor in determining the IRR of the project and any project with installed capital cost per MW of power of less than US$ 1.5 million (or NPR 1.5 billion) per MW are expected to have IRR values better than the hurdle rate for the sector.

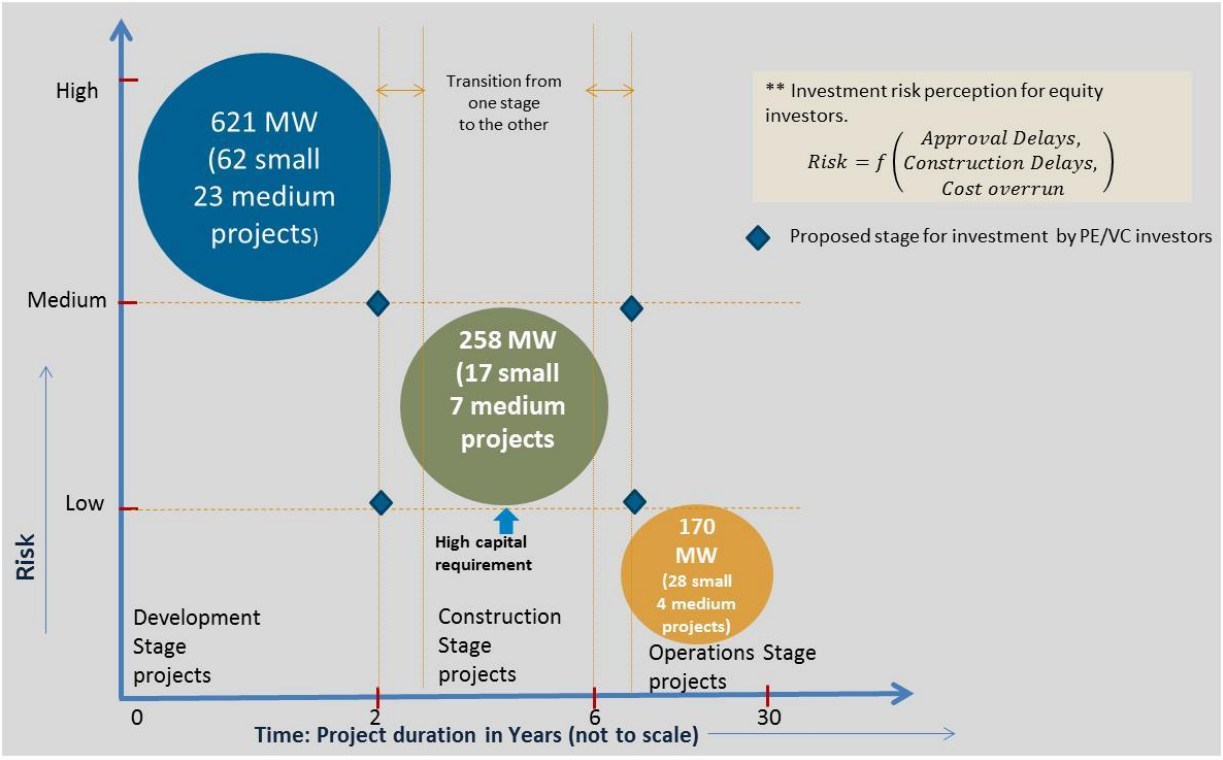
As economies of scale usually lead to lower cost of generation for a project, hydropower projects in above 10 MW are expected to create more value than the smaller size projects.

6.1.2. Stage of the project for investment

Given the high gestation period of hydropower projects where development to operations stage can take more than 6 years to complete, the investment entry points for VC/PE investors is the key for estimating the time period for investments. The risk of time delays and cost overruns in the hydropower project reduces from development to construction to operations stage. Hence businesses with projects in operations or construction stage are more attractive for investment than businesses with projects in development stage. The requirement of capital however is the most in the construction stage and development stage and least in operations stage. Most of the developers / IPPs in Nepal also prefer equity investment in the construction or in development stage[110]. A risk analysis framework for different project stages has been shown in figure 41.

[110] Intellecap primary research, 2014

Figure 41: Risk analysis framework for different stages in the hydropower project lifecycle



Source: Primary interviews and Intellecap analysis, 2014

Construction stage of the project is best suited for PE/VC investment in small and medium hydropower projects in Nepal.

Based on the risk analysis and capital requirements of the promoters/ IPPs it is estimated that the construction stage is best suited for PE/VC investment and development stage the least. In addition the following entry points have been identified for PE/VC investment in different stages that investors should be aware of:

- Award of the contract for civil works (End of development stage, beginning of the construction stage): This usually signifies the end of the development phase and start of the construction phase of the project. Most of the project activities are under the control of the developer (refer Figure 27) and hence project delays are less likely to occur.
- Completion of tunnelling works (Construction stage): It was observed that a number of projects in Nepal get delayed and cost overruns happen during the tunnelling construction[111]. Completion of tunnelling for the project indicates that there are less likely chances for the project to get delayed and overruns can be controlled in a better way. Completion of tunnelling works thus offers less risk to a potential PE/VC investor
- Investors looking to invest in operation stage of hydropower plant would be expected to offer inputs beyond capital investment which may include state of art technology and managerial expertise

6.1.3 Power evacuation infrastructure

Hydropower projects with power evacuation infrastructure in place or under construction are more attractive as supplying the power to grid in Nepal is a key challenge due to inadequate transmission infrastructure.

[111] Intellecap primary research, 2014

6.1.4 Signed PPA rates and payment consistency

Payment consistency from NEA and predictable cash flows for a hydropower project would be a key parameter for a PE/VC investor while deciding upon the attractive businesses in the sector. NEA has plans to procure electricity from new projects[112] only from mid-November to mid-April but not during the rest of the year due to extreme supply demand mismatch[113]. The projects with PPA is place that ensure that NEA procurers electricity even in the 'wet' months of May to October are in better financial position compared with the projects that have no such agreements. In addition projects with latest PPA rates (approved in 2012-13) and projects with PPA rates in dollar terms may also be considered by the PE/VC investors.

6.1.5 Management teams

With sectorial and business experience, and good governance practices are better placed to manage the entire life cycle of a hydropower plant that could range for more than 35 years. In addition prior experience of the management team in handling power projects in all stages: development, construction and operations is key to control costs and on time completion of the project. Given the different stage time in the project life cycle for a hydropower plant in Nepal, it is expected that enterprises with management team of more than 10 years of experience (in development, construction and operations stage) will manage the project and enterprise in a more professional and efficient way.

6.2 Framework for selecting the most attractive business model in hydropower sector

All the key factors for identifying the attractive businesses in Nepal in the hydropower sector have been summarised in the form of a framework as shown in figure 42.

[112] Commissioned after 2014

[113] NEA expects the demand supply mismatch in wet months to start from 2016-17

Figure 42: Proposed framework for identifying attractive business in Nepal in hydropower sector

Parameter	Parameter Attribute	Investment attractiveness
Capital Cost per KW of generation (only for ROR projects, for others IRR is a better tool)	Less than US$ 1500 (NPR 150,000) per kW	●
	Between NPR 150 -180,000 per kW	◑
	More than NPR 180,000 per kW	○
Stage of project	Development	○
	Construction	●
	Operation	◑
Power evacuation Infrastructure	Available	●
	Not Available (under construction)	◑
	Not Available (proposed for construction)	○
PPA rates payment consistency	PPA for selling grid power 12 months a year	●
	PPA for selling grid power only in dry months	◑
	PPA for selling grid power only in wet months	○
Experience of Management team in managing hydropower projects	Less than 3 years	○
	From 3 -10 years	◑
	More than 10 years	●

● High ◑ Moderate ○ Low

Source: Intellecap Analysis, 2014

6.3 Exit potential

As in any frontier market where the capital markets are very less developed, exits for PE/VC investors pose the biggest challenge. The hydropower sector in Nepal also poses similar challenges to equity investors and there have been few successful exits in the sector despite having witnessed substantial foreign equity investment[114].

6.3.1 Exit spectrum for PE / VC investors in Nepal

A key role that PE/VC firms are expected to play in Nepal is to make businesses better at what they do through market linkages, enhancing management capacities and accessing better technology. This results in making their portfolio companies more attractive to other investors and in return a PE/VC firm expects a successful exit from the project/firm in question. In Nepal the major ways to exit investments are a) Trade Sale b) Secondary Sale c) Management / Promoter buyout and d) IPO route[115].

- **Trade Sale:** A trade sale is selling the company's shares to another company usually in the same industry sector when the acquirer needs the company to supplement its business areas[116]. The numbers of publicly available M&A transactions in Nepal are on the lower side (excluding BFSI sector) but the activity is picking up in recent years after the political stability in the country. Many companies in Nepal have started to realise the benefits of economies of scale and scope, increased revenue and market share, cost reduction through consolidated operations. The trade sales therefore in general offer better opportunities VC/PE funds for exits in Nepal in a number of industry sectors such as hydropower, BFSI that have many

[114] Refer section 4.5.2
[115] Intellecap primary research, 2014
[116] A trade sale is assumed similar to 'strategic' sale

existing players (monopolistic competition) and where opportunities for consolidation are higher.

