



VAASAN AMMATTIKORKEAKOULU
VASA YRKESHÖGSKOLA
UNIVERSITY OF APPLIED SCIENCES

Binod Lamichhane

FOREIGN INVESTMENT OPPORTUNITIES IN NEPAL

Case: Production of Hydroelectricity in Nepal

Business Economics and Tourism

2013

Acknowledgement

I would like to express my very great gratitude to my supervisor Mr. Ossi Koskinen for his advice, motivation and moral support while writing this thesis. Advice given by him was really important for me to complete this thesis successfully.

I would also like to offer my great thanks to Mr. Deepak Rauniar: CEO of HIDCL; Dr. Subarna Das Shrestha: President of IPPAN and MD of Sanima Hydro and Engineering P. Ltd.; Mr. Suresh Kumar Basnet: President of Nepal Chamber of Commerce and Mr. Hari Ram Koirala: Secretary of Nepal Electricity Authority for their time and valuable information about the hydroelectricity of Nepal.

Last but not least, I would also like to express my very great gratitude to my beloved family and friends who support and motivate me all the way while completing this thesis.

Vaasa, March 29, 2013

Binod Lamichhane

VAASAN AMMATTIKORKEAKOULU
UNIVERSITY OF APPLIED SCIENCES
Bachelor of Business Administration

ABSTRACT

Author	Binod Lamichhane
Title	Foreign Investment Opportunities in Nepal. Case: Production of Hydroelectricity in Nepal
Year	2013
Language	English
Pages	63 + 4 Appendices
Name of Supervisor	Ossi Koskinen

Nepal at present is suffering from the energy crisis due to the lack of enough production of electricity in the country. The main purpose of this thesis is to evaluate the present situation of electricity crisis in Nepal and provide the information to the foreign investors about the investment opportunities in hydropower sector in Nepal.

The theoretical section gives the details about Nepal and electricity production scenario in Nepal. It also gives the detail about the demand and supply of electricity, investment policies in hydropower, and risks in the investment of hydropower as well as the barriers of investment in hydropower in Nepal. In the empirical study, an interview was conducted with the senior officer from hydropower related government as well as private sectors to get the details about the hydropower investment opportunities in Nepal.

Eventually, based on the theoretical overview as well as the empirical study deep analysis is done to make the conclusion of the thesis. The major problems of not being able to produce enough electricity in the country were found to be the lack of capital, lack of stable government and stable political situation. The investment policy of Nepal was found to be compatible for foreigner to invest in the country. Finally, the thesis was concluded with a finding that there are very good opportunities for investors to invest in hydropower sector in Nepal.

Keywords: Hydropower, Nepal, Investors, Investment opportunities

VAASAN AMMATTIKORKEAKOULU
LiiketalousjaMatkailu

TIIVISTELMÄ

Tekijä	Binod Lamichhane
Opinnäytetyön nimi	Foreign Investment Opportunities in Nepal. Case: Production of Hydroelectricity in Nepal
Vuosi	2013
Kieli	suomi
Sivumäärä	63 + 4 liitettä
Ohjaaja	Ossi Koskinen

Nykypäivän Nepalia on koetellut energiakriisi, johtuen maan riittämättömästä sähköntuotannosta. Tämän opinnäytetyön tarkoitus on arvioida energiakriisin tämänhetkinen tilanne ja antaa lisätietoa ulkomaalaisille sijoittajille vesivoimasektorin sijoitusmahdollisuuksista Nepalissa.

Teoreettinen osuus esittää Nepalin tämänhetkisen sähköntuotannon tilanteen. Osuudessa esitellään myös yksityiskohtaisesti sähkön kysyntä ja tarjonta, vesivoiman sijoitustoimintatavat sekä riskit ja esteet vesivoimaan sijoittamisessa.

Empriisessä tutkimuksessa haastateltiin yleisellä sektorilla toimivaa virkamiestä sekä yksityissektoriin, joilta edustajia saatiin tietoa vesivoiman sijoitusmahdollisuuksista Nepalissa.

Perustuen sekä teoreettiseen että empiiriseen osuuteen työssä suoritettiin perusteellinen analyysi, jonka perusteella opinnäytetyön päätelmät tehtiin. Löytöjen perusteella riittämätön sähköntuotanto johtui pääoman puutteesta, sekä epätasapainoisesta valtion poliittisesta tilanteesta. Nepalin sijoitus olosuhteidensa ansiosta todettiin olevan kilpailukykyinen ulkomaalaisille sijoittajille. Opinnäytetyön loppupäätelmän mukaan Nepal tarjoaa erittäin hyviä sijoitusmahdollisuuksia vesivoimasektorilla.

Avainsanat: Vesivoima, Nepal, Sijoittajat, Sijoitumahdollisuudet

CONTENTS

ABSTRACT

TIIVISTELMÄ

LIST OF FIGURES AND TABLES

LIST OF APPENDIX

1	INTRODUCTION	11
1.1	Background of the thesis:.....	11
1.2	Objectives of the thesis	12
1.3	Structure of thesis:	12
2	HYDROPOWER	14
2.1	History of hydropower	15
2.2	Production Process.....	17
2.3	Methods of Generations	18
2.4	Pros of hydropower Plant.....	20
2.5	Cons of hydropower Plant	20
3	NEPAL.....	22
3.1	Economy of the country	22
3.2	Political Situation of the country	23
3.3	Business Culture	24
3.4	Foreign Investment in the country	26
3.5	Taxation Policy	29
3.6	Important Aspects for investors	31
4	ENERGY MARKET IN NEPAL	35
4.1	Sources of Energy in Nepal:	35
4.2	Energy Crisis and Its Impacts in Nepal:.....	36
4.3	Demand and Supply of Electricity in Nepal:	37
4.4	Private Investment Policies in Hydropower Sectors:.....	38

4.5 Taxation policies for Hydropower Investment	39
4.6 Licensing Process for the generation/transmission/distribution of hydropower:	41
4.7 Documents required for obtaining the license:	42
4.8 Barriers and challenges of hydropower Development in Nepal:	43
4.9 Risks in the investment of hydropower in Nepal	45
4.10 Current Players in the sectors and their Introduction	48
4.11 Government Bodies and the Supporting organizations in Nepal	49
4.12 NEA (Nepal Electricity Authority) and Its Roles	49
5 EMPIRICS	50
5.1 Research Methods	50
5.2 Research Questions	52
6 RESULTS	53
7 CONCLUSION	58
REFERENCES	60
Appendix 1	64

LISTS OF FIGURES AND TABLES

Figure 1.	Hydroelectricity production process.....	17
Table 1.	Economic Indicator Listing of Nepal.....	23
Table 2.	Home economy distribution of FDI in Nepal.....	28
Table 3.	Income tax regime, 1992 and 2002.....	30
Table 4.	Source of energy in Nepal.....	35
Table 5.	Royalty for Export Oriented Projects.....	40
Table 6.	Royalty for internal Consumption.....	41

LIST OF APPENDICES**APPENDIX 1.**Existing, ongoing, proposed as well as identified

Potential of the hydropower projects of Nepal

p. 65

ABBREVIATIONS

MW	Mega watt
NEED	National Energy Education Development Project
IRENA	International Renewable Energy Agency
KW	Kilo Watt
NHA	National Hydropower Association
STO	Storage type
ROR	Run of river type
GDP	Gross Domestic Production
PPP	Purchasing Power Parity
CA	Constitutional Assembly
UNCTAD	United Nations Conference on Trade and Development
FDI	Foreign Direct Investment
NRs	Nepali Rupee
BIPPA	Bilateral Investment Promotion and Protection Agreement
CIA	Central Intelligence Agency
NEA	Nepal Electricity Authority
INPS	Integrated Nepal Power System
GWh	Giga Watt Hour
MOWR	Ministry of Water Resources
DOED	Department of Electricity Development
IEE	Initial Environment Examination
PPA	Power Purchasing Agreement

PAN	Permanent Account Number
MIGA	Multilateral Investment Guarantee Agency
NGO	Non -Governmental Organizations
INGO	International Non- Governmental Organizations
HIDCL	Hydroelectricity Investment and Development Company Limited
CEO	Chief Executive Officer

1 INTRODUCTION

1.1 Background of the thesis

Nepal is one of the richest countries in water resources; though Nepal has huge potential of constructing large hydropower plants; the country is not able to mitigate the problem of energy crisis. Some study has revealed that Nepal has higher economically feasible potential in hydropower exploitation which accounts almost 40000 MW of which only 600MW was already exploited. The produced amount of electricity is far less than the demand of the country which causes the crisis of electricity. Currently, Nepal is having the blackout problem (known as load shedding in Nepal) of up to 12 hours a day which is not normal. Also, less than 40% of the populations have access to electricity (IPPAN, 2013). This fact tells us that much more energy have to be produced in the country to eradicate the crisis of energy as well as to give access to electricity for the remaining 60% of the population. Lack of technological advancements in the country, lack of skilled workforce and lack of bigger investors in the country; the desire of producing more electricity in the country is not fulfilled yet. The need of large foreign investors has been realized in the country.

Promoting hydropower not only helps to fulfill the market demand of the electricity in the country but also helps the economy of the country. The current fact is that the prices of other sources of energy like oil and gas is hiking up day by day. In this situation, if the country cannot use the resources available inside its own territory and if it has to be dependent more on other countries then that will be the big disaster in the development of the economy. Many people in Nepal are using kerosene for lighting lamps; many companies are using diesel generators to produce the electricity needed for them. So that way the country has to be dependent more on oil which is expensive. To eradicate this problem production of hydroelectricity should be done rapidly.

1.2 Objectives of the thesis

The main objective of this thesis is to promote the business opportunities in Nepal, especially in the sector of hydropower to the foreign investors. This study not only gives the information about the business investment possibilities in the country but also examines the opportunities and challenges for the investment inside the country. Investors will get the detail information about the energy market in Nepal, the current demand and supply situation in the country, investment policies in the hydropower sectors, taxation policies, and risk in the investment as well as current players in the industry.

The main problems of this thesis will be to know the answer of the following question:

1. *What are the business opportunities for foreign investors to invest in Hydropower sectors in Nepal?*

Regarding the above question the thesis will be able to solve the problems by answering for the following sub questions:

1. *What is the current situation of hydropower in Nepal?*
2. *What are the obstacles for foreign hydropower investors to invest in Nepal? What could be the solutions?*
3. *How to encourage those investors to come and invest in Nepal?*

1.3 Structure of thesis

The first chapter of the thesis introduces the background as well as objective of the thesis. Chapter two in this thesis gives details about hydropower including the history of hydropower, production process, methods of generation, pros and cons of hydropower.

