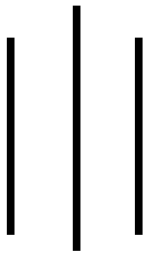
Financing in Hydropower Project of Nepal

(A Financial Study of Upper Chardi Hydroelectric Project)



A THESIS

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in the form of partial fulfillment of the requirement of the Master's Degree in Business Studies (M.B.S.)

Kathmandu, Nepal

December, 2009

RECOMMENDATION

This is to certify that the thesis:

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(A Financial Study of Upper Chardi Hydroelectric Project)

has been prepared as approved by this Department in the prescribed format of faculty of Management. This thesis is forwarded for examination.

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VIVA-VOCE SHEET

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DECLERATION

I hereby declare that the work reported in this thesis entitled ***"Financing in hydropower Project of Nepal (A Financial Study of Upper Chardi Hydroelectric Project)"*** *submitted to Shanker Dev Campus, Faculty of Management, Tribhuvan University, is my original work done in the form of partial fulfillment of the requirement of the Master's Degree in Business Studies (M.B.S.) under the joint supervision of Dr. Kamal Das Manadhar, Professor of Shanker Dev Campus and Mr. Dhurba Subedi, Lecturer of Shanker Dev Campus.*

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This Thesis on topic of **"Financing in Hydropower Projects of Nepal** *(A Financial Study of Upper Chardi Hydroelectric Project)" has* analyzed the financial part of the project with capital budgeting technique. This has been prepared and submitted with the purpose of fulfilling the partial requirement of Master's Level of Business Studies (Under Tribhuvan University).

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At last but not least, I would like to accept any deficiencies and errors that may be in my Thesis work, which might be there knowing or unknowingly remained in this Thesis during its preparation.

DEVA RAJ SUBEDI

List of Abbreviations and Acronyms

@	At the Rate
AC	Alternating Current
ACSR	Aluminium conductor steel reinforced
B/C Ratio	Benefit-Cost Ratio
BM	Bench Marks
BOQ	Bill of Quantities
BPC	Butwal Power Company Ltd.
CGI	Corrugated galvanized iron
cm	Centimetre
D/S	Down Stream
DC	Direct Current
DG	Diesel Generator
DHM	Department of Hydrology and Meteorology
Dia.	Diameter
DoED	Department of Electricity Development
ED	Engineering Division
EDM	Electronic Distance Measurement
EIA	Environmental Impact Assessment
EL	Elevation
ERT	Electrical Resistivity Test
FIRR	Financial Internal Rate of Return
FNCCI	Federation of Nepalese Chamber of Commerce and Industries
GON	Government of Nepal
GPS	Global Positioning System
GW	Giga Watt
GWh	Giga Watt hour
HP	Hydropower Project
HRT	Head Race Tunnel
Hz	Hertz (cycle per second)
ICIMOD	International Centre for Integrated Mountain Development
IDC	Interest during Construction
IEE	Initial Environmental Examination
INPS	Integrated Nepal Power System
IPP	Independent Power Producers

IRR	Internal Rate of Return
km	Kilometre
km^2	Square Kilometre
kmph	Kilometre per hour
kV	Kilovolt
KVA	Kilovolt Ampere
KW	Kilowatt
kWh	Kilowatt hour
L/B	Left Bank
LCU	Local Control Unit
LRMC	Long Run Marginal Cost
Ltd	Limited
m	Metre
M	Million
m/s	Metre per second
m^2	Square metre
m^3/s	Cubic metre per second
m^3/s	Cumecs
mm	Millimetre
mm^2	Square millimeter
MoWR	Ministry of Water Resources
MVA	Mega Volt Ampere
MVHPL	Mai Valley Hydropower Pvt. Ltd.
MW	Megawatt
MWh	Mega Watt Hour
NEA	Nepal Electricity Authority
NEDEPL	Nepal Energy Development Endeavour Pvt. Ltd
NPV	Net Present Value
NRs	Nepalese Rupees
O&M	Operation and Maintenance
PDR	Project Definition Report
PPA	Power Purchase Agreement
ppm	parts per million
Pvt	Private
R/B	Right Bank

RC	Reinforced concrete
ROE	Return on Equity
ROR	Run of River
TOR	Terms of reference
U/S	Up Stream
UCHEP	Upper Chardi Hydroelectric Project
US$	United States Dollar
V	Volt
VAT	Value Added Tax
VDC	Village Development Committee
W	Watt
WECS	Water and Energy Commission Secretariat
Yr	Year

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CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

Hydropower is economic, non-polluting and environmentally benign source of energy. Out of 83000 MW potential, only 50 percent is in technical feasible. But till the date only 609 MW has been harnessed and about 100 MW under construction. That means less the 1 percent have been developed out of which more than 99 percent of yet to be develop. In the line of fact, research, analysis and development of hydropower is very essential from the view of economic development of the nation and up lift the overall economic condition of Nepal.