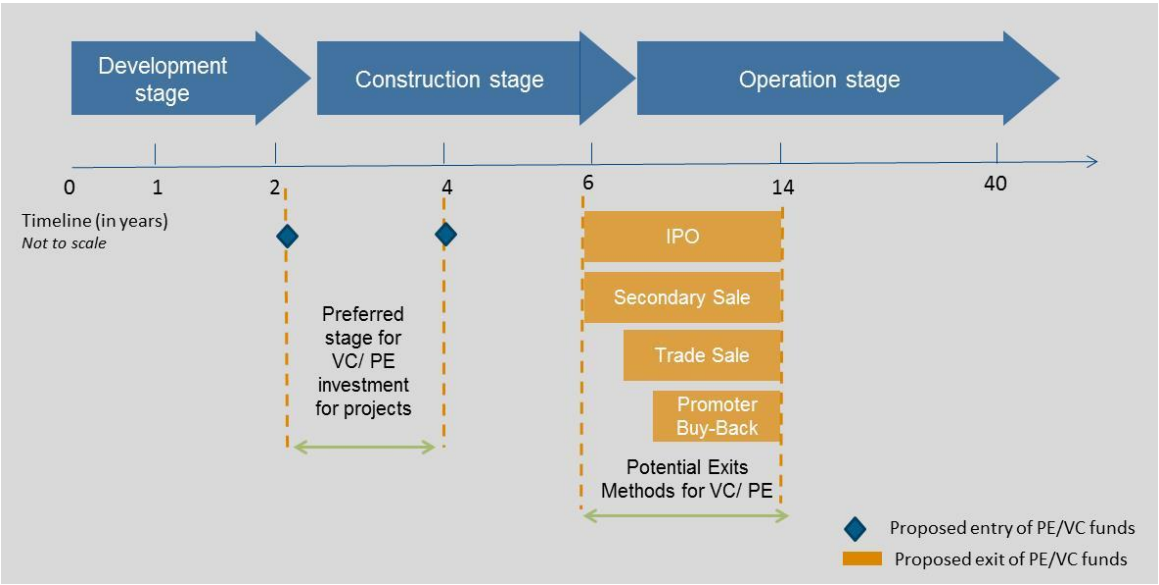
- **Secondary Sale:** Secondary sales is the purchase of the private equity investors' or others' shareholdings by another investment institution. PE/VC investor activity in Nepal is still an emerging phenomenon; however development financial intuitions such as IFC have been active in Nepal in recent past. Secondary sale would be an attractive method to exit in Nepal once the investment eco-system is little more developed. Section 8.2 recommends some of the ways on how the PE/VC enabling ecosystem in Nepal can be created.
- **IPO (Initial public offering):** IPO is used to publicly share the equity offering that is followed by the listing of shares on stock exchange. The capital markets in Nepal are in nascent stage and are dominated by banks and financial institutions where presence of real sector on the capital markets is very low (excluding the hydropower sector)[117]. IPO route in general may not be the best possible ways of exits for VC/PE funds in Nepal.
- **Management / Promoter buyout:** Management / Promoter buyout involves the repurchase of the private equity investors' shares by the company and/or its management. The management buyout could be attractive exit method in the sectors where profit margins, liquidity in cash flows are on the higher side and payback period is on the lower side[118]. It thus becomes possible for the promoters to utilise the cash earnings for buying back the stake of PE / VC investor.

6.3.2 Exit spectrum for PE / VC investors in the hydropower sector in Nepal

Timing is critical and PE/ VC investors must be cognisant of the right times for entry and exit in hydropower projects.

Given the high gestation period of hydropower projects where development to operations stage can take more than 6 years for even small and medium size projects, the entry points for VC/PE investors is the key while making investment decision as successful exits will depend on the entry points of investments. The risk analysis framework developed in section 6.1.2 indicates that the construction stage is most suitable for PE/VC investors as the requirement of capital is highest at this stage and risks are lower compared to development stage. Based on the analysis and discussion above, the capital value chain for possible exit options for PE/VC investors in Nepal has been shown in figure 43 for small and medium size projects.

Figure 43: Capital value chain for investment exits in hydropower sector in Nepal



Source: Intellecap Analysis, 2014

[117] Refer Annexure 10.5.3 for detail discussion in capital markets in Nepal
[118] Intellecap primary research, 2014

The timeline for different exits methods has been estimated based on: a) investment and listing policies related to hydropower sector in Nepal and b) the trends available from the primary research and secondary research data[119].

Previous cases of exits through strategic sale and promoter buy-back

Three exit cases for equity investment in the hydropower sector in Nepal were documented through primary and secondary research as shown in Table 14 below.

Table 14: Successful investment exit cases in hydropower sector in Nepal

S.No	Target Company	Acquirer	Seller	Stake (%)	Location of target	Exit Procedure
1	Bhote Koshi Power Company Pvt. Ltd. (BKPC)	Himal International Energy Pvt. Ltd.	International Finance Corporation (IFC)	10	Nepal	Trade Sale
2	Arun Valley Hydropower	Promoter	Japanese equity investor	NA	Nepal	Promoter Buy Back
3	Kabeli Energy	Infraco Ltd. Singapore	Butwal Power Company	74	Nepal	Trade Sale

Source: Bhotekoshi project website (accessed in April 2014), Nepal Energy Forum website (accessed in April 2014, Intellecap primary research, 2014

The first and second cases are examples of PE/VC exits whereas the third case is a strategic sale. The first exit was through a trade sale when IFC offloaded its equity share to Himal International though the transaction took over a period of more than 4 years. The second exit case was that of promoter buy-back from a Japanese equity investor that happened over a period of 5 years from the investment date[120].

IFC's successful exit in the Bhote Koshi Power Company Pvt. Ltd project investment

Bhote Koshi Power Company Pvt. Ltd (BKPC) is a 36 MW ROR hydropower project in the Sindhupalchowk district that was commissioned in January 2001 with a total investment of US $ 98 million. IFC owned 10% equity in the project and used its 'Put Option' to sell the shares to Himal International Energy Pvt. Ltd. (HIEPL) in 2006. This was one of the earliest success case stories of PE/VC exit in Nepal in the hydropower sector. IFC divested its investments and was able to get returns from the investment over a period of 6 years from the initial investment.

Promoters prefer the IPO route for PE/VC exits in the hydropower sector

The enterprises in the hydropower sector in Nepal (covered in primary research) were asked to indicate their relative preference on the possible exit options for equity investors. Table 15 shows the response of these enterprises that clearly indicates their preference of IPO route as an exit option.

Table 15: Analysis of exit models in private equity investments

Type of Exit	Enterprise preferences	Key reasons
IPO Route	High	Enabling government policies and regulations on IPO listing Exit could be immediately possible after lock-in period given the success of secondary sale in the hydropower segment
Secondary Sale	Medium	With more foreign investors interested in Nepal, secondary sale would definitely be a possibility. No clear rules or guidelines that may hinder the exit

[119] Refer Annexure 10.4 for detail estimations
[120] Intellecap primary research, 2014

Type of Exit	Enterprise preferences	Key reasons
		for the equity investor. Reparation of capital could be an issue
Trade Sale	Medium	The number of transactions in the M&A space in the hydropower sector in Nepal is low but the activity has been picking up recently. Lack of clear guidelines and policies in general for M&As in the sector are the key issues with trade sale in Nepal
Promoter buy-back	Low	The projects are capital intensive and promoters would prefer to utilise the additional capital in developing new projects. Reparation of capital could be an issue

Source: Primary interviews and Intellecap analysis, 2014

IPO route was the most preferred option for these enterprises given the ease of regulations in listing the hydropower companies, excellent stock performance of the listed companies such as Chilime and major success of IPO listing for new companies such as Ridi Hydropower in 2014.

Ridi Hydropower IPO oversubscribed by 92 times

IPO of Ridi Hydropower, an independent power producer (IPP) operating 2.4 MW Ridi Khola project and 3 MW Piluwakhola project, was oversubscribed by 92 times in a filing submitted by the company in March 2014. Civil Capital Market - the issue manager for the IPO mentioned that they had received around 90,000 applications for 1.17 million units of primary shares in the company with face value of Rs 100. The IPO created a major buzz in the market and people were seen thronging the six collection centres in Kathmandu on all four days of the collection of applications.

Exit through IPO route in Nepal is more feasible if the project gets listed in the operations stage

Though IPO route seems to be the most attractive way for PE/VC exits, such exit is possible only if the IPO is issued in the operations stage of the hydropower project. This is due to the three year promoter lock-in period criterion in Nepal. The construction stage for a small and medium size project typically ranges from 3 to 4 years and the PE/VC investment is preferred in this stage. In case the IPO of the project is issued in the construction stage, there are good chances that the PE/VC investor may not have fulfilled the criterion of three years holding. PE/VC investors looking through exiting the IPO route need to ensure that IPO of the project is issued in the operations stage.