In the third chapter, detailed information about Nepal, economy of the country, political situation, business culture, investment policy as well as taxation policy is presented.

The fourth chapter is all about the energy market of Nepal which gives brief details about the demand and supply, investment and taxation policies in hydropower, licensing process, documents required, risk and challenges to invest in hydropower sector.

Eventually, the empirical part is in chapter five where briefed interview is conducted with most of the hydropower functioning bodies officer located in Nepal. Based on the brief interview, results are expressed in chapter six with conclusion in chapter seven.

2 HYDROPOWER

Hydropower is a source of renewable energy resources available for the generations of today's electricity based on the flowing water. Hydro means water and hydropower in general means the generation of energy from the force of moving water. Hydropower is the most mature, reliable and cost effective renewable power technology available (Brown, 2011). Basically, hydropower is considered to be the largest renewable source of energy in the modern era which produces around 19% of the world's electricity (USGS, Science for a changing world, 2012). Many countries nowadays are almost totally dependent on hydroelectricity for the source of electricity. More and more investment has been done in the hydropower sector. Countries like China, America, Brazil, India, Canada and other countries in the world are investing billions and billions of dollars in hydropower production every year.

Hydropower is also the long-lasting and cheapest source of energy which can be used for many and many years once the production process is completed and the maintenance cost is also low. It is also considered as the most flexible source of power generation which is capable of responding to the demand fluctuations in every minute meaning that it can be operated very quickly and operate almost instantly when needed for even one or two hours. As a result hydropower dams in the large reservoirs storage can be used to store energy over time to meet the peak demand and is also the very easiest source of energy to store which can be stored for over days, weeks, and months, seasons or even years.

2.1 History of hydropower

During the ancient time also people knew the importance of hydropower. The Greeks used water wheels to grind wheat into flour more than 2,000 years ago (NEED, National Energy Education development Project). Even in recent times in developing countries like Nepal, we can see such kinds of traditional mills used to grind flour in some villages that are operated by the turning of wheel by the force of running water.

The evolution of the modern hydropower technology was coined first in the mid-1700s when a French hydraulic and military engineer, Bernard Forest de Bélidor wrote “ArchitectureHydraulique”by describing the vertical versus horizontal axis of machines. The development of turbines has continued after that also. In 1800, a brush dynamo driven by a water turbine was used to provide theatre and storefront lightning in Grand Rapids, Michigan and in 1881, a brush dynamo connected to a turbine in a flour mill provided street lightening at Niagara Falls, New York. Both of those projects used direct-current technology. But the first hydropower plant was developed on the Fox River in Appleton, WI in 1882. (National Energy Education Development Project, 2012)

In 19th century, hydroelectricity development took its crucial steps and the modern technology was invented to make the electricity generation more effective and efficient. Dams started to be constructed and bigger projects with huge amount of electricity generation have been constructed. Though, the price of burning coal or oil was cheaper, so they began to underprice the smaller hydroelectric plants which could make the price of electricity cheaper. Hydropower can be classified into different categories on the basis of their size and their production capacities which are described as follows. (International Renewable Energy Agency, 2012-17)

Large Hydro Project: Those kinds of hydropower projects which have the production capacity as well as the capacity to feed into the grid of 100MW or more than that are called large hydro projects.(International Renewable Energy Agency, 2012-17)

Medium-Hydro Project: Medium hydro projects ranges from 20 MW to 100MW of production capacity and are connected into the electricity grid. (International Renewable Energy Agency, 2012-17)

Small-Hydro Project: The capacity of this hydropower project to feed into the electricity grid ranges from 1MW to 20MW. (International Renewable Energy Agency, 2012-17)

Mini-Hydro Project: That kind of hydropower project which ranges from 100KW to 1MW is considered as mini hydro projects. This kind of projects could be connected to the grid or mini grid or even they could stand all alone. (International Renewable Energy Agency, 2012-17)

Micro-Hydro Projects: These kind of hydro projects are suitable for a small community or rural industry in remote areas which are away from grid. They can produce electricity from 5kW to 100kW. For example; many rural/remote areas in Nepal have this kind of micro-hydro projects which help to make the availability of electricity in those areas. (International Renewable Energy Agency, 2012-17)

Pico-Hydro Projects: These kinds of projects are also suitable for small communities in remote areas. Their production capacity is from few hundred watts up to 5kW. (International Renewable Energy Agency, 2012-17)

2.2 Production Process

The following figure 1 shows the main principal upon which a hydropower project is constructed.

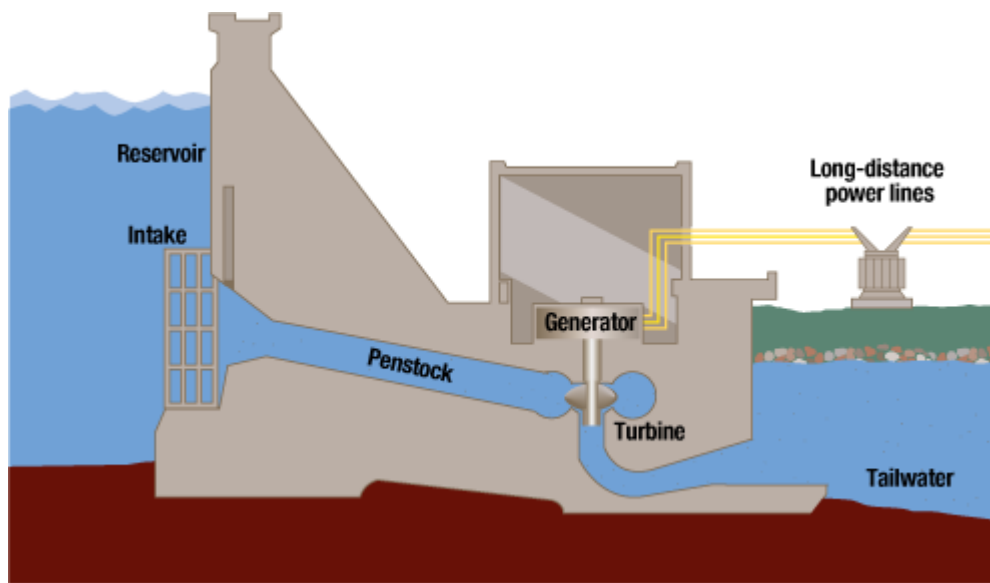


Figure 1. Hydroelectricity production process. (Tennessee valley authority, 2012).

Hydropower plant consists of three parts, a power plant where the electricity is produced, a dam which control the flow of water and a reservoir where water can be stored. When the dams' gates are open from the reservoir, water started to flow through the pipe called penstock down to the turbine where the force of water hits the turbines blades and the turbines starts to spin. When the water runs through the penstock it has kinetic energy and when it spins the turbines which is connected to the generator to produce electricity then the kinetic energy is converted into electrical energy. The amount of electricity produced there is then transferred to the local transmission lines for the purpose of local use. The amount of electricity generated is determined by two factors called head and flow. Head means the distance of water flow meaning the distance from the dam to the power producing turbines whereas

flow is the amount of water that moves through the system. So hydropower as a whole consists of the following components. (BinodPandey, 2012)

Reservoir: It is like a lake to store water.

Penstock: The pipe from the dam to the mouth of the generator which will carry water.

Turbines: Mechanical devices which extract energy from the flowing water and convert into electrical energy.

Generator: A device that converts the mechanical energy into electrical energy.

Power House: The facility for the generation of electric power.

Tailrace: The pool where water can flow into its normal way.

Transmission lines: The main line that will supply the produced electricity to the supply channels or to the local utility.

2.3 Methods of Generations

Hydroelectricity can be classified into three types on the basis of the different methods of generation. They are described as following:

Storage Type (STO): They are the most traditional and the most common types of hydroelectric projects which uses dams to store the water in a reservoir. In this process, water stored in a reservoir travels through a large pipe called Penstock to reach to the generator. The force of water then spins the turbines which are connected the generator. The shaft will then spins coils of copper wire which is placed inside a ring of magnet in the generator which then creates an electric field producing electricity. The electricity produced is then connected to the grid for the supply. Dams in this process are often built on rivers where there is a drop in elevation creating

“head”- the height difference between the water contained in the reservoir behind the dam and that of the water released below the dam, use the gravity of the flowing water to produce clean renewable power. A higher head means that water will flow with more force through a turbine to generate more power. (National Hydropower Association, 2012). At present, The Kulekhani I and II are the only storage type hydropower projects in Nepal. (BinodPandey, 2012)

Pumped Storage Type: Pumped storage hydropower essentially is more for storing energy so that more electricity could be generated during the peak demands. In this process, there are two reservoirs (Upper and Lower reservoir). During the off peak hours the reversible turbine will pump the water back to the upper reservoir from the lower one. When it is peak demand, the upper reservoir will have more water stored to generate the electricity for peak demand. The only large scale and low cost electricity available are the pumped storage and the conventional storage type. Pumped storages are considered as the important means of large scale grid energy storage and they help to improve the generating capacity of the system. (BinodPandey, 2012)

Run of the River Type (ROR): The hydropower generation in this method is dependent on the natural flow of water in the river with consistently smaller storage or no storage at all but sometimes they may have a smaller dam at the head of the river for a smaller storage. This kind of small storage helps to shift the generation of electricity for a few hours or a day when needed. Though this kind of projects may not be able to produce huge amount of electricity they are less expensive for the construction. The disadvantage of this project could be that they are not able to produce their full capacity when the level of water in the river is lower especially in dry seasons. This is also the most common problems in Nepal which is causing many hours of load shedding during dry seasons because most of the hydropower projects in Nepal are R-O-R type. (BinodPandey, 2012)

2.4 Pros of hydropower Plant

The main advantages of hydropower are described as follows:

Hydropower is fueled with water, so it is clean source of fuel. Hydropower production will reduce the air pollution and is considered one of the greenest energy of green technology. Water is freely gifted by our nature, so it does not cost anything to produce hydropower but only what costs are the construction and the regular maintenance. So hydropower production is considerably cheaper also. The other great advantage of hydropower is that hydropower plant has comparably longer life than other source of electricity but the minimal maintenance is required.