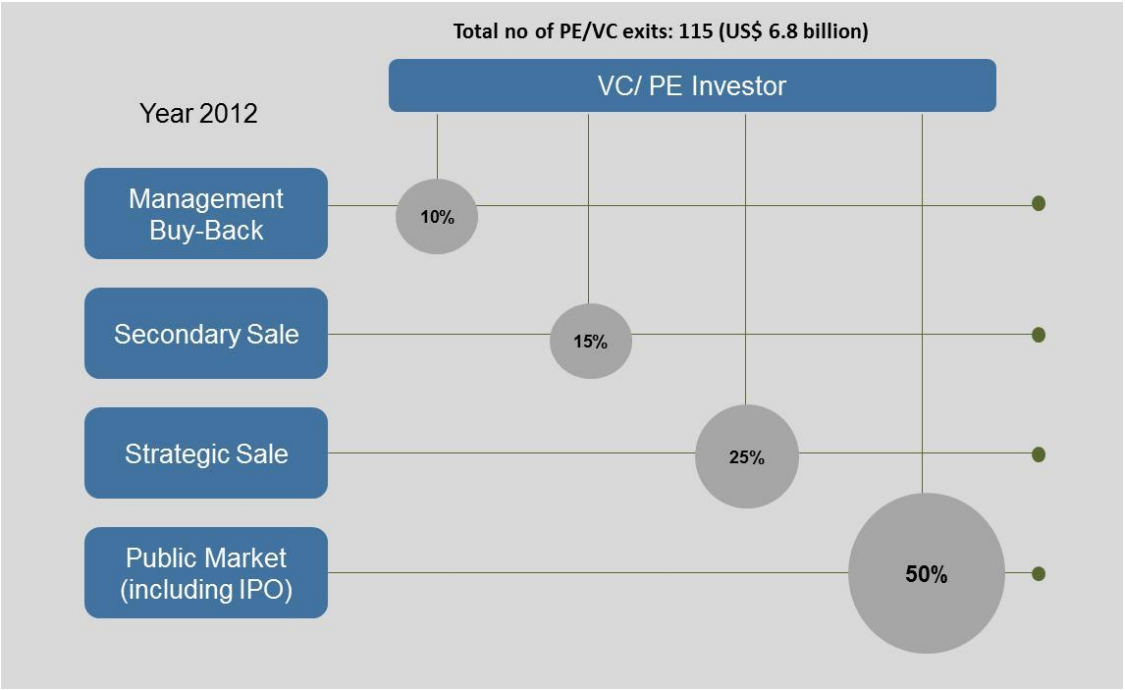
6.3.3 Exit spectrum for PE / VC investors in the hydropower sector in India

The capital markets in India are much more developed compared to Nepal[121] and the PE/VC activity is much advanced level. The most popular exit route for both VC and PE investments in India is through public market sales, including IPOs. Out of the 115 PE/VC exits reported in India 2012, more than 50% were through public market sales, including IPOs[122]. The trends in PE/VC exits in India have been shown in figure 44.

[121] Refer Annexure 10.5.3 for details

[122] IVCA; India Private Equity Report 2013, Bain and Company

Figure 44: PE/VC exits in India



Source: IVCA; India Private Equity Report 2013, Bain and Company

There are very few publicly available cases for PE/VC exits in India for the hydropower sector though there are a number of strategic sales as shown in Table 10. Two cases of successful PE/VC exits in the hydro energy space in India have been listed in Table 16 below.

Table 16: PE/VC exits in India in the hydropower sector

Target Company	Acquirer	Seller	Stake (%)	Location of target	Exit Procedure	Investment returns
Ambuthirtha Power Pvt Ltd	NA	FE Clean Energy	20	India	Secondary Sale	26%
Soham Renewable Energy India Pvt Ltd	NA	FE Clean Energy	NA	India	Secondary Sale	28%

Source: VC Circle (website accessed in April 2014)

The investment returns of 26 and 28% on these exits is very good when compared to the target IRRs of VCs/PEs in India at average of 'late teens' or 'early twenties'.

FE Clean Energy Groups' successful exit case in the hydropower sector in India

FE Clean Energy Group is a private equity firm with investments throughout Asia and Latin America. It currently manages a portfolio of $230 million focused on the clean energy sector and of the existing fund it has deployed around $90 million in India across five firms. The group made successful exits from two investments—Ambuthirtha Power Pvt Ltd and Soham Renewable Energy India Pvt Ltd in 2011, realising an attractive gross return (IRR) of 26 per cent and 28 per cent, respectively. It held 20% stake in Ambuthirtha Power (P) Ltd that it offloaded in 2011. Ambuthirtha Power is located in Bangalore and operates two ROR hydroelectric power plants of combined installed capacity of 22 MW

7. Opportunities and challenges for hydropower sector in Nepal

There is a growing participation from the private sector and increased government focus on improving the power infrastructure in Nepal. The private sector is expected to add more than 1000 MW to the existing installed capacity in the next 5-6 years[123] expanding nearly five-fold from the present capacity of 230 MW. The market size for the private companies is expected to increase seven folds from US$ 90 million (NPR9 billion) in 2012-13 to US$ 680 million (NPR 68 billion) in 2019-20 at an impressive CAGR of 33%. The hydropower sector can have a greater impact on the economic growth in Nepal as well as a positive environmental impact by providing clean energy.

Although the outlook is positive; hydropower sector faces considerable challenges

Some of the key challenges and opportunities for the hydropower sector have been analysed in the subsequent sections.

7.1 Inadequate infrastructure and high T&D losses in transmission and distribution landscape

Inadequate transmission infrastructure is the one of the key challenges for new hydropower projects in Nepal that can critically affect their future cash flows[124]. The problem of inadequate infrastructure for transmission and distribution could be resolved to some extent by encouraging private sector participation through public private partnership (PPP) models. Privatisation of distribution could be investigated through the franchisee model of distribution which has witnessed success in India and other developing countries. The privatisation of distribution has been associated with reduction of distribution losses and electricity thefts and will ensure better quality and reliability in power supply[125].

7.2 Seasonality challenges for ROR hydropower projects

The inadequacy of the ROR projects to meet demand requirements in the dry months is a key technical challenge. All existing Hydro Power projects in Nepal (barring NEA owned Kulekhani project) are ROR projects whose power generation depends on the river discharge. Excess power is produced during the 'wet' months and there is extreme less supply during the dry months leading to demand supply mismatch[126]. It opens up the opportunity for Nepal to enter into a trade agreement with its power deficient neighbours such as India and Bangladesh to export the surplus power produced during the wet months and import power during the peak demand period.

7.3 Access to finance and role of PE/VC investors

Access to finance for small and medium hydropower projects under current scenario is not much of concern. However, as electricity generation, transmission and distribution scales up and attempts to realise the full hydro-electricity production potential of Nepal, the existing debt instruments and debt capital may be rendered insufficient. Nepal's own financial resources both in the public and private sector will be insufficient to make financial investment in a scale that hydropower development needs.

PE / VC investors could play a very important role in financing the small and medium projects in future. The PE/VC investors can provide cash to small and medium sized hydropower companies to burn in the construction stage before turning profitable and cash positive in the operations stage. In addition PE/VC investors would also help these to build up their governance, managerial and technical capacity.

7.4 Overvaluation of the enterprises by the promoters

[123] Refer section for 2.1 for more details
[124] Refer section 4.6.2 for detail discussion
[125] Spark Capital , Initiating Coverage on the Indian Power Sector-2010
[126] Refer Figure 6 and Figure 7 for details

Arriving at right valuation for the prospective hydropower projects is critical for investors as overvaluation and funding equity through debt is a key risk.

There have been few incidents of overvaluation of hydropower project by promoter while applying for debt funding from banks so as to maximise quantum of debt allocated and fund equity through debt. Therefore, off late a number of banks have set up their technical expert teams (in the hydropower sector) to check the valuation and strength of financial statements of the promoter group. On these lines it becomes imperative for the equity investors as well to have reasonable and comparable valuation parameters or matrices that would assist them to decide upon the robustness of the valuation claims of the promoter. The hurdle rate method for valuation of hydropower projects in different stages of project life cycle may be utilised by the PE/VC investors to validate the valuation of a hydropower enterprise.

7.5 Social challenges

Displacement of local community and social unrest

Hydro Power projects are usually associated with the displacement of a large set of population and hence are often targets of various social groups. Many of the IPPs in Nepal have overcome this problem by offering an equity stake in the project to the displaced community of the order of around 10% in the company. However there have been several reported cases of social vandalism targeting the hydropower projects under construction in Nepal with the local population demanding that the project should construct roads, irrigation canals, bridges, school buildings in the affected area. Some of these demands may be genuine but disruption of work will result in time and cost overrun of the project. The government has to play a crucial role to overcome this challenge by financially and administratively supporting the IPPs to take up some the genuine demands of the local people.

7.6 Over dependency on NEA as a single buyer

There is over-dependency on NEA in Nepal as a single buyer for grid power; however the space can be opened for the private sector

NEA is the single buyer of grid electricity in Nepal and despite its financial problems has never defaulted on payments to the IPPs. However with the installed capacity expected to increase by 3 folds in next 5-6 years, NEA could be under extreme pressure for payment to the IPPs in case its revenues does not increase proportionately. The entire power value chain is dependent on NEA for proper functioning and could collapse under such situation. This is a major risk for IPPs in future and one way of mitigating this risk is allowing the industrial sector to directly purchase grid power from the IPPs. Industries in Nepal have been facing acute power shortage and have identified the availability of electricity as one of the major obstacles for doing business[127]. In near future, decentralisation and opening up of power sale directly to industries by IPPs can bring respite to this challenge.

7.7 Policy and regulatory challenges

Establishment of an energy regulator is of utmost importance in Nepal

At present there is no utility or energy regulator in Nepal which is responsible for planning, construction and operations for electric supply[128]. The ordinance of forming regulatory body and development policy for the sector have been tabled in parliament but passage of same has got delayed largely due to long standing political uncertainty in the country.

The Hydro Power Development Policy 2010 recommends that the Electricity Tariff Fixation Commission (which was established through provisions of Electricity Act 2009) should be developed as regulatory body in Nepal. The present role of the Tariff Fixation Commission is to review and approve tariff filings by the NEA but it is neither required to review the IPP transactions between NEA

[127] Enterprise Survey Report: Nepal, World Bank, 2013
[128] REEEP policy database, 2013, Accessed in March 2014

and IPPS, nor is involved in the approval of power purchase agreements between the two parties. In addition the Commission does not review energy exchange arrangements between the NEA and India giving NEA the sole power in business transactions and decisions in buying of electricity.

The establishment of an energy regulator, with the responsibility to oversee the sector could ensure fairness, and promote transparency and competition in the energy sector. The presence of an effective regulatory body can facilitate private participation, both domestic and international, in the sector as well as protect the sector from political instability. As Nepal moves to a more stable political system, the policies and ordinances for the establishment of energy regulator are expected to be approved soon by the parliament.

7.8 Challenges in currency fluctuation

Other challenges associated with the hydropower sector in Nepal that affect the quantum of foreign investments include political risks, taxation risks and currency risks. The political system in Nepal and Nepalese currency are at state of constant flux and hence investors tend to safeguard their investments by seeking to sign investment deals in stable currencies. This ensures that the expected returns on investment of these investors do not fluctuate wildly. Though, Nepalese Rupee has not seen wild variations in the past except during INR slowdown, the socio-economic and political environment is still marked by uncertainties. So, if Nepal plans to attract investors, it has to keep a close eye on the currency fluctuations.

Additionally the sovereign guarantee may be demanded by investors given investors face considerable risks if a hydropower project fails or is declared unviable after investment has been made due to reasons beyond the promoter's control or natural disasters. Nepal may need to increase its foreign reserves, if it intends to provide sovereign guarantee to these investors.

8 Exit challenges for PE/ VC investors in the hydropower sector in Nepal

PE/VC investors could play an important role in the development of the hydropower sector in Nepal by infusing the requisite capital in the sector as well as providing governance, managerial and technical advice. Exit opportunities available are key criterion of investment decision for the PE/VC investors as investors would want to hold on to investments longer than they can extract value from or add value to. So an enabling environment for exits further increases the attractiveness of a country for investment. However managing successful exits could be a challenging task for PE/VC investment in a frontier market such as Nepal. The following section briefly analyses the challenges in exits that exist in Nepal and then specific challenges for exits in the hydropower sector. Some recommendations on creating an enabling environment for PE/VC activity in Nepal with focus on exits have been covered in the subsequent section.

8.1 Challenges in exits

The key challenges to private equity exits in Nepal fall under two broad categories as shown in Table 17 below; i.e. systemic and equity investor-related challenges.

Table 17: Challenges for PE/VC exits in Nepal

Systemic Challenges
Nascent industry, so higher risk and longer return horizons are possible
Little or no regulatory oversight for private exit markets
Unclear policies in the judicial processes and efficient enforcement of business law
Lack of investor-entrepreneur connection platforms and investment intermediaries
Currency devaluation risk
Lack of exit platforms designed for secondary-sale
Lack of ecosystem enablers angel networks VC/PE networks etc.
Equity Investor-Related Challenges
Less experience of managing portfolio companies in economies like Nepal
Difficulty in building deal-flow
Lack of risk assessment frameworks customised for Nepal
Low level of secondary market transactions in the capital markets
Sector Specific Challenges
Challenges in issuing shares at premium
Promoter lock-in period of 3 years
The repatriation of capital is a challenge for foreign equity investors in Nepal

Source: Primary interviews and Intellecap analysis, 2014

Specific challenges for PE / VC exits in the Hydropower sector

The key challenges for the equity investors in the hydropower sector have been discussed briefly below[129].

Challenges in issuing shares at premium: Currently the companies in Nepal have to issue their shares at a constant par value of NPR 100 per share. A company can issue its share in premium only if it has been recording profit for past three consecutive years. Due to this provision promising and

[129] Intellecap primary research, 2014

scalable companies are often reluctant from going public given the low valuation of their shares. The private equity investors would thus find it difficult to exit these enterprises through offering at premium.

Promoter lock-in period of 3 years: The promoter lock-in period of three years is a key challenge for exits of private equity companies in Nepal. The existing law states that "the shares subscribed by the shareholders in the groups other than public (group of promoter and other) of the body corporate which is eligible for going public, shall not be qualified for sale unless a three years period after the allotment of such shares is complete"[130]. The three years lock in period for private equity investors is on the higher side in the SAARC when compared to one year in India[131] and Sri Lanka[132] and no lock in period in Bangladesh[133].

The repatriation of capital is a challenge for foreign equity investors in Nepal: At present the repatriation of capital to a foreign country (except India) requires approval from the different departments in the NRB and department of industries and is often discretionary[134]. Given the uncertainty in the policies and regulations of future governments due to political instability, this discretion could be major hurdle for foreign investors in exits.

8.2 Enablers needed for promoting PE/VC ecosystem and facilitating exits

Public sector institutions in Nepal such as the NRB, HIDCIL; International development financial institutions (DFIs) such as IFC and bilateral donors such as ADB can play a critical role in overcoming the barriers and challenges in exits to create friendly investments ecosystem for PE/VC investors in Nepal. Some key recommendations for creating an enabling ecosystem that would facilitate exits for PE/VC investors have been discussed in the section below.

Introducing Anchor funds: Public sector institutions such as HIDCIL and international DFIs in Nepal can play the role of anchor investors to identify promising new fund management teams and commit capital to them. These teams can benefit from the DFIs knowledge of best practices in emerging markets private equity as well as access their network for information and knowledge pool. Anchoring new funds in a country such as Nepal has the potential to kick-start the PE/VC investing in diverse areas. Given the high requirement of equity in the hydropower sector in the next few years, these PE/VCs can play a critical role in enabling access to finance to the enterprises. Further with creation of an ecosystem for PE/VC funding, secondary sale transactions would be a clear possibility as a methods of exit.

Global Energy Efficiency and Renewable Energy Fund (GEEREF)

GEEREF is an anchor fund advised by the European Investment Bank Group that was created in 2009. It promotes the private equity funds which focus on renewable energy and energy efficiency projects in emerging markets. Till December 2013 GEEREF had invested in 6 funds across Africa, Asia, Latin America and the Caribbean in emerging /frontier economies such as Bangladesh, Sri Lanka, Vietnam, and Indonesia in Asia. It has committed over Euros 50 million so far across these six funds with investments ranging from 10 million euros to 12.5 million euros.

Creation of Private Investment in Public Equity (PIPE) funds[135]: One of the important ways for exits in the hydropower sector is through the IPO route and later through open markets. However given the nascent stage of capital markets (especially secondary markets) in Nepal, PIPE funds could be utilised to enable VC/PEs to offer securities through private placement issued at a set price. The key benefit for a PIPE transaction is its quick turnaround time when compared to the traditional IPO

[130] SEBON Annual report 2011-12
[131] SEBI annual report 2012-13
[132] CSE directive 2012
[133] SECBD website, 2013
[134] Intellecap primary research, 2014
[135] A PIPE transaction is a funding transaction involving private placement of equity securities

route because a) the issuer is a public entity in which a substantial amount of public information is available already and b) a resale registration statement is usually filed after the PIPE transaction is closed.

Creation of 'Guarantee funds' by the Public sector institutions to overcome the challenge of debt and equity financing: The capital structure for hydropower projects in Nepal is debt dominated and access to debt in the next five years could be a challenge as local banks may struggle to entirely fund all the hydropower projects. Similarly for equity investors delay in the construction of projects or cost overruns may significantly affect their valuation of projects. Creation of guarantee fund by Public sector institutions, both for debt and equity products could provide commercial banks and PE/VC funds with partial coverage of risk exposure against investment made for hydropower projects. This would ensure that the capital supply to the hydropower sector is not affected in the long term and this would facilitate further investments in the sector.

Building an Ecosystem for the secondary markets to facilitate private equity investment exits through open offer: More awareness about the nuances of equity investing would be beneficial for both entrepreneurs and investors. Industry networks, forums and conferences, incubators and investment intermediaries have a key role to play in building this awareness and creating a better ecosystem for equity investments. Historically given the low trading volumes in secondary markets in Nepal, an enabling environment for promoting secondary market transactions should be created[136]. The key drivers that would facilitate the trading volumes in the secondary markets in Nepal are a) introduction of reliable online trading system making trading affordable and b) settlement of transactions to be shortened to a few days from the present duration that could last for few weeks.