Hydropower is also a very flexible source of energy which can be easily controlled; meaning that the flow of water through the turbines can be controlled so that the production can be carried as the demand. Also the constructed dams will help in controlling the flood and are also helpful for the irrigation to nearby agricultural lands. More employment opportunities will be created.

2.5 Cons of hydropower Plant

The main cons of hydropower plant are described as following:

Hydropower plants can produce electricity only when there is enough water to flow, but for instance, during the dry season when the flow of water is apparently less, than the production will not be enough which is the current problem in Nepal.

The initial production cost is extremely high, so it needs careful planning and huge investments. Also the construction of a dam is really risky, even a small mistake in the construction process can have a big effect as well as huge loss of investment.

Hydropower dams' construction will also change the ecosystem, damaging many natural herbs and inhabitants of wild life, and those endangered species will be in a

more critical situation. Resettlement of huge human population is also another challenging task, for example, *construction of Three George Dams in China creates many questions regarding the replacement of 1.3 million peoples* (Reuters, 2009). Flooding of many historical sites, change in the ecosystem and many social impacts because of forcing many people to leave their homes.

3 NEPAL

Nepal is a landlocked and independent country of South Asia with the size of 147,181 sq. km. located in between the two giant India on the east, west and south and China on the North. Its territory extends roughly 500 miles from east to west and 90 to 150 miles north to south (Britannica, 2012). Kathmandu is the capital of Nepal. Nepal also consists some of the most difficult mountain terrain in the world. Nepal geographically is divided into three geographical regions where 83% of the country is covered with mountains while only 17% is flat land which is suitable for agriculture. The southern part of the country with flat, fertilized and agricultural land called Terai is bordered to North by Himalayan foothills and to the south by the Ganges River (India). The central part of the country is full of Mahabharat Range with the height of 2,000-3000 meters where farming is the main activity in the area. The third region of Nepal is known as the Himalayan region stretching across the northern part of Nepal bordering to China (Tibet) with the highest peaks in the world including Mt. Everest (8848 meter). Nepal has some 6000 rivers running from the mountains contributing 2.27% of fresh water whereas forest provides nearly 90% of the country's fuel demand (Ramesh M. Singh & Dinesh R. Bhujju, 2001; 2-3). Country has the literacy rate of about 45 % (Chance for Nepal, 2012).

3.1 Economy of the country

With its adverse geographical situation, being a landlocked country, lack of resources for development and having poor infrastructure, Nepal is considered as one of the least developed country in the world with quarter of its people living under the line of poverty. The country is more dependent on agriculture which employees 75% of the work force followed by 18% services sectors, and 7% manufacturing based work. More over 46% of the whole population is unemployed (Theodora, 2012).

Table 1.Economic Indicator Listing of Nepal (2010) (Economy Watch, 2011)

GDP (PPP)	US\$ 35.813 Billion
Population	28.185 million
GDP Per Capita(PPP)	US\$1,270.6
GDP Share of World Total (PPP)	0.048%
GDP(Current Prices, US Dollars)	US\$15.836 Billion
GDP Per Capita (Current Prices, US	US\$561.872
Values of Oil imports	US\$0.693 Billion
Value of oil export	US\$0 Billion
Current Account Balance(US Dollars)	US\$-0.435 Billion
Current Account Balance(%GDP)	-2.744%

A big part of GDP of the country is dependent on the remittance from abroad. Because of the high unemployment rate in the country many people are working in abroad and they send the share of their earning to their family in Nepal. The remittance also helps the country to reduce the number of poor people in the country and boost the economy of the country. In 2011 Nepal earned US\$4.22 billion from remittance which is 22.3% of GDP and is expected to be US\$5.12 billion in 2012. As the share of GDP of the country, Nepal was listed as the sixth highest receiver of workers remittances in the world. (ChandanSapkota, 2012)

3.2 Political Situation of the country

Nepal, the developing country between India and China has been struggling to overcome its past political tensions. The Maoists in 1996 started the civil war in the country which lasted till 2006 and took the life of more than 15,000 people and many people had to be displaced as a result of the conflict between the government and the Maoists. In 2006 November, the peace agreement was done between the seven parties

of Nepal and the Maoists. This peace agreement resulted in the declaration of Interim Constitution in the country. Before the agreement was made in November, the alliance of seven parties and the back support of the Maoists party were able to dethrone the Monarchy of Nepal which was ruling the country for more than 200 past years in April 2006. So the peace process finally begins in the country. Election was held in the country in 2008 April, which resulted the formation of Constitution Assembly (CA). The CA also elected the first president of the Republic of Nepal as DR. Ram BaranYadav.

Since 2008, many governments have changed in the country to follow the norms of the peace process and write the constitution of the country in the given time. But still now also the country was not able to get the new written constitution because of the disagreement between the political parties. But in the four years since the election was held in 2008, many reforms have been done in the country. Integration of the Maoist army into Nepal army with full control of weapons to Nepal army was the greatest achievement of the peace process. The country which suffered in terms foreign exchange, tourism and other development activities during the civil war, is again on its way to reform on those sectors. Many new investors are attracted in the country with the hope of good investing environment and political stability in the country. (BBC news; 2012)

3.3 Business Culture

Nepal is culturally rich country with own customs. The Nepalese are, though deeply integrated in their culture and traditions; they are open minded, friendly and are easy to consult with. For business people the following tips will be useful while dealing with Nepali business partner. (Culture Crossing, 2012)

Generally, meetings start with greeting and are done by saying Namaste with palms pressed together around the chest. Also a handshake is acceptable with foreign business partners.

Communication starts by asking more about the personal matters and family matters. For example, how are you? How are your family members, sons and daughters? While conversations, people hardly use no because they think using no is not polite, so while giving instructions it is better to repeat several times and step by step to make sure that your meeting partners have understood everything in detail. So it is always better to allow time for small personal talks before starting business discussions.

Hospitality is great in Nepali society, so never reject the offer of a cup of tea or water. Thankfulness is expressed by a smile rather than with words, so never think that person is ungrateful because s/he does not say thank you. Calling by name is not usual, so people prefer to use Sir/Madam when they want to communicate with you or also whenever people use name then they like to use Jee after the name. For Example: Toni Jee, Mika Jee, KatjaJee, etc.

Friendship is a strong bond to start making deal with Nepali partner. If they found that you are friendly, then the relationship will be stronger and there will be more trust. Try to put some distance while talking with women, people take it in wrong way if you make some touch to women during conversation.

Eye contact is very important while making conversation. Time does not move exactly as planned in Nepali society. So never wonder if some of your business partners are late than planned.

Using left hand while giving or receiving with left hand is considered rude and disrespectful, instead use right hand while receiving and giving things, but the best thing is to use both hands which will show more respect.

Formal attire such as coat and tie with Nepali hat for men whereas Saree, kurtasurwal for women are common dresses.

Decisions are made by top management without the input of staff and handshake means the deal is done.

3.4 Foreign Investment in the country

The World Bank has listed Nepal as the least developed nation in the world and is currently ranked 157th out of 187 countries on the Human Development Index (The Rising Nepal, 2011). This means Nepal has to focus more on the economic stability by establishing more production process in the country, bringing new investment opportunities and opening the door for foreign investors to invest in Nepal. Nepal has adopted a very liberal policy for the investors to invest in Nepal which will accumulate the social as well as economic development of the country. For that the government is playing a role as a facilitator to provide the infrastructure and convincing environment for investment.

There are many opportunities in the country for foreign investors as well as local investors but because of the many challenges that have to be faced by the investors, the investment process is getting slow. The main challenges faced by the investors in recent time are the political instability in the county, more politicized labor unions whose activities demoralize investors to invest inside the countries and existing industries has been closed, lack of infrastructure (like roads, water facilities) and lack of energy (the country could not provide the electricity needed all around the year), security for the investments, corruptions, paperwork etc. If the country can reform in those sectors then there will be big inflow of investors in the country. Despite of all those challenges still investors are attracted to this country because of its location between the two world's giant India and China, big potential market with large population, low wages, etc. Both countries China`s and India`s markets offer the

unique reforms in economy and both are the big players in the world economy. This can lead Nepal as a transit for business between India and China from where Nepali investors as well as the country can get direct as well as indirect benefits.

Nepal gets massive aid from international communities for the development projects but due to lack of proper utilization of those aids there are not big changes in the development of the country. But if the country could attract private investors then it would make some positive progress in the economy of the country, GDP will rise, more employment opportunities will be created and even good news will go all-around the globe from those investors which will help to make more and more investments in the country.

Tourism, hydropower, infrastructure, construction, information and communication, agro-processing, health etc. are the major investment sectors in Nepal. Most of the investors are more concentrated in the manufacturing sectors. According to UNCTAD, manufacturing sector accounted for 50% of approved foreign direct investment (FDI) projects, over 40% of foreign investment and 65% of total employment in 2001. Among the total investment approved in the country, food and beverages and tobacco industry accounts for 25% and the amount of FDI in this sector is 24% whereas the textile and garment industry accounts for 24% of total FDI Projects. Beside these two fields, tourism is also the next point of attraction for FDI. (Investment Policy Review, 2003: 5)

The following table (Table 2) shows the total share of FDI in Nepal, with the share in the number of enterprises in the country with the share of employment rate. If we consider India as the example; India alone has invested in 35% of the total number of enterprises with 35.8% of share in FDI. This also shows that the Indian investments are most labor-intensive compare to that of Norway and United States which are mostly capital oriented.