Regulatory regime can play a key role in putting in place regulatory structures to allow exit platforms to emerge

Recognising equity investments as a separate asset class creates more formal structures and higher degree of organisation in the private equity market, which helps investors to navigate the processes of incorporation, licensing and approvals. This recognition can also pave the way for special concessions to private equity investors as well as create the foundation for public and private exit platforms to emerge.

9 Limitations of the research

The report is constrained by limited consistent availability of data across all sectors. In absence of hard and consistent data in some sectors, the report relies on data from the field and relevant, triangulated proxy data from secondary sources. It must also be noted that report does not extensively cover all the value chain elements in a sector - only promising, potentially high growth sectors are analysed. Users of this report should be cognisant of these data limitations.

[136] Refer Annexure 10.5.3

10. Annexures

10.1 Legal Structures for Businesses in Nepal

Table 18: Legal Structures available to Businesses in Nepal

Structure	Description	Implications for financing
Sole Proprietorship	Only 1 shareholder allowed, registered with the Department of Cottage and Small-Scale Industry	Cannot issue shares or debentures and hence cannot take in equity investments
Private Limited (Pvt. Ltd.)	1 to 50 shareholders can register a Pvt. Ltd. company with the Office of the Company Registrar under the Companies Act. A company that intends to trade also needs to register with the Department of Commerce.	Can issue different types of shares and debentures with limited liability to shareholder; and hence is an appropriate structure for equity investments
Public Limited (Ltd.)	At the time of incorporation 7 shareholders can register a Ltd. company, but the actual number of shareholders should exceed 51. Also registered with the Office of the Company Registrar under the Companies Act. A company that intends to trade also needs to register with the Department of Commerce.	Can issue different types of shares and debentures with limited liability to shareholder; and hence is an appropriate structure for equity investments, and can also raise capital from public markets.
Cooperative	Minimum of 25 members can register a Cooperative under the Cooperative Act.	Can issue shares and debentures and net profits are distributed to members after retaining 25%; however dividend cannot exceed 15% of the paid up capital per share. This is a less appropriate legal structure for equity investors expecting a market rate of return.

10.2 Peak Demand and Peak Supply of grid power: Assessment Methodology

Peak demand of grid power: assessment methodology

- NEA estimated peak demand of 1024 MW for the year 2011-12 was taken as the benchmark for predicting demand growth till 2020
- The peak demand was expected to grow at a CAGR of 9% from 2011-12 and is expected to be at 2052 MW in 2020. The growth in demand was expected to be driven by three major factors:
  - Annual energy demand growth that is expected to grow at 7.5% till 2020[137]
  - Increasing income levels (GNI per capita) at CAGR of 9.3% for the past 4 years (2009 to 2013)
  - Increase in industrialisation rate (in terms of contribution to GDP) that has increased by a CAGR of 4.5% in the last 4 years (2009 to 2013)[138].

Peak supply of grid power: assessment methodology

[137] Climate Investment Funds Nepal statistics 2011
[138] Economic survey 2012-13, Ministry of finance, Nepal

- NEA estimated peak supply of grid power at 710 MW for the year 2011-12 was taken as the benchmark for predicting supply growth till 2020
- The peak supply in 2020 is estimated at 2430MW (including NEA supply). The peak supply was estimated based on the following factors:
    - Around 95% of the projects with PPAs in the development and construction stage will be operational by 2020.
    - The time period of the development cycle has been taken in the range of 2-4 years and construction cycle has for the projects been taken in a range of 3-7 years depending on the size of the project. The maximum time period for development and construction stage for a small project has been taken at 4 years, for medium projects at 6 years and for large projects at 8 years starting from 2011-12
    - At least 3-4 small and medium size projects have been estimated to enter the operations phase every year from 2013 onwards. There will be a major spurt in the supply of grid power in 2016-17 as the large size 456 MW Upper Tamkoshi project is expected to be commissioned

Peak demand and supply of grid power in 2018-19: assessment methodology

- The peak demand of grid power in 2018-19 has been taken at 2057 MW as per NEA estimates. Peak demand will be highest in the dry months i.e. from September to March
- The peak demand is expected to be highest in the months of December and January at 2057 MW. The month wise peak demand will be not less than 90% of the peak demand in December and January
- The peak supply is expected to be highest in the months of June and July at 2206 MW. The supply will be highest in the wet months i.e. from April to September
- The month wise peak supply will fall to as low as 50% in the dry months leading to extreme demand supply mismatch in the dry months

Power shortage was calculated by measuring the difference between peak demand and supply and presenting it in % terms of the peak demand

Power shortage % = (Peak Demand- Peak Supply) / Peak Demand

10.3 Market Opportunity and Capital Flow Assessment Methodology

Assessment of market opportunity

The key assumptions for calculating the present market size for IPPs in Nepal and its estimated growth potential in 2019-20 has been shown in Table 19 . Other possible sources of income for a company operating a hydropower project such as technology transfer or engineering services have not been included in the estimation process.

Table 19: Key parameters for Market size estimation for hydropower sector in Nepal

Market Size Estimation for hydropower in Nepal	
Present Installed Capacity (only private players or IPPs)	230 MW (all ROR projects)
Capacity Factor[139]	0.75 average for wet months for ROR projects 0.2 average for dry Months for ROR projects

[139] Intellecap primary research, 2014

	0.35 for Storage projects
PPA Rates as approved by NEA in 2013	NPR 4.80 per KWh in wet months (total 8 months) NPR 8.40 per KWh in dry months (total 4 months) NPR 7 per KWh for storage projects (for all 12 months)
Market size estimation in 2019-2020 (only for private players or IPPs)	Installed Capacity to increase to 1750 MW 70% ROR, 30% storage projects Tariff increase rate :@3% annually

Source: NEA Annual report 2012-13, Intellecap Analysis, 2014

Dry month period has been assumed from November to February (4 months). Remaining months are assumed as wet months[140].

Based on the above assumptions the following calculations were carried out to estimate the present and future market size of the IPPs in the hydropower sector:

- For ROR projects in dry months
  - Actual power generated in dry month = Capacity x capacity factor (for dry month)x no of hours in four months
  - Revenue generated in dry months= PPA rate x actual power generated
- For ROR projects in wet months
  - Actual power generated in dry month = Capacity x capacity factor (for wet month)x no of hours in eight months
  - Revenue generated in wet months= PPA rate x actual power generated
- For storage projects
  - Actual power generated= Capacity x capacity factor x no of hours in a year
  - Revenue generated= PPA rate x actual power generated

The total market size is the sum total of the three above revenue categories for different projects in Nepal.

Assessment of Capital flow in the hydropower sector in Nepal in the next 3-5 years

The following assumptions have been made to assess the requirement of capital in hydropower projects in Nepal over a period of 5 years (starting from 2013 onwards)

- Capital requirement for large size projects
  - 6 large size projects will be in need of capital over period of five years they enter the construction phase
  - The average capital cost per kW for the large size projects is assumed at NPR 120,000. Total capital required will be capacity times average capital cost per kW
  - The capital structure of the projects will range from 70: 30 (debt to equity) to 80:20
- Capital requirement for medium size projects
  - 28 medium size projects capacity will be in need of capital over period of five years they enter the construction phase

[140] Intellecap primary research, 2014

- The average capital cost per kW for the medium size projects is assumed at NPR 150,000. Total capital required will be capacity times average capital cost per kW
- The capital structure of the projects will range from 70: 30 (debt to equity) to 80:20

- Capital requirement for small size projects
  - 106 small size hydropower projects will be in need of capital over period of five years they enter the construction phase
  - The average capital cost per kW for the medium size projects is assumed at NPR 175,000. Total capital required will be capacity times average capital cost per kW
  - The capital structure of the projects will range from 70: 30 (debt to equity) to 80:20

The total capital costs will be the sum of all the capital costs for the three categories. The capital structure will range from 70:30 to 80:20 (debt to equity)

10.4 Entry and exit timings for PE / VC investors in the project life-cycle: Assessment Methodology

PE/VC entry stage: assessment methodology

- Only projects in the small and medium category have been considered for analysis
- The average project life cycle for the hydropower projects has been taken at 2 years for development stage, 3 years for construction stage and 35 years for operations stage
- End of development and award of the construction contract has been recommended as the minimum early point of PE/VC investment. For the small and medium hydropower projects this corresponds to the end of second year on the time line
- The last preferred stage of the entry of the PE/VC investor is the end of civil works stage. The additional requirement of capital beyond this stage will be very low and the promoter/ developer may not be very much interested in receiving equity. For the small and medium hydropower projects this corresponds to the end of fourth year on the time line

PE/VC exit stage: assessment methodology

- A minimum investment timeframe of 3 years and a maximum timeframe of 12 years have been considered for the PE/VC investor in the sector. For the small and medium hydropower projects this corresponds to the start of seventh year and end of 14th year on the time line
- The operations stage is the most attractive stage of exiting a project as the hydropower plant would have started generating revenues and could be evaluated more accurately by other equity investors for value addition. For the small and medium hydropower projects this corresponds to the start of seventh year on the time line
- IPO exit is possible only if the IPO is made in the operations stage due to the three year lock-in period criterion in Nepal. For the small and medium hydropower projects this corresponds to the start of seventh year on the time line
- Given the lower M&A transaction in the sector, Trade Sale seems to be attractive only once the project has started to generate revenues. For the small and medium hydropower projects this corresponds to the start of seventh year on the time line
- Promoter buy-back is possible only after 3-4 years once the project has generated sufficient cash flows and retained earnings. For the small and medium hydropower projects this corresponds to the start of ninth year on the time line

10.5 Investment Markets in Nepal and Impact on Enterprise Valuation

10.5.1 Overview of Capital/Investment Market in Nepal

Role of capital in economic growth for any country is universally accepted and the fluctuations in the index of capital market could be seen as the barometer of economic performance. The capital markets in Nepal are sustained by the shares of banks, financial institutions and insurance companies

that contribute to over 75% of the market capitalisation[141]. There is minimum presence of real sector in the capital market in Nepal but off-late there is an increasing presence of hydropower companies on the stock exchange.