Table 2. Home economy distribution of FDI in Nepal (Investment Policy Review, 2003:5)

Home Economy	Share in the number of enterprises	Share in total FDI	Share in employment in FDI projects
India	35.0	35.8	40.0
USA	10.3	17.1	8.1
China	7.7	10.9	7.8
Britain	0.6	6.4	1.4
Norway	0.7	4.9	0.2
Japan	10.5	4.2	5.5
Republic of Korea	3.9	3.5	2.8

According to a 2010 Central bureau of Statistics survey, there were 1897 firms operating with foreign investment from 139 countries with a net worth of US \$2.48 billion. India had the largest investment with 393 companies, followed by China 179, Japan 132, South Korea 94, UK 94, Germany 61 and Switzerland 27. Nepal is also ranked in 134 out of 141 countries in the Inward FDI Performance Index in a report called World Investment Report 2011 released by UNCTAD, which means that still Nepal performance to attract FDI is poor. (Siddhant R. Pandey, 2012)

Nepal has also announced Nepal Invest Year for this fiscal year 2012/2013, with a hope of bringing new investors in the country. Nepal government is expecting to attract 50 mega projects during the fiscal year 2012/13 through this program. All those initiatives in the country show that the government of Nepal is keen on the foreign investors. (The Kathmandu Post, 2012)

3.5 Taxation Policy

Nepal has introduced Foreign Investment and Technology transfer act, 1992 and One Window Policy of 1992 that will ensure the environment for foreigner investor to invest in Nepal. Those policies allows for foreign shares up to 100% foreign owned enterprises or as joint venture with Nepali partner. They are permitted up to 100% equity shareholdings in medium and large scale industries. Medium industries are defined with a fixed capital investment between Nepali Rupees (NRs.) 10 million and NRs. 50 million, whereas large scale industries means those industries with fixed capital investment more than NRs. 50 million. There are also the following sectors in the policy that are exceptions for foreign investors from investing. (Nepal Foreign Investment Opportunities, 2012)

- Defense industries which produce items like military armament, ammunition or explosive materials.
- Cigarettes and Bidi
- Alcohol

Table 3.Income tax regime, 1992 and 2002(Investment Policy Review, 2003:21)

	Regime from 1992	Regime from 2002
Corporate tax rate	Standard 25% Financial Services 30% Industries* 20%	Standard 25% Financial services 30% Only manufacturing qualifies for 20% special fee of 1 % on all the above
Corporate taxes rebates	10% for high local content 10% for local employment > 600 in any industry 50% for national priority industries* for 7-10 years 20-30% in disadvantaged areas	Removed 10% for manufacturing bodies Improved to 10% years but apply only to manufacturing 20-30% of manufacturing only in disadvantaged areas
Investment allowances	40% for reinvestment in significant expansion or modernization	Removed
Capital allowances (Depreciation)	5% buildings; 15-20% other assets 1/3 rd acceleration for all industries*	5% buildings; 15-25% other 1/3 rd acceleration for manufacturing industry(only), power sector and infrastructure BOT(Build Operate Transfer)
Withholding tax	No tax on dividends from Industries* 15% on foreign service fees and royalties	10% Same

Note: Industries* is defined in the Industrial Enterprise Act to include nearly all non-financial enterprise.

3.6 Important Aspects for investors

For foreign investors to invest in country like Nepal it is crucial to know the rules and regulations based on the investment environment if they are beneficiary for investors. This topic will present some of the policies that Nepal has adopted for foreign investors. (Foreign Investment Policy, 1992)

Form of foreign investments:

The following forms are considered as the forms of foreign investment in Nepal.

Equity investment made by foreign investors in the form of foreign currencies or capital assets and reinvestment of the income,

Loans obtained in the form of foreign currencies or capital assets,

Use of rights, specialization, formulae, processes and patents relating to any technology of foreign origin,

Use of foreign owned trade-marks, goodwill,

Use of foreign technical, consultancy, management and marketing services

Permissions for Industries to be established under Foreign Investment:

In the following cases, permission will be granted for industries to be established under foreign investment.

Foreign investment in the industries classified as prohibitive shall not be permitted. In case of other industries, permission for foreign investment should be obtained.

Foreign investment will be permitted up to 100% in large and medium scale industries with a fixed assets up to five hundred million rupees, grant permissions itself. However, in the case of industries exceeding above mentioned limit, in accordance with the decision of the Board, grant permission within thirty days from

the date of application. The department will communicate the decisions so made to the applicant.

Provision for Repatriation:

Foreign investors who have received permission to invest in convertible currency can repatriate the following amounts outside Nepal are the prevailing rate of exchange.

The amount received by sale of the whole or any part of the equity investment.

The amount received as benefits or dividends from foreign investment.

The amount received as payment of principle and interest on foreign loans

The amount received under an agreement for the transfer of technology.

Foreign experts, working in Nepalese industries with prior approval from countries where convertible currencies are in circulation, shall be permitted to repatriate in convertible currency up to 75% of the amount received by them as salaries, allowances, etc.(Foreign Investment Policy, 1992)

Facilities and concessions:

The following facilities will be granted to industries established with foreign investment, without prejudice, to avail the additional facilities if any, available under the industrial Enterprises Act. (Foreign Investment Policy, 1992)

Interest income on foreign loans will be taxed at a rate of 15% only.

Royalties, technical and management fees will be taxed at a rate of 15 % only.

Income tax will be levied at 15% on the income earned from exports.

Industries established with foreign investment are entitles to enjoy all the facilities and incentives including with foreign investment are entitles to enjoy all the facilities

and incentives including tax facilities provided to local investment under the industrial Enterprise Act.

Other Facilities:

Other facilities include the following facilities for the investors:

Facilities on electricity industries will be given priority in the supply of electricity. No fee will be charged if an industry generated electricity for its own use.

For the purpose of avoiding double taxation on incomes of foreign investors Government of Nepal will take necessary action to conclude agreements for the avoidance of double taxation with countries of the concerned foreign investors.

Custom duty, excise duty and sales taxes levied on raw materials and auxiliary raw materials of export oriented industries will be reimbursed to the exporters on the basis of the quantum of exports with 60 days from the receipt of the application for such reimbursement.

Industries exporting 90% or more of its total production are entitled to enjoy the same facilities provided to industries established in the Export Processing Zone. The bonded warehouse facilities will also continue.(Foreign Investment Policy, 1992)

In case any industry sells its products within the country in foreign currency, the excise duty levied on the quantity of sold and the custom duty, excise and sales taxes levied on the raw materials used in such products shall be reimbursed to such industry within 60 days upon the receipt of application of such reimbursement.

Custom duty, excise duty and sales taxes levied on the production of intermediate goods used in the production of exportable goods and sales tax levied on the production shall be reimbursed to the exported on the basis of the quantity of goods exported within 60 days from the receipt of the application for such reimbursement.

Priority will be given to arrange infrastructure facilities required for the establishment of industries.

Government land and land within the industrial districts will be made available to industries for the establishment of industries on priority basis.

No intervention will be made in fixing price of the products of any industry.

No taxes will be levied on machinery and equipment, raw materials and finished exportable products of industries established within the export processing zone.

Visa Arrangement:

A tourist visa will be granted to a foreign investor or his authorized representative as well as their dependent to stay in Nepal for the period during which a foreign investor maintain his/her investment.

A non-tourist visa up to six months will be granted to any foreign investor who has come to Nepal to undertake research and study with the purpose of investing in Nepal.

If any foreign investor makes a lump sum investment equivalent to more than US\$ 200,000 in convertible foreign currency, the investor and his/her dependents will be granted resident visa for the period he/she maintain his/her investment in the industry.(Foreign Investment Policy, 1992)

Government of Nepal has signed bilateral investment promotion and protection agreement (BIPPA) with some countries which will helps in boosting up the confidence of foreign investors to invest in Nepal. Nepal has signed this BIPPA agreement with 6 countries including Finland, France, Germany, India, Mauritius and United Kingdom. So it will be direct benefit for the investors from those countries in terms of rights of foreign investors, fair treatment, and security of the investment and from other disputes. (Foreign Investment Policy, 1992)

4 ENERGY MARKET IN NEPAL

4.1 Sources of Energy in Nepal:

Nepal, where most of the people are residing in rural areas with the poor development activities have to rely more on the traditional sources of energy. According to CIA World Factbook, there are no productions of petroleum products or natural gas in the country. The primary sources of energy used in Nepal are distributed as follows:

Table 4. Source of energy in Nepal (Energypedia, 2008).

Biomass	87%
Petroleum Products	8%
Hydropower	2.5%
Coal	2%

With the total energy consumption rate growing at 2.4% per year between 2001 and 2009, non-renewable sources of energy without considering hydropower projects such as biogas, small hydro projects and solar energy contributed about 0.7% in 2008/09 with an increase rate of 40% since 2005. (Energypedia, 2008)

Biomass: Due to the lack of development of alternative renewable sources of energy biomass is considered as the most important primary source of energy. Biomass consists of woods, agricultural residue and animal's dung. The consumption of biomass is predominated by households' activities such as cooking and heating. The large consumption of wood as a source of energy is causing deforestation in the country.

Petroleum Products: Without any reserves/production of petroleum products or natural gas, they are largely used all over the country as the source of energy. The petroleum products used in Nepal are imported from India. According to Nepal

Central Bank, in fiscal year 2010/11, Nepal consumed petroleum that cost NRs. 78.5 billion. Nepal imported mainly petrol, diesel, kerosene and gasoline. Petrol and diesel was mainly used in transportation whereas kerosene and gasoline was used for cooking and also lightening. Because of the lack of electricity many private industries were also using diesel as source of electricity and even government is also planning to rerun the diesel plants to produce the government as a way of reducing the load shedding in the country.

Hydropower: Hydropower consists of 2.5% of the total energy used in Nepal (Energylopedia, 2008).

Coal: Coal is the energy sources mainly for industrial sectors for heating and boiling. Specially, it is used in the processing of bricks, cement, and lime and even in the steel factories. Despite of small production of coal inside the country again it is imported from India.

4.2 Energy Crisis and Its Impacts in Nepal

Despite of having huge potential of hydropower in the country, Nepal is facing a blackout problem from many years. The population of the country is growing rapidly, country is trying to move towards more industrial era, new construction projects have been launched in the country, and people are becoming more and more urbanized. All of those happening in the country are demanding more and more electricity, but due to the lack of development of new power projects Nepal is facing so many problems.

The insufficient amount electricity in the country is affecting the daily household's activities, businesses, enterprises, industries, communication, education, hospitals and other service sectors. Nepal has the higher potential in the tourism sector due to its natural beauty and its geographical locations which helps to increase the GDP of the country. That sector is also directly or indirectly affected by this crisis of energy. All

of this had resulted in the weak performance in the economic sector of the country. The export is going down and down whereas the country has to be more dependent on the import which leads to the trade deficit with all its trading partners. This is certainly not the good sign for the development of the country like Nepal.

The power shortage has impacted Nepal to increase in import by Nepali Rupees (NRs.) 25 billion (NRs. 12 billion-diesel, NRs. 3 billion battery, NRs. 5 billion-inverters and generators and other means of energy (Business Age, 2011). This increased demand of energy has been creating more trade deficit with its trading partners. If the country could exploit its own resource and construct more power plants, Nepal could easily cut off that hefty amount of deficit and could use that money in other development activities like education, transportation, communication etc. Because of all those negative impacts in the country, Nepal has to focus more on the development of new power projects. Nepal also has no any reserve source of petroleum products as well as natural gas, has more possibility on producing hydropower plants which is gifted freely from the nature. So, it is very crucial to increase the production of electricity in the country for the better future.

4.3 Demand and Supply of Electricity in Nepal

In a Nepali newspaper called Nepali Times, former Nepal Electricity Authority (NEA) Chief Uttar Kumar Shrestha explains *“We are having a 14-hour power cut in February, which will increase to 16-hours by April. With a minimum of an 80MW annual increase in demand, this will reach 19 hours next year and 22 hours the following years”*. (DeewanRai and RubeenaMahato, 2011)

The given phrase gives the clear explanation of the demand and supply situation of electricity in Nepal. According to the annual report of Nepal Electricity Authority (NEA) 2011, the demand of Integrated Nepal Power System (INPS) reached to 946.10MW with annual energy demand totaled to 4833.35 GWh. from the previous

year figure of 885.28MW and 4367.13 GWh. This figure shows that the growth rate of 6.87% and 10.67% growth in peak power and annual energy demand. The same report also shows that out of 4833.35 GWh demand only 3850.87GWh(79.67%) was served from the available sources while remaining 982.48 GWh (20.33%) of energy demand has to be done with load shedding. Also only 40% of the populations have the access of electricity resulting 60% of people out of electricity using other sources of energy. Among the available energy 3156.82 GWh (81.58%) was contributed from the domestic generation whereas 694.05 GWh (18.42%) was imported from India. Among the available energy of 3156.82 GWh, hydropower generated 3153.42GWh of energy while 3.40GWh of energy was generated from thermal plants. (NEA, Annual Report 2011; 14-16). These data shows how important hydropower sectors are in terms of energy in Nepal. With all this figures, also those 40% of population access with electricity are facing several hours (up to 16 hours during dry seasons January, February and March) of power cut problems.

All of these figures show that the unbalance between demand and supply is very high. Despite of Nepali market, Bangladesh is also showing concerns to import electricity from Nepal. Nepal and India already are doing business with electricity. Nepal imports 694.05 GWh of electricity from India while has also exported 29.59 GWh in 2011. So the potential of hydropower market of Nepal has bright future if the development is done in time. (NEA, Annual Report 2011; 14-16)

4.4 Private Investment Policies in Hydropower Sectors

Nepal has endorsed the national water resources strategy which will help to provide the country with the development of standard procedure of water for the sustainable use of resources ensuring the protection of environment. This plan has the target of developing up to 2035 MW hydroelectricity by 2017. This plan will helps to provide 50% of households with Integrated Nepal Power System (INPS) electricity, among which 12% will be from micro and small hydroelectricity whereas 3% will be from

alternative sources of energy. Also the government has the target of developing 4000MW by 2027 which will help to provide 75% households with INPS, 20% by isolated and 5% by alternate energy. (Anup Kumar Upadhyay, 2012)

With the vision of developing hydropower projects to meet the local demands, national demands and for export, Government of Nepal has developed the Hydropower Development Policy of 2001. The main objectives of this policy is to generate electricity at low cost by using the tremendous amount of water resources available in the country, to link electricity with the economic development of the country and to support the development of the country by rural electrification as well as by exporting electricity.

4.5 Taxation policies for Hydropower Investment

Any companies producing hydropower in Nepal has to pay royalty to the government of Nepal. Those royalties depends upon the production capacity of electricity. Also the royalty rate is different for those with the aim of producing electricity for Internal Consumption and for Export oriented projects whereas there is no any royalty or license or corporate income tax required for the production of small hydropower Projects(up to 3000kw). Details about the royalty are shown in the following tables.

Table 5. Royalty for Export Oriented Projects. (Federation of Nepalese Chambers of Commerce & Industry, 2012:1)

	Type	Up to 15 years		After 15 years from the date of	
		Annual capacity Royalty, per kW	Energy Royalty per KWh	Annual Capacity Royalty,	Energy Royalty
1.	Export-oriented run of-the river project	NRs. 400	7.5%	NRs. 1800	12%
2.	Export Oriented Storage Projects	NRs. 500	10%	NRs. 2000	15%

The above table (Table 5) shows the royalty for export oriented projects. Royalty for export oriented projects is of projected in two time frames which is 15 years and after 15 years. The rate of royalty is different with run of river type projects and storage type projects. For example: run of river type projects should pay NRs. 400 per kW and energy royalty of 7.5% per kW for the first 15 years and after that NRs. 1800 per kW as annual royalty and 12% of energy royalty.

Table 6. Royalty for Internal Consumption. (Federation of Nepalese Chambers of Commerce & Industry, 2012:1)

	Electricity Capacity	Up to 15 Years		After 15 years from the date of commercial operation	
		Annual Capacity Royalty, per kW	Energy Royalty per kWh	Annual Capacity Royalty, per kW	Energy Royalty per kWh
1	Up to 1 MW	-	-	-	-
2	From 1MW to 10 MW	NRs. 100	1.75%	NRs. 1000	10%
3	From 10MW to 100MW	NRs. 150	1.85%	NRs. 1200	10%
4	Above 100MW	NRs. 200	2.00%	NRs. 1500	10%
5	For Captive use	NRs. 1500	-	NRs. 3000	-

The above table (Table 6) shows the royalty for internal consumption. The royalty rate depends on the capacity of the project. There is also the time frame for the payment of royalty which is projected for the first 15 years and after 15 years the rate will be different.

4.6 Licensing Process for the generation/transmission/distribution of hydropower

For projects with the capacity of 100kW-1000kW no license are needed but the proponents should submit related information including desk study planning like topographic map, are of distribution, beneficiary numbers, boundary of the survey area, financial evidence , Letter of Interest of Power Purchase Agreement etc. to

Ministry of Water resources(MOWR) through Department of Electricity Development(DOED).

For the project with capacity more than 1000kW, the proponents should get the following licenses:

Survey license to study generation, transmission and distribution survey of a project

Operation License: The projects need to get the following operation license in order to get the operation license.

- a) Production License for the construction and operation of a production facility
- b) Transmission license is given for the construction and operation of transmission lines.
- c) Distribution license is given for the construction and operation of a distribution facility.

4.7 Documents required for obtaining the license

To obtain the license for the generation/transmission/distribution of hydropower in Nepal, the following documents should be submitted by the proponent.

Feasibility Study Report: This report includes the detail descriptions of the transmissions line evacuated power and approved IEE/EIA Report from concerned ministry.

Detail Financing Plan: This report includes the total estimated cost of the project, financial capability of investor to invest in the project, commitments of financial institutions to be involved directly in the project, percentage of liability of investor and equity debt ratio.

Power Purchase Agreement (PPA): The paper of agreement between the parties who generates electricity and the one who intends to buy the electricity.

Other documents: Other documents required includes Certification of registration, Memorandum of article, memorandum of association, Industrial registration certificate, PAN (permanent account number) and details of technical capability.

4.8 Barriers and challenges of hydropower Development in Nepal

Though, Nepal has many possibilities for foreign investors to come and invest in Nepal there are certain barriers which make investors to abandon their investment plans. Some of the barriers are discussed as following:

Infrastructure and Facilities: It will be very costly for investors if sufficient infrastructures are not provided. Government of Nepal could not provide the basic infrastructures to the investors in the country. The supply of power and water is insufficient whereas the facilities of roads are not good which makes the transportation very complex and expensive. Other noticeable case is Nepal being a landlocked country; all the giant and heavy machinery stuff which has to be imported will land first on the port of Calcutta, India, and then have to drive to Nepal, which is a big problem.

Government Procedures: The government working procedure is not as simple as mentioned. Investors have to wait for a long time to get the small work done. Challenges with tax admissions are inadequate. Also the corrupted working policy which includes bribery has raised the risks of doing business in Nepal. The visa procedures made by the government of Nepal is not adequate to investors. The government should be able to give long term visa for the investors.

Political Situation: The country is politically unstable. Rules made by one government will be on trash because of the rules made by the upcoming government. The labor unions are also politically hindering the investors.

Implementations of Policy: The government of Nepal has committed in amending the Electricity Act under which hydropower generations licenses are granted, policies are intended to simplify the licensing procedures as well as fragmentation of NEA`s monopoly was announced but some of those are implemented with the exception of NEA`s monopoly which is hindering from the fair market competition in the electricity sector in Nepal.

Disputes: The major challenges for hydropower investors are to settle the disputes arisen. For example; the disputes in West Seti project has a situation where the project will be operated as per Nepalese law but the settlement of disputes will be solved by British Court. This shows the inability of disputes solving capacity of Nepal`s law which will also makes the disputes settlement procedure to be very hard, lengthy and costly. Therefore, it is very important that national regulatory framework and authorities are well equipped to deal with investment related matter for the enhancement of professional and fair manner in providing incentives for the investors as well as in avoiding the possible legal disputes. (US Department of State, 2011)

Nepal Electricity Authority (NEA): NEA is a state owned monopoly company and a sole buyer of produced energy and also the sole distributor of the electricity in the country. NEA has the absolute right to conclude all the agreements made with investors in the energy sectors. Without the competition it is difficult for investors to exist in the energy sectors as well as for consumers it will not be beneficial to get adequate service timely and at an affordable price. So for a fair market, a key competitor in infrastructure development and distribution of electricity is crucial. As a result, the government of Nepal should realize the importance of liberating the monopoly situation of NEA. (Madhab Raj Ghimire, 2011)

Technical Barriers: Nepal is a facing problem not only in the producing of hydroelectricity but the country is also not able to properly utilize the exploited electricity due to the lack of transmission lines. Nepal has the main transmission line of 132 kilovolts (kV) which runs for approximately 1,200 kilometers parallel to the

Indian border from East of Nepal to West of Nepal (SARI/Energy,2012). Currently, during the rainy season, the electricity produced from Kaligandaki has not been well utilized due to the lack of high voltage transmission lines which further results the commercial as well as revenue loss. (Nepal Energy Forum, 2012). So new investors who want to invest in hydropower will have the same barrier, once electricity is produced because of the lack of transmission lines the produced electricity will not be in use.