The Nepal stock market or NEPSE since its establishment in 1992-93 has seen the number of companies listed in 1994 at 66 to 230 companies in 2013[142]. Despite the increase in the number of listed companies, it is estimated that only 10% of the companies registered on Office of the Company Register are listed on NEPSE[143]. This in turn could indicate that firms in Nepal tend to avoid stock market as an alternative source of long-term capital[144].

Primary capital market in Nepal is quite diversified and securities such as Debentures, Ordinary Share and Right Share are used for training the market place. Out of the total approvals for public issues, 30 companies get approvals for initial public offering (IPO) of Rs. 3113.49 million a substantial increase of over 130% on the amount when compared with the previous year. Political stability and institutional support was considered as the key reason for the spurt of activity in the primary capital markets in Nepal

Table 20: Primary securities approval issued by SEBON for the FY 2012/13

S. No	Types of Securities	FY 2012-13		FY 2011-12	
		No of Issues	NPR In Million	No of Issues	NPR In Million
1	Debenture	7	3550	3	1200
2	Ordinary Share	30	3114	15	1298
3	Right Share	5	3939	7	452
	Total	**42**	**10602**	**25**	**2950**

Source: NEPSE Annual report 2012-13

The general investors in Nepal are still are attracted only toward primary shares. The fact that initial public offering (IPO) is listed many times more than that invited by the companies making IPO in the primary markets but the transactions in the secondary market is very low. This in turn shows the lack of awareness about capital market and trading in general in Nepal.

Trading in secondary markets in Nepal is a major challenge due to high trading and transaction costs, long duration of settlements and lack of reliability in the transactions.

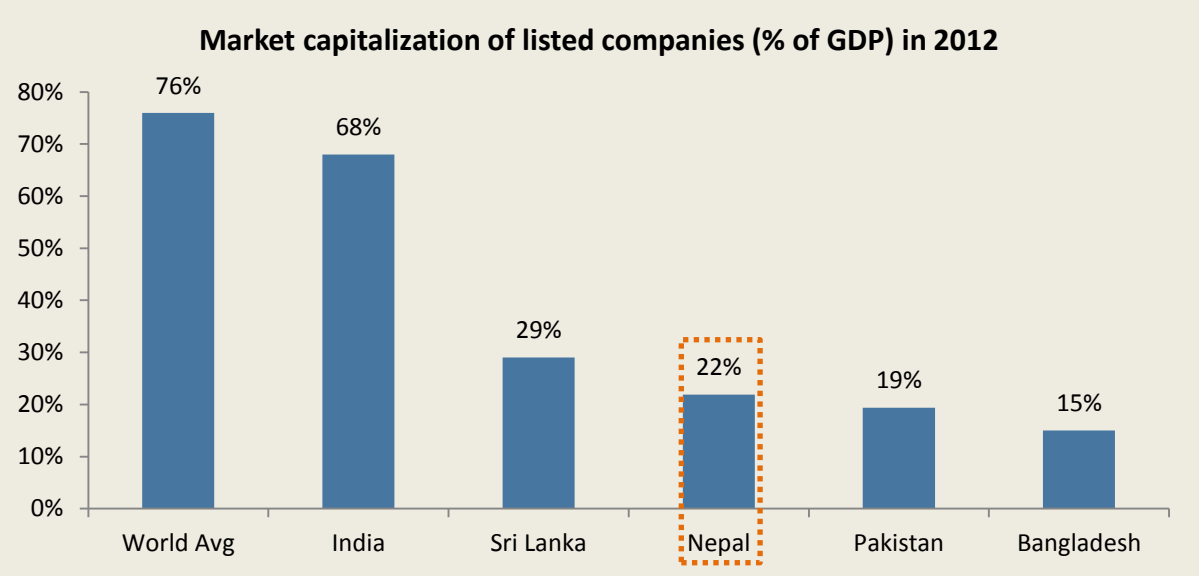
10.5.2 Nepal Investment Market Valuation and Key Drivers

The three key parameters to measure the capital market development for Nepal have been discussed briefly below. They are a) Market Capitalisation Ratio (MCR), b) Total Value Traded Ratio (TVTR) and c) Turnover Ratio (TR)

In terms of Market Capitalisation Ratio (MCR), Nepal ranks the third best in the SAARC region after India and Sri Lanka. However the MCR in Nepal is very low in comparison to the world average and India. A lower MCR in Nepal indicates that the stock market is yet to show its impact on the economic activities of the country.

[141] Nepal stock exchange website
[142] Nepal stock exchange website
[143] Department of industry, Industrial statistics 2012-13
[144] Stock Market Development and Economic Growth report, Dr. Udaya Raj Regmi, 2012

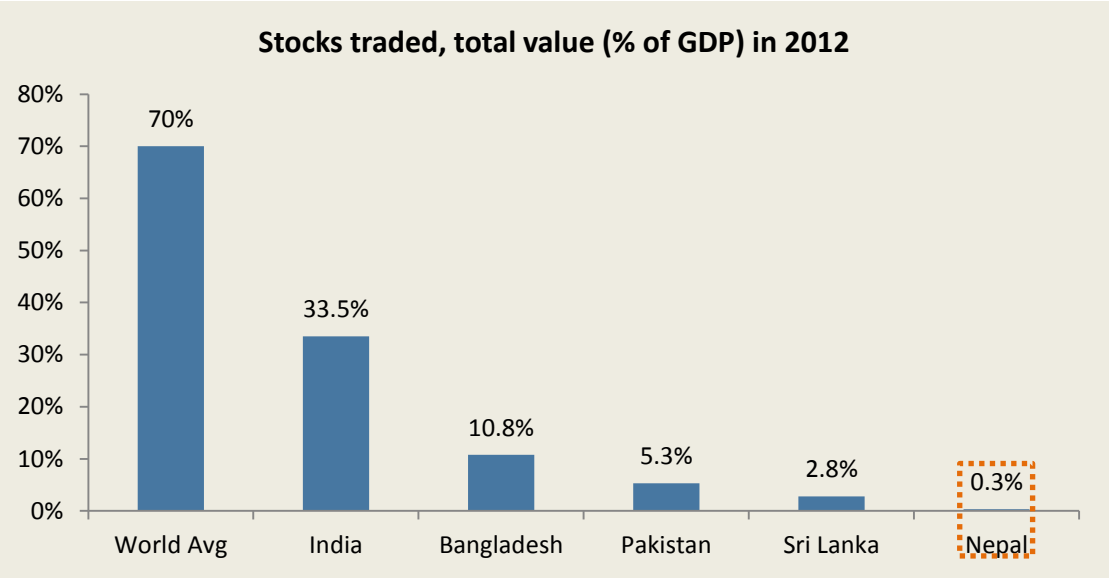
Figure 45: Market Capitalisation Ratio (MCR) for SAARC countries



Source: World Bank Development Indicators database (accessed in March 2014)

Total Value Traded Ratio, as a market liquidity indicator, shows that Nepal has one of the lowest values of shares traded in the world when compared to its GDP. This indicates the illiquidity in secondary markets in Nepal and that trading is very costly and difficult. One of the key reasons for increased cost of trading is the reliance on legacy based data systems for trading and absence of an online platform for trading.