Financial Barriers: The investment needed in the hydropower will be considerable. Nepal itself is not able to invest big amount of money in the hydropower sector due to its economic situation. Storage type hydropower costs about NRs. 150,000 to 200,000 per kilowatt to develop. Considering 1000 MW as our peak requirement and 300 MW as available the total cost of developing the remaining 700MW of storage type hydropower to fulfill our entire present peak requirement would be NRs.125, 000, 000,000 which will be 68% of our annual budget. The main body to invest in Nepal in this situation is either private sectors or international communities, or organizations or big companies. But because of the insecure environment in Nepal it is not so easy to obtain assistance for the hydropower development. So the main challenge of Nepalese economy is to make the proper arrangement of international funds required for hydropower development in Nepal. (Ambikesh Kumar Jha, 2012:86)

4.9 Risks in the investment of hydropower in Nepal

Despite of the demand in the country, investors face certain kinds of risks when investing in hydropower sectors in Nepal. Some of the major risks for the investors are given as below:

Foreign Exchange Risk: Foreign exchange risk is the risk of changing in the value of the original investment due to the change in currency exchange rate. In case of Nepal, if the investor has borrowed money from a foreign lender then this kind of risk will occur. If the value of Nepalese rupees is weaker than the foreign currency, investor will face the problem when they have to pay back the loan to the foreign

lender in different currencies than Nepali Rupees. So this kind of risk can be mitigated either by having the loan in the local currency or by denominating the rate of revenue in foreign currency. (RatnaSansarShrestha, 2008)

Repatriation Risk: Repatriation means for example if a citizen from Finland is investing in Nepal and when he receives return from the investment, he wants to send that money back to Finland. This process generally is called repatriation. The concern will be serious if the investors are not provided the full incentives on the risk concerning the repatriation. Foreign Investment and Technology Transfer Act of 1992 and the Electricity Act of 1992 have guaranteed repatriation for hydropower investors in Nepal. (RatnaSansarShrestha, 2008)

Country Risk: Because of the change in the country's policy, if the foreign government is not able to honor the business commitments is generally known as country/sovereign risk. In case of Nepal, the foreign investors have those kinds of risk in the situations like the government credit worthiness, change in political environment and enforceability of contracts, the possibility of confiscation and expropriation. To ensure those risks for free in Nepal, Multilateral Investment Guarantee Association (MIGA), a member of World Bank groups are working. (RatnaSansarShrestha, 2008)

Interest Rate Risk: The risk which changes the rate (value) of investors securities portfolio for example bonds and utilities is known as interest rate risks. Generally, investors are offered two kinds of interest rate which are floating rate and fixed rate. Floating rate changes with the market trend with uncertainty for the borrower and usually bank prefer to offer this rate. Fixed rate is the rate where the rate does not fluctuate with the market trend which is more risk free for borrower. (RatnaSansarShrestha, 2008)

Inflation Risk: The value of money tends to be changing with the changes of time and economy. Inflation will depreciate the real value of currency. This risk could undermine the performance of investor's investment. Hydropower is considered a

long-term investment where the inflation risk is considerably high. (RatnaSansarShrestha, 2008)

Legislative Change Risk: Legislative change risk is about the changes in the country's rules and regulation that will enforce to increase the rates and taxes or other expenses and liabilities, by further reducing the project revenues which will skeptically affect the viability of a project. Legislative changes risk could sometimes be in favor of the projects and sometimes against the project. For example if legislative changes to lower the tariff then the company would be benefited but if the company for example produces more pollution and if legislative changes and ask the company to pay the fines then it will be against the company.(RatnaSansarShrestha, 2008)

Market Risk: For the development of energy the market is crucial and is always certain and limited due to its constraints with regard primarily to storage and transmission. This kind of problem can be overcome by making long term power purchasing agreement with the distributors. (RatnaSansarShrestha, 2008)

Revenue Risk: For the developers especially in case of run-off-river projects due to the lack of storage, the long-term PPA may not ensure the plant factor if the utility accepts delivery of energy at its pleasure. It means that the investors may not be able to generate enough revenue in order to fulfill the financial obligations of daily operation, maintenances and repair. A take or pay (which means all the energy available wither in wet season or in dry season will be converted into cash) type PPA will mitigate this risk. (RatnaSansarShrestha, 2008)

Payment Risk: Payment risk arises when the buyer is not creditworthiness enough to pay back to seller. Most of the developing countries, state owned utilities may not be creditworthy because of the suffering from poor management, over-employment, high leakage etc. In such cases developers can mitigate these kinds of risk by signing a guarantee of payment with the government of that state which will ensures that the

utility pays its debts in time and incase if the utility cannot pay in time then the government will be obligated to make the payment. (RatnaSansarShrestha, 2008)

Construction Risk: The main construction risks are to cope with planned time and planned money. Time overrun will result to the loss of revenue and raise the cost due to inflation. Penalties because of not being able to provide the energy in time whereas the interest costs are other result of not being able to move with planned time. Other risk includes social, economic, environmental, and geological risks, performance and design risks etc. Some of the risks can be covered by insurance coverage. (RatnaSansarShrestha, 2008)

Hydrological Risk: Take or pay nature of the PPA will ensure that the energy available with the producer will generate cash. But incase if there is not enough water to generate electricity due to the change in waterfall, climatic change or change in hydrology of the watershed area, then the projects are on their own risks. So to mitigate hydrological risks, the proper way of engineering is essential. One of the best solutions is to collect the hydrological data for certain years in the past and design the project accordingly. (RatnaSansarShrestha, 2008)

4.10 Current Players in the sectors and their Introduction

Currently, Nepal has some big hydropower stations owned by Nepal Electricity Authority, independent power producers, private companies as well as international companies. Other than big projects there are also some medium, small, micro as well as Pico hydro projects. Some of the projects are under construction whereas some are the future proposed projects. The detail of the existing, ongoing, proposed as well as identified potential of the hydropower projects of Nepal as shown in the Appendix 1.

4.11 Government Bodies and the Supporting organizations in Nepal

Major government agencies involved in power sectors in Nepal are as following:

1. Ministry of Water Resource (MOWR).
2. Water and Energy Commissions Secretariat (WECS)- Planning and policy research
3. Department of Electricity Development (DOED) - Licensing, facilitation, promotion, compliance monitoring, project study.
4. Nepal Electricity Authority (NEA)-Public utility for generation, transmission and distribution of electricity.
5. Electricity Tariff Fixation Commission (ETFC) - Tariff setting.
6. Ministry of Energy
7. Ministry of environment
8. Independent Power Producers Association of Nepal(IPPAN)

4.12 NEA (Nepal Electricity Authority) and Its Roles

NEA is one of the key players in the electricity sector in Nepal. It is the sole manufacturer and distributor of electricity in the country. The primary objectives of NEA is to generate, transmit and distribute adequate, reliable and affordable power by planning, constructing, operating and maintaining all generation, transmission and distribution facilities in Nepal's power system both interconnected and isolated(NEA, 2012).NEA is the monopolistic company in Nepal who has the utmost right for the generation, transmission and distribution of the electricity.

5 EMPIRICS

All the data used in this thesis are gathered from secondary data sources like previous reports, reports by different NGOs and INGOs, newspapers, and internet and different blogs. In this thesis, the author has designed some questionnaires and the interview is based on those specific questionnaires. Different people related to the power sector of Nepal were interviewed and based on the answers from those interviews the author concludes the depth of the thesis.

5.1 Research Methods

In order to make the best decisions, individual or organizations have to collect and analyze data and information based on their problems which is basically referred as research. Business research not only collects and analyzes data but it also suggest for the further research in future. So, a good research will be able to diagnose the situation, take the account of organizational strength, weakness and help to make the best decision in the best suitable environment. According to Ray Kent (2007), Qualitative marketing research seeks to explore and understand people's attitudes, perceptions, motivations and behaviors by constructing and then analyzing data that are largely qualitative in nature. The research problem of my research is to find if there are enough investment opportunities for foreign investors to invest in Nepal, particularly in the production of hydroelectricity.

The most commonly used research methods are the qualitative method and quantitative method. The qualitative method is more about collecting, analyzing and interpretation of data by understanding people's attitude, perceptions and behavior. It can also be called a more subjective method which describes the inner thought, feelings and emotions about the situation or problem of the corresponding respondents. Quantitative method is more based on the mathematical and statistical interpretation of the data found from the research. (Ray Kent, 2007)

This thesis is analyzed in a qualitative way. Initially, secondary data is provided in the thesis to prove the present situation of hydropower in Nepal which was taken from different sources. To match the theoretical frame work in the thesis, an interview was conducted with different personnel from different backgrounds related to the production and distribution of electricity in Nepal. Based on those interviews and secondary data provided in the theory part, a conclusion was derived to prove the result of the research.

In total four persons were interviewed for the research and all of them were related with the hydropower development projects in Nepal. The name and their positions are described as following:

1. Mr. Deepak Rauniar: Chief Executive Officer of Hydroelectricity Investment and Development Company Limited (HIDCL)
2. Dr. Subarna Das Shrestha: President of Independent Power Producers`AssociationNepal (IPPAN) and Managing Director of Sanima Hydro and Engineering (P.) Ltd.
3. Mr. Suresh Kumar Basnet: President of Nepal Chamber of Commerce
4. Mr. Hari Ram Koirala: Secretary of Nepal Electricity Authority (NEA)

The author believes that the result obtained will be highly valid. Among four persons, phone interview were conducted with MR. Deepak Rauniar, DR. Subarna Dash Shresthaand Mr. Hari Ram Koirala whereas the written form of questions was sent to Mr. Suresh Basnet.

Other than four persons, there was a discussion program by BBC Nepali presented by Mr. Narayan Shrestha, episode 262 called SaghaSawal with a title Hydropower Development and Possibilities. The main guests of that discussion program were as following:

1. Dr. UpendraGautam: Researcher at water resources
2. Mr. Anup Kumar Upadhya: Spoke person at Energy Ministry

3. Mr. Arjun Karki: Executive CEO of NEA

It was found that the discussion was also a part of the research and the result of the discussion was found to be quite similar to the research the discussion program was also included as the result of the research.

5.2 Research Questions

The following questions will be asked to the specialists associated with different organizations of Nepal.