Figure 46: Total Value Traded Ratio (as % of GDP) in SAARC countries



Source: World Bank Development Indicators database (accessed in March 2014)

The next measure of stock market development Turnover Ratio shows that Nepal has one of the lowest total values of shares traded to the average market capitalisation. This indicates that trading

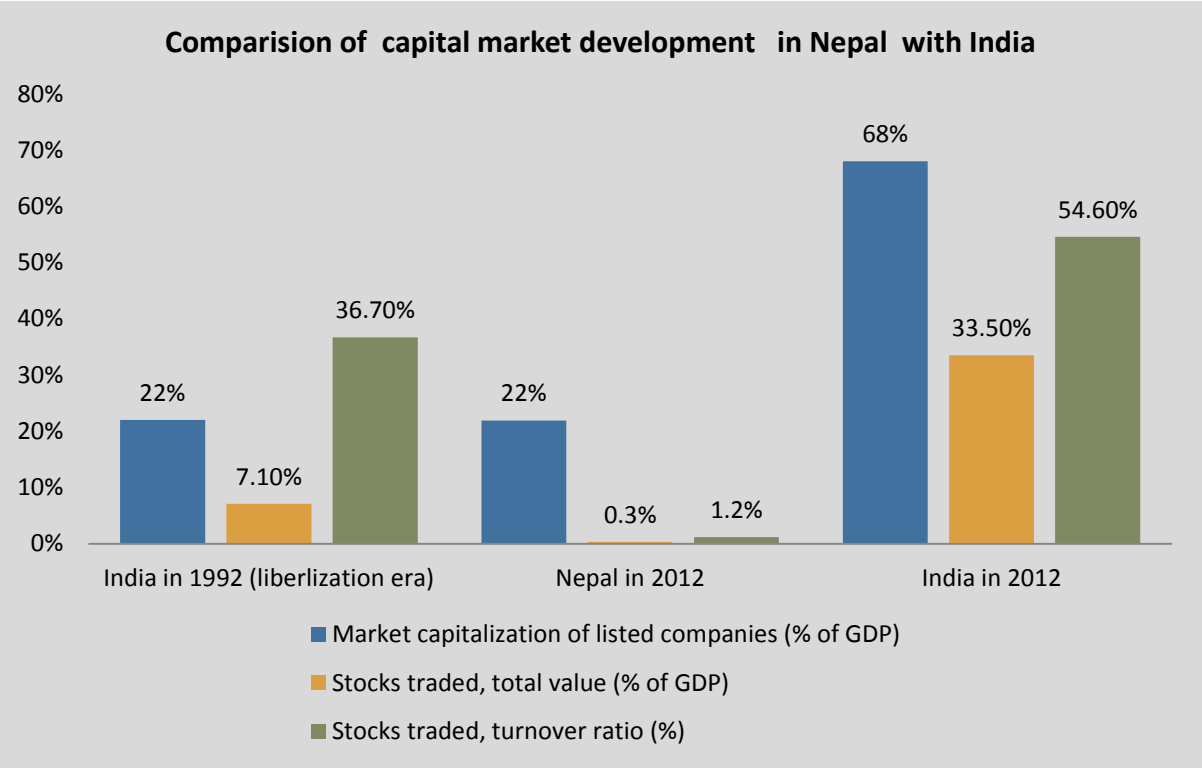
and transaction costs are high in Nepal and buying and selling of shares in secondary markets is very difficult. Of all the three parameters, there are ample opportunities for Nepal to develop its capital markets fast by increasing turnover ratio even though market capitalisation is very low.

Figure 47: Turnover Ratio in SAARC countries

Source: World Bank Development Indicators database (accessed in March 2014)

A comparison with the present stock market development indicators in Nepal with the Indian stock markets just after the liberalisation era in 1991-92 shows some similarity in the two stock markets. India has come a long way on secondary capital markets in the last two decades. Nepal could witness the same pace of growth given the requisite institutional framework and investor friendly eco-system is put in place. Allowing foreign institutional investors to trade in secondary markets in Nepal could put the country on fast track development in capital markets.

Figure 48: Comparison of capital market development in Nepal with India



Source: World Bank Development Indicators database (accessed in March 2014)

The key drivers that would facilitate the trading volumes in the secondary markets in Nepal are a) introduction of reliable online trading system making trading affordable b) settlement of transactions to be shortened to a few days from the present duration that could last for few weeks and c) with higher GNIs per capita and increasing literacy levels emergence of a social class that is aware of the benefits of wealth creation through the secondary markets d) an expected long-term political stability would boost the confidence of investors to invest in the capital markets in Nepal .

10.5.3 Impact of Investment Market on Enterprise Valuations in Nepal

Enterprise valuation in Nepal can often be challenging because – (a) there is limited historical financial data; (b) there is a lack of adequate industry benchmarks, and (c) the capital markets are less developed and hence benchmarking the valuation of companies with other SAARC nations could be a challenge.

Generally speaking high returns are expected by foreign equity investors in emerging and especially in frontier markets because of the following factors-

- There are risks associated with devaluation of currency in frontier markets. These countries possess lower level of foreign reserves to hedge the risk associated with devaluation of currency and hence more risk is there for private equity investors and demands high returns.
- The economic growth in frontier markets is likely to be much higher than developed markets and hence equity investors can look for higher returns by investing in these countries.
- The correlation of stocks of developing countries with developed countries is very low and hence investors get a chance to hedge their risks while earning high returns.
- There is often more political instability in frontier markets compared to developed markets & there are more chances that economy faces booms and busts.

Hurdle rate can be utilised as an indicator of minimum expected return from investments in Nepal as there are challenges to estimate the valuation ratios for companies given the lack of financial information. The two benchmark rates considered for the analysis include (a) Cost of Equity and (b) Weighted Average Cost of Capital (WACC) for a given financing mix of equity and debt

Cost of Equity and leverage are considered together to estimate the Weighted Average Cost of Capital (WACC) using the formulae shown in Figure 49 and Figure 50.

Figure 49: Formula for calculating cost of equity

$$Ke = Rf + ß \times (\text{mature market equity risk premium} + \text{country risk premium})$$

Where –

Rf: Risk free rate (treasury bond rate), **ß:** Predicted equity beta, **Rm:** Market risk premium

Figure 50: Formula for calculating WACC

$$WACC = \frac{D}{D+E} \times (1\text{-tax rate}) \times Kd + Ke \times \frac{E}{D+E}$$

Where -

D: Market value of Debt, **E:** Market Value of Equity, **Tax rate:** corporate tax rate in Nepal,
Kd: Cost of debt in Nepal, **Ke:** Cost of equity calculated by the formula:

- The risk free rate can be obtained from major banks in Nepal such as SBI Nepal Rastra Bank and Bank of Kathmandu and comes out to be around 9-10% as yielded by most of the banks on bonds issued
- Current risk premium was taken for a mature equity market at 5%

Assessment of country risk premium

- No shadow rating is given by Moody's or S&P for Nepal. Based on ratings given by IFC at CCC+ (CAA1 in Moody's) the default spread is 7.5%. This has been multiplied by volatility factor of 1.5 for emerging markets to reach country risk premium of 11.25 % for Nepal. This is done because equity markets are about 1.5 times more volatile than bond markets.
- Alternately the country risk premium can be calculated using volatility of stock markets of a country.
  Default Spread= US bond rate * (σ Nepal Stock/ σ US Stock)
- US bond rate is taken as 5% and 5 years standard deviation of Nepal Stock was calculated using stock market data and comes out to be 219. The corresponding 5 years standard deviation of US Stock market comes out to be 190. Utilising this data default spread has been estimated is 5.77%. This has been multiplied by volatility factor of 1.5 for emerging and frontier markets to reach country risk premium of 8.66 % for Nepal.

Assessment of Market Risk Premium

Method 1:

- Current risk premium was taken for a mature equity market at 5%
- No shadow rating is given by Moody's or S&P for Nepal. Based on ratings given by IFC at CCC+ (CAA1 in Moody's) the default spread is 7.5%. This has been multiplied by volatility factor of 1.5 for emerging and frontier markets to reach country risk premium of 11.25 % for Nepal
- The market risk premium is the sum of current risk premium and country risk premium and is estimated at 16.25%

Method 2:

- Current risk premium was taken for a mature equity market at 5%
- 5 years Standard Deviation Nepal Stock was taken at 219[145]. The corresponding 5 years Standard Deviation US Stock was taken at 190[146]. Utilising this data default spread has been estimated is 5.77%. This has been multiplied by volatility factor of 1.5 for emerging and frontier markets to reach country risk premium of 8.66 % for Nepal
- The market risk premium is the sum of current risk premium and country risk premium and is estimated at 13.66%

Assessment of Beta

[145] Nepal Stock exchange
[146] US S&P Data

- Unlevered Beta for power sector is 0.494 in neighbouring countries of Nepal, i.e. India, Bangladesh, Pakistan & Sri Lanka. The same value has been taken for Nepal
- β levered = β unlevered * (1 + (1- tax rate) * D/E)
- The levered beta comes out to be 1.38 for the hydropower sector in Nepal

10.6 Key financial data and valuation multiples of listed hydropower companies in Nepal

Table 21: Key financial data for listed companies in Hydropower sector in Nepal[147]

Name of the company	Operating Revenue(in Million NPR)				Operating EBITDA (in Million NPR)				EBITDA Margin				PAT (in Million NPR)			
Year	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*
Butwal Power Co. Ltd.	479	573	605	512	273	342	359	200	57%	60%	59%	39%	224	328	483	243
Chilime Hydro power Co.	886	885	900	968	772	759	750	816	87%	86%	83%	84%	666	651	642	707

Name of the company	Earnings Per Share (in NPR)				Dividend Per Share (in NPR)				Payout ratio				Dividend Yield			
Year	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*
Butwal Power Co. Ltd.	24	32	48	32	30	25	25	18	1.25	0.78	0.52	0.56	3.68%	4.55%	5.31%	2.28%
Chilime Hydro power Co.	107	102	70	55	60	70	50	40	0.56	0.69	0.71	0.73	6.52%	9.26%	6.01%	3.54%