1. How do you analyze the present situation about the energy distribution scenario of Nepal?
2. Is it possible to get rid of the problem of load shedding in Nepal? If yes when do you think is possible?
3. What do you think the most convenient source of energy in Nepal?
4. Nepal though is considered as the most potential country for the development of hydropower, why the development process is not fast enough to get the early benefit of the available resources?
5. What are the problems for the development of hydropower?
6. What could be the possible solutions for the development of those problems?
7. How do you analyze the private or foreign investment in the sector?
8. What could be the opportunities for foreign investors to invest in hydropower sector in Nepal?
9. Is the business process of Nepal compatible for the foreign investor to come to Nepal and invest here?
10. What could be the risk for investing in hydropower for foreign investors?

6 RESULTS

All the respondents agree that the current power shortage problem in Nepal, where there are so many opportunities for developing hydropower projects, is in the worst situation. The result of having this maximum blackout (power cut) problem is because of the country's economic and political situation. The country is facing extreme energy crisis because of not been able to make effective planning and implementing those planning in the past. So, to make the future bright and not to make the same mistake again, effective planning with action is today's need. This is the only way to get rid of energy crisis.

The demand of electricity in Nepal is very high compared to the supply. The figure of demand provided by the NEA is not the accurate one because the figure includes the electricity just for the basic households use but it does not include industrial use of electricity. In the view of Mr. Rauniar and Dr. Shrestha, *Electricity is that kind of energy where supply will create demand meaning if the supply is high then the demand will also get high* because enough supply will motivate consumer to use more electrical equipment whereas new companies will be opened in the country. Because of the lack of electricity many organizations are not operating in the country. But enough supply will then be able to solve the problem. According to Dr. Upendra Gautam, Nepal is importing oil which amount almost 126% of the total export of the country which is unfortunate for the whole economy. If there is enough availability of electricity, the imported amount of oil will decrease and this will help to strengthen the economy of the country. Every respondent agrees that there is huge gap between the demand and the supply situation of electricity in the country. According to Mr. Gautam only 25% of the demand is fulfilled by the supply which causes 15-18 hours of power cut. So some actions should happen in the country very fast to solve the current problem.

Yes, the solution of electricity crisis is possible but it will not be successful until and unless there are proper planning and implementation. Most the projects which are

being in use now and which are ongoing for constructions are R-O-R type meaning there is no any facility for the storage of water. The problem is not during the wet season when there is enough water flow in the rivers but during the dry seasons when the level of water flow in the river is less, then the hydropower plants are not able to operate with their full capacity which resulted 15-18 hours of load shedding. So, the main solution to eradicate the current situation is to develop storage type projects.

Hydropower is considered as the free source of energy. Once the construction process is completed it does not cost anything to use as water is the natural gift and only what will cost is the repair and service cost. Also, if the project is completed the estimated lifespan of hydropower is considerably higher than other energy sources like wind power, biomass, solar energy etc. For the commercial use of electricity hydropower is found to be the most convenient source of electricity in the context of Nepal. Besides this, for the commercial purpose private organizations like banks, offices, factories, hotels etc. are using diesel to produce electricity for their own use and according to Mr. Anup Kumar the total amount of that of produced electricity from private sector for their own use is estimated about 350 MW. Instead of using diesel to generate electricity for individual use that is costing huge amount of money for the government to import oil, if those companies are encouraged to produce hydroelectricity or some other renewable sources of energy like solar it will be good for the whole economy of the country.

Due to the lack of proper planning, proper implementation of those planning, lack of good understanding and wrong way of analyzing the result, the development of hydropower is not fast enough as it should be. Also, the other main problem that is hindering the development of the hydropower projects is the current political situation of the country. Nepal, which just ended the long civil war and is on the way to its peace process, is politically unstable and government could not exist in the long term. This is affecting the development of the country because once the government is changed, then it also comes up with new ideas and plans and the plans launched by previous government does not work anymore. So, the stable political situation of the

country will be the base not only for the development of hydropower but also the whole economy of the country.

The number one problem in the development of hydropower in the country is lack of capital. It is found that lack of security of the investment, the hydropower sector is not able to attract private as well as foreign investors and capital as well. In recent years, though private as well as foreign investors are playing more important role for the production of 1/3rd of the total electricity production in the country, there will be more foreign and private investors if they found that the government is providing them more secure environment to invest and operate (Anup Kumar, 2012). Also the high inflation rate in the country is hindering the investors. Hydropower projects are long-term projects to complete, so because of the high inflation rate, the gap between the estimated budget planning and actual completion cost of the project will be very high. In the meantime, the political strikes which are common in the country are affecting the working environment of the companies to complete the projects in the projected time which resulted for the delay penalty. Additionally, the other problem is found to be the development of high voltage transmission lines. NEA has the authority to develop transmission lines but NEA is not able to build new high voltage transmission lines. So, to solve this problems responsibility of NEA should be divided and stable government with stable policy which can control the inflation rate as well as the economy of the country is crucial. Meanwhile, corruption is found to be another problem that is giving a bad impression to the foreign investors. The country being already listed as one of the most corrupted country in the world; investors do not find it so easy to invest fairly in the country. Respondent agrees that in hydropower sector also the rate of corruption is high.

As there is a huge gap between the demand and supply within the country, the internal market already looks promising for investors to invest in hydropower projects. The demand figure projected by NEA may not be accurate as more availability of electricity will create higher consumption. Nepal has already been engaged in international trade basically with India which has created more possibility

to export produced electricity to India. Nepal has already started to export some of the produced electricity to India and some new projects which are export oriented are also on pipeline of production. Not only India but Bangladesh and other countries are the possible buyer of electricity from Nepal if the country can produce in excess. So, internal market is the huge opportunity as well as export is other opportunity for investors in this sector in Nepal.

According to Mr. Anup Kumar, the total amount of electricity produced by foreign as well as private companies is 187 MW which is itself the proves that the investment sector is very much supportive for the private as well as foreign investors. Also in recent time the government of Nepal is buying electricity in dollar from foreign investors who had invested in dollars which also gives the very supportive action for foreign investors to invest in Nepal. Also the major disputes found between the private investors and the government is between the Power Purchasing Agreement with escalation. It was found that the PPA should be in favor of both parties for the benefit of both parties and to minimize the risk for investors as well as purchasing body with escalation. It was found that the power purchase agreement with escalation should include the following things:

1. Take or pay
2. Guarantee for purchasing of energy
3. Guarantee to supply the minimum amount of energy
4. Purchase guarantee of excess amount of energy
5. Third party sales guarantee

The research shows that if the government or the sole buyer of electricity NEA could guarantee PPA agreement with escalation defining the above terms then there will be less risk for investors to invest in the sector. Mr. Rauniar believes that the rate of return in hydropower sector in Nepal is about 20%-22%, so to gain that return investors should put some risk also. But the major risks in the hydropower sectors are found to be market risks, political risks, natural disaster, changes in law, foreign exchanges guarantees such as convertibility, repatriation, devaluation, escalation,

concessional funding etc. Despite of these risks, there are some more risks such as operation risk, dispatch risk, schedule outages, maintenance, etc. For certain kind of risks, investors can mitigate risks by making appropriate dispute resolution methods, applying insurance of the projects etc. Every business will start with some sort of risks which is common in business but in case of Nepal, investors found that political risk is the biggest risk to invest in the country because politics of Nepal is very uncertain. Rules and planning made by one government will change with the change of the government. All the respondents strongly believe that if the political situation of the country gets better then there will be big flow of foreigners investing in hydropower sector and investors are also waiting for the better political situation.

7 CONCLUSION

This research played a crucial role to determine some utmost facts for the development of hydropower in Nepal more efficiently. It was found that without the cooperation of foreign as well as private sectors, there are no any possibilities of mitigating the current energy crisis. The cooperation between government and private as well as foreign investors will help to end the energy crisis of the country. Development of hydropower not only fulfill the gap between demand and supply but also creates more jobs in the country, help to lessen the import of petroleum products in the country, new industry will be opened which will lead the country towards the prosperity of economic growth.

Development of storage type hydropower projects will be the final solution to eradicate the current problem. Though the environment is found to be compatible for foreign as well as private investors, the act to end the monopoly of NEA which will create more competition in the power distribution as well as purchasing process is what should be further developed by the government of Nepal. NEA is found to be the sole purchaser and distributor of the entire produced electricity in the country. Effective power purchasing agreement with escalation is found to be the utmost important for private as well as foreign investors which will further help them to reduce the risk of their investment.

As the gap between demand and supply is very high, more and more opportunities are found for foreign investors in the sector. The investment policy of Nepal in the hydropower sector is found to be very welcoming for foreign investors and the market for the produced electricity is found to be huge. Despite of many risks which are common in business, hydropower has some extra risks such as market risks, manufacturing risks, operation risks, dispatch risks, schedule outages risks, maintenance risks, delay risks etc. But the most and crucial risk for investors in the sector in case of hydroelectricity production is found to be political risk. Once the political situation of the country will get better and if there will be a stable

government with clear view, better planning and simplified rules and regulations, then the sector is found to be fruitful for foreign investors. Excluding the political risk, the opportunities for foreign investors in Nepal are found to be highly assured and guaranteed. Last but not least, if the country could create better political situation with stable government, then the country will find many foreign investors investing in Nepal, not only in hydropower but in the whole economic sectors that will ensure for the better and new Nepal.