Source: Annual reports for Butwal Power and Chilime Hydropower from 2010 to 2013

Table 22: Valuation multiples for Hydropower companies in Nepal

Name of the company	ROE %				EV/ EBITDA					EV/ Operating revenues				
Year	*2010*	*2011*	*2012*	*2013*	*2010*	*2011*	*2012*	*2013*	*Avg.*	*2010*	*2011*	*2012*	*2013*	*Avg.*
Butwal Power Co. Ltd.	10.4%	7.8%	10.5%	5.8%	30x	17x	15x	45x	27x	17x	10x	9x	17x	13x
Chilime Hydro power Co.	19.1%	15.9%	12.2%	11.9%	20.8x	17.3x	19x	24x	20x	18x	15x	16x	20x	17x

Source: Intellecap Analysis, 2014

[147] Operating revenues, operating EBITDAs have only been considered for valuation purpose. RoE has been calculated over the consolidated book value of PAT

10.7 References and Field Research Data

List of Organisations met for primary research in the Renewable Energy segment:

Govt. Bodies/ International Agencies	Role
Alternate Energy Promotion Centre	Government Agency
SEBON (Securities Board of Nepal)	Market Regulator
IFC A2F	International Donor
Practical Action	International NGO

Banks and Financial Agencies	Type of Agency
Hydro Electricity Investment and Development Company Limited	Govt backed Fund focusing on hydropower investments
Laxmi Bank	Commercial Bank
NIC Asia	Commercial Bank
Excelling Investment	Merchant Banker / Financial Consultant
Nabil Invest	Merchant Banker / Financial Consultant

Private Organisations in Renewable Energy	Sector
Mailung Hydro power	Hydropower
Sanima Hydropower	Hydropower
Arun Valley Hydro	Hydro
CHF Hydro Fund	Hydro
Lotus Energy	Solar
Gham Power	Solar
ICRA Nepal	Credit Rating Agency

Primary research Questionnaire for hydropower companies:

Understanding Private Sector Activity in Hydro Energy segment in Nepal

1. Company Overview

a. Name of the company / promoter:	
b. Name of the Hydro Power project /s , location& Type:	
c. Project Start Date	

d. Project Commissioning Date

2. Technical Details of the project

a. Installed Capacity:

b. Load / Capacity Factor (for dry and wet months):

c. Transmission line infrastructure (existing / proposed)

3. Financial Details of the project

a. Project Cost:

b. NPV / Expected IRR (if available)

c. Key Lenders and avg. cost of debt capital

d. Any foreign equity partners

e. IPO plans (proposed year)if applicable

Understanding growth drivers in the Hydro Energy segment in Nepal

4. Rate the following growth drivers as “high”, “medium” or “low” based on the degree to which they act as enablers to growth (with “high” ranking indicating a critical growth parameter and “low” a less important growth parameter)

Growth parameters	High	Medium	Low
Local demand of electricity in Nepal	☐	☐	☐

Hydro Potential of the country	☐	☐	☐
Access to technology and collaboration	☐	☐	☐
Stability of NEA as Govt. owned institution	☐	☐	☐
Taxation & Regulation	☐	☐	☐
International demand of electricity from India	☐	☐	☐
High investment returns	☐	☐	☐

(Please share views on any other growth parameter that you deem important and why)

Understanding policy and regulatory environment in the Hydro Energy segment in Nepal

5. How is the overall policy and regulatory environment in the Hydro Energy segment? In what ways does it support growth of businesses and in what ways does it negatively impact growth.

Understanding Barriers to Growth of IPPs in Nepal

6. Rate the following challenges as “high”, “medium” or “low” based on the degree to which they act as barriers to growth (with “high” ranking indicating a critical growth barrier and “low” a less important growth barrier).

Challenges	**High**	**Medium**	**Low**
Access to Finance	☐	☐	☐
Access to talented man-power	☐	☐	☐
Financial position of NEA	☐	☐	☐
Taxation & regulation	☐	☐	☐
Inadequate Power Evacuation and supply to the grid	☐	☐	☐
Corruption leading to delay in approvals	☐	☐	☐
Currency fluctuation risks	☐	☐	☐
Local Population unrest	☐	☐	☐
Infrastructure: Access to location	☐	☐	☐

Any other challenge and why?

(Please explain any other challenge that you deem important and why)

Understanding Access and Use of Capital

7. Which type of capital do you prefer and why?

Capital Type	High	Medium	Low
Debt (bank loans and similar products)	☐	☐	☐
Domestic Equity (raising money from local investors by selling a stake in your company)	☐	☐	☐
Foreign Equity (raising money from international investors by selling a stake in your company)	☐	☐	☐

Why?

(Please explain your preference for debt/ domestic equity/ foreign equity briefly)

8. Which of the following do you see as the most important contribution by an equity investor? Please rate "high", "medium", and "low" (with "high" ranking indicating most important and "low" least important).

Contribution by equity investor	High	Medium	Low
Add management expertise to your company	☐	☐	☐
Add technical expertise to your company	☐	☐	☐
Add financial value only	☐	☐	☐
Help to unlock capital for you by divesting or diluting company	☐	☐	☐
Help in accessing international growth opportunities	☐	☐	☐

9. Which of these following financing needs do you prefer to use debt for and which do you prefer to use equity for? Please tick in the appropriate column

Financing need	Prefer debt	Prefer equity	No Preference
Purchase fixed assets (land, building, machinery)	☐	☐	☐
Use for working capital	☐	☐	☐
Short term operational expenses (salaries, rent etc.)	☐	☐	☐

Primary research Questionnaire for solar power companies:

Understanding Private Sector Activity in Solar Energy segment in Nepal

1. Company Overview

a. Name of the company / promoter:	
b. Number of Solar Off-Grid projects completed:	
c. Geographic locations for installed projects	

d. Geographic locations of projects under execution

e. Key client sectors (industrial, commercial)

2. Technical Details of the projects

a. Avg. cost of installation of projects (cost per kW)

b. Average Efficiency for installed projects:

3. Financial Details of the company / projects

a. Key Lenders and cost of debt capital

b. Any foreign equity partners

c. IPO plans (proposed year)

Understanding growth drivers in the Solar Energy segment in Nepal

4. Rate the following growth drivers as “high”, “medium” or “low” based on the degree to which they act as enablers to growth (with “high” ranking indicating a critical growth parameter and “low” a less important growth parameter)

Growth parameters	High	Medium	Low
Local demand of electricity in Nepal	☐	☐	☐
Solar Potential of the country	☐	☐	☐
Access to technology and collaboration	☐	☐	☐
Cost efficiency of Solar PV cells	☐	☐	☐
Taxation & Regulation	☐	☐	☐
High investment returns	☐	☐	☐

Any other growth parameter? Why?

(Please share views on any other growth parameter that you deem important and why)

Understanding policy and regulatory environment in the Hydro Energy segment in Nepal

5. What are the various subsidies available to you and how do they impact your business?

6. How is the overall policy and regulatory environment? In what ways does it support growth of businesses and in what ways does it negatively impact growth.

Understanding Barriers to Growth of Solar Energy companies in Nepal

7. Rate the following challenges as “high”, “medium” or “low” based on the degree to which they act as barriers to growth (with “high” ranking indicating a critical growth barrier and “low” a less important growth barrier).

Challenges	High	Medium	Low
Access to Finance	☐	☐	☐
Access to talented employees	☐	☐	☐
Taxation & regulation	☐	☐	☐
Corruption leading to delay in approvals	☐	☐	☐
Currency fluctuation risks	☐	☐	☐
Too much dependency on Subsidy	☐	☐	☐

Any other challenges?

(Please explain any other challenge that you deem important and why)

Understanding Access and Use of Capital

8. Which type of capital do you prefer and why?

Capital Type	High	Medium	Low
Debt (bank loans and similar products)	☐	☐	☐
Domestic Equity (raising money from local investors by selling a stake in your company)	☐	☐	☐
Foreign Equity (raising money from international investors by selling a stake in your company)	☐	☐	☐

Why?

(Please explain your preference for debt/ domestic equity/ foreign equity briefly)

9. Which of the following do you see as the most important contribution by an equity investor? Please rate "high", "medium", and "low" (with "high" ranking indicating most important and "low" least important).

Contribution by equity investor	**High**	**Medium**	**Low**
Add management expertise to your company	☐	☐	☐
Add technical expertise to your company	☐	☐	☐
Add financial value only	☐	☐	☐
Help to unlock capital for you by divesting or diluting company	☐	☐	☐
Help in accessing international growth opportunities	☐	☐	☐

10. Which of these following financing needs do you prefer to use debt for and which do you prefer to use equity for? Please tick in the appropriate column

Financing need	**Prefer debt**	**Prefer equity**	**No Preference**
Purchase fixed assets (land, building, machinery)	☐	☐	☐
Use for working capital	☐	☐	☐
Short term operational expenses (salaries, rent etc.)	☐	☐	☐

Note:

- *The titles sections and sub-sections of the report will be modified to reflect the trends in the sectors and sub-sectors*
- *In cases where hard data is not available, relevant proxy measures will be considered*