REFERENCES

- 2011 Investment Climate Statement-Nepal.U.S. Department of State.(Online).Accessed 22.11.2012.
<http://www.state.gov/e/eb/rls/othr/ics/2011/157332.htm>
- Ambikesh Kumar Jha. Vidyut.Volume 1.(2012)Page-86.Accessed 23.11.2012.
http://www.nea.org.np/images/supportive_docs/Vidyut.pdf
- Annual Report 2010/2011.Nepal Electricity Authority. Page 14-16. Accessed 17.11.2012.
http://www.nea.org.np/images/supportive_docs/Annual%20Report-2011.pdf
- Anup Kumar Upadhyay. Legal and Policy Environment for Private Sector Participation in the Power Sector in Nepal (2012).Accessed 02.12.2012.
www.nepjol.info/index.php/HN/article/download/884/976
- Basnet, S.-K.2013: President of Nepal Chamber of Commerce.
chamber@wlink.com.np 15.02.2013.Printed 20.02.2013.
- BBC News South Asia.Nepal Profile.2012 (Online).Accessed 13.04.2013.
<http://www.bbc.co.uk/news/world-south-asia-12499391>
- BinodPandey, 2011. Status of Hydroelectricity in Nepal: Potential and Challenges. Accessed 8.12.2012. <http://binodpandey.files.wordpress.com/2011/03/e2809cstatus-of-hydroelectricity-in-nepal-potential-and-challengese2809d-doc.pdf>
- Britannica academic edition.Nepal, 2012 (Online).Accessed 21.10.2012.
<http://global.britannica.com/EBchecked/topic/409152/Nepal>
- ChandanSapkota. Nepal was the sixth highest receiver of remittances in 2011. (Online). 2012. Accessed 20.10.2012. <http://sapkotac.blogspot.fi/2012/11/nepal-was-sixth-highest-receiver-of.html>
- CIA- The World Factbook. 2013. (Online). Nepal. Accessed 1.12.2012.
<https://www.cia.gov/library/publications/the-world-factbook/geos/np.html>
- Conventional hydropower, 2012 (Online).Accessed 1.12.2012.
<http://hydro.org/tech-and-policy/technology/conventional/>
- Countries of the world.Nepal Economy. 2013. (Online). Accessed 18.10.2012.
http://www.theodora.com/wfbcurrent/nepal/nepal_economy.html
- Culture Crossing. Nepal, 2012 (Online). Accessed 16.11.2012.
http://www.culturecrossing.net/basics_business_student.php?id=145

- Demand and Supply. Business Age. 2011. (Online). Accessed 19.11.2012.
<http://www.newbusinessage.com/Cover%20Story/414>
- Dewan Rai and Rubeena Mahato. No light at the end of the tunnel. Nepali times (2011). Accessed 17.11.2012. <http://nepalitimes.com/news.php?id=17958>
- Economy Watch. Nepal Economic Statistics and Indicators. 2010. (Online). Accessed 18.10.2012. <http://www.economywatch.com/economic-statistics/country/Nepal/>
- Energy Sector Overview-Nepal. SARI/Energy, 2012 (Online) Accessed 22.10.2012.
http://www.sari-energy.org/pagefiles/countries/nepal_energy_detail.asp
- Energypedia. Nepal Country Situation, 2012 (Online). Accessed 20.11.2012.
https://energypedia.info/index.php/Nepal_Country_Situation
- Foreign Investment Policy, 1992. Accessed 8.11.2012.
http://www.ngcci.org/pdf/Foreign_Investment_Policy.pdf
- Foreign Investment Policy. Nepal- Foreign Investment Opportunities. (Online). Accessed 6.11.2012.
<http://www.catmando.com/gov/industry/fipd/fipd10.htm>
- History of Hydropower, 2012 (Online). Accessed 20.10.2012.
http://www1.eere.energy.gov/water/hydro_history.html
- Hydroelectric power water use, 2012 (Online) The UCGS water Science School. (Online). Accessed 25.10.2012. <http://ga.water.usgs.gov/edu/wuhy.html>
- Hydroelectric power, 2012 (Online). Accessed 12.5.2012. <http://www.tva.com/power/hydro.htm>
- Hydropower in Nepal, 2012 (Online). Accessed 9.11.2012. <http://www.ippan.org.np/HPinNepal.html>
- Hydropower, 2012 (Online). Accessed 20.10.2012. http://www.need.org/needpdf/infobook_activities/SecInfo/HydroS.pdf
- Hydropower: Some Legal Provisions and Policies Highlights (2012). Accessed 20.11.2012. http://www.fncci.org/text/hydropower_some.pdf
- Indexmundi Factbook-Nepal, 2012 (Online). Accessed 8.11.2012.
<http://www.indexmundi.com/nepal/>
- Investment Policy Review-Nepal. UNCTAD (2003). Page-5. Accessed on 03.08.2013.
http://unctad.org/en/docs/iteipcmisc20031_en.pdf

Investment Policy Review-Nepal.UNCTAD(2003).Accessed 24.10.2012.
http://unctad.org/en/docs/iteipcmisc20031_en.pdf

Koirala, H. 2013.Secretary of Nepal Electricity Authority (NEA).Interview
 05.03.2013.

Madhab Raj Ghimire.Regulating Network (2011).Accessed 22.11.2012.
<http://regulatingnetwork.blogspot.fi/2011/11/optimal-issues-of-nepalese-hydropower.html>

Nepal Rastra Bank. The share of Kathmandu valley in the National Economy
 (2012).Page-11.Accessed 20.11.2012.
http://www.nrb.org.np/red/publications/study_reports/Study_Reports--The_Share_of_Kathmandu_Valley_in_the_National_Economy_20120830-New.pdf

Ramesh M. Singh and Dinesh R. Bhujju.SageJournals.Development of science
 technology in Nepal. (2001). Accessed 24.10.2012.
<http://sts.sagepub.com/content/6/1/159.full.pdf+html>

RatnaSansarShrestha. Investment in Hydropower sector in Nepal: Opportunities and
 Risks (2008).Accessed 25.11.2012. <http://www.ratnasansar.com/2008/11/investment-in-hydropower-sector.html>

Rauniar, D. 2013. Chief Executive Officer of Hydroelectricity Investment and
 Development Company Limited (HIDCL).Interview 17.02.2013.

Ray Kent (2007) Marketing Research: Approaches, Methods and Applications in
 Europe (page 86) London England. Thomson Learning.

Renewable Energy Technologies: Cost analysis Series Volume 1: Power Sector:
 Hydropower. IRENA. (2012) Accessed
 1.12.2012.http://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf

Renewable energy Technologies: Cost analysis series, Volume 1, Issue 3/5,
 Hydropower (2012). IRENA.Accessed 1.12.2012.
http://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf

Reuters, 2009. China says Three Gorges Dam cost \$37 billion. Accessed 01.11.2012.
<http://www.reuters.com/article/2009/09/14/idUSPEK84588>

SajhaSawal- Hydro-Power Development and Possibilities.CanadaNepal.Episode-262,
 2013 (Online).Accessed 03.5.2013. <http://www.canadanepalvid.com/2012/11/sajha-sawal-episode-262-hydro-power.html>

Shrestha, S.-D. 2013.President IPPAN and Managing Director of Sanima Hydro and
 Engineering (P.)Ltd. Interview 05.03.2013.

Siddhant Raj Pandey.2011.Investing in the future.NepaliTimes.Accessed 5.11.2012.
<http://nepalitimes.com/news.php?id=18861>

Transmission Failure.Nepal Energy Forum. 2012. (Online). Accessed 11.10.2012.
<http://www.nepalenergyforum.com/transmission-failure/>

Appendix 1

The main existing, ongoing, proposed as well as identified potential of the hydropower projects of Nepal are as given below :(BinodPandey, 2012; 11-18)

Major Hydropower Stations

Number	Hydropower Stations	Power Output (KW)
1	Middle Marsyangdi	70000
2	Kaligandaki A	144000
3	Maryangdi	69000
4	Kulekhani 1	60000
5	Kulekhani 2	32000
6	Trisuli	24000
7	Gandak	15000
8	ModiKhola	14800
9	Devighat	14100
10	Sunkoshi	10050
11	Puwakhola	6200
	Total	<hr/> 459150

Small Hydropower Stations

Number	Hydropower Stations	Power Output (KW)
1	Chatara	3200
2	Panauti	2400
3	Tatopani/myagdi (1&2)	2000
4	Seti(pokhara)	1500
5	Phewa (Pokhara)	1000
6	Tinau (Butwal)	1024
7	Sundarijal	640
8	Pharping ***	500
9	Jomsom**	240
10	Baglung	200
11	Khandbari**	250
12	Phidim**	240
13	Surnaiyagadh (Baitadi)	200
14	Doti	200
15	Ramechhap	150
16	Terathum**	100

Total	13844
Total Power Output (KW)	472994

Existing (Isolated)

Number	Hydropower Stations	Power Output
1	Dhankuta***	240
2	Jhapra (Surkhet)	345
3	Gorkhe(Illam)	64
4	Jumla**	200
5	Dhading***	32
6	Syangja***	80
7	Helambu	50
8	Darchula 1&2**	300
9	Chame**	45
10	Taplejung**	125
11	Manang**	80
12	Chaurjhari (Rukum)**	150
13	Syarpudaha (Rukum)**	200
14	Bhojpur**	250
15	Bajura	200
16	Bajhang**	200
17	ArughatGorkha	150
18	Okhaldhunga**	125
19	Ruplagadh (Dadeldhura)	100
20	Achham	400
21	Dolpa	200
22	Kalikot	500
23	Heldung (Humla)	500
	Total (KW)	4536

Note

<p>* line length within Nepal *' leased to private sector ***not in normal operation</p>
--

Undergoing and Future Projects

Under Construction

Number	Power Projects	Power Output
1	Upper Tamakoshi	456000
2	Chamelia	30000
3	Kulekhani III (Storage)	14000
4	Gangadh	400
	Total (KW)	<u>500400</u>

Planned and Proposed Projects

Number	Power Projects	Power Outputs
1	Upper Trisuli-3A	60000
2	Upper Trisuli 3B	37000
3	BudhiGandaki	600000
4	Rahughat	27000
5	Upper Seti (Storage)	128000
6	SetiTrisuli(Storage)	128000
7	Upper Modi A	42000
8	Naisyagu gad (Storage)	400000
	Total(KW)	<u>1422000</u>

Identified Potential Hydropower Projects

Number	Projects	Capacity(MW)	Type
1	West Seti	750	Storage
2	Arun III	402	PROR
3	Kali Gandaki II	660	Storage
4	Lower Arun	308	PROR
5	Upper Arun	335	PROR
6	KarnaliChisapani	10800	Storage
7	Upper Karnali	300	PROR
8	Pancheswor	6480	Storage
9	ThuloDhunga	25	ROR
10	Tamor/Mewa	100	ROR
11	DudhKoshi	300	Storage
12	Budhi Ganga	20	ROR

13	Likhu 4	51	PROR
14	Kabeli A	30	ROR
15	Upper Mrshyangdi A	121	Storage
16	Andhikhola (Storage)	180	Storage
17	Khimti II	27	ROR
18	LangtangKhola (Storage)	218	Storage
	MadiIshaneshwor		
19	(Sotrage)	86	Storage
20	Kankai (storage)	60	Storage
	Total Capacity (MW)	<u>21253</u>	