Government of Nepal (GoN) has listed up the transition of traditional energy to commercial energy as one of the most important governmental strategies. Among the commercial energy sources, hydropower has been considered as the most economic and stable base energy compared with coal and thermal energies. It has been expected that hydropower development will become a motive power for economic development of the country.

For enhancing hydropower development, the most important elements are promoting cost effective small and medium-sized projects to meet domestic demand at affordable price, encouraging private sector investment in hydropower development and distribution, accelerating rural electrification also by attracting investment from the community and local private entrepreneurs, improving the integration of social and environmental elements into the power development process, and encouraging power-based industries and transportation systems as markets for the energy produced.

Objective

With the intention of involving the private sector in the development of hydropower. Ministry of Water Resources, Government of Nepal awarded the study license for Upper Chardi Hydroelectric Project to **Nepal Energy Development Endeavour Pvt. Ltd. (NEDE).** The objective of this study is to carry out the financial analysis of Upper Chardi Hydroelectric Project.

Introduction of the Project

The Upper Chardi Hydroelectric Project (UCHP) is run-of–the-river type hydroelectric project located in Kaski district. The project will have a generation capacity of 10.0 MW and will be able to generate 74.00 GWh of energy annually. The Upper Chardi Hydroelectric Project (UCHP) is envisaged as 3 hrs peaking scheme, which utilizes the design flow of 9.62 m3/sec. The desander will feed the water into headrace pipeline. All the project structures like headworks, desanding basin, headrace Canel, forebay, penstock, the surface powerhouse and tailrace are aligned on the left bank of the Chardi Khola. The surface powerhouse is located near Chardi Khola Bridge at Bhachowk VDC. The 9.62 m3/sec water discharge is diverted over a distance of 5.4 km to the powerhouse, utilizing a net head of 178.9 m for electricity generation. The proposed installed capacity is 10.2 MW in two units to produce 74.00 GWh of energy per year on average. The transfer of generated power from powerhouse to the interconnection point at Nepaltar existing INPS 1321 kV transmission.

Concerning the technical feasibility of the scheme, the weir site lies in the alluvial deposit. The pipeline alignment, forebay, Tunnel and penstock alignment passes through colluvial deposits and bedrock at places. The powerhouse site lies in the alluvial deposit.

The intake and powerhouse site consists colluvio-alluvial deposit. Danger of flood as well as siltation problem is expected. So, strong foundation to resist the flood should be constructed. Construction at loose materials (like

alluvial and colluvial deposit) should be properly treated. Consideration should be taken during the cutting of slope.

The present feasibility study has been carried out to establish the financial, technical and environmental viability of the project. The construction cost of the project is NRs.1,656,961.00 and it is expected to be completed in 3.5 years from the start of the construction.

Power Sector of Nepal

Presently only about 22 % of the population of Nepal has access to electricity. Most of these people live in the urban areas. The vast majority of the rural population does not have access to electricity and the benefits that can be derived from it. One of the key elements to not expanding the transmission and distribution system is the lack of power supply to the main grid.

There are several power plants being built through the public as well as the private sector. Some of the power plants will commence generation very soon. With these power plants coming on line the present grid capacity will more than double. It is estimated that with this augmentation in supply there will be adequate power supply in the grid to cover the demand up to the year 2011/2012. Following which there will be requirement for additional power plants to come on line to meet both capacity as well as energy demand of the INPS.

Legal status and government policies

It is the government's policy to involve the private sector in the generation of hydropower. In this line the government is seeking international investment in the sector. Since the

Government came up with new policies and regulations in the early 1990s to promote private sector involvement in the hydropower sector, several projects have been promoted. These projects are in their completion phase. It is now the government's priority to develop the country through

the development of hydropower. This involves mobilizing resources from both the national and international investors into the hydropower sector. The policies, rules and regulations for this have been put into place and several other hydropower projects have been successfully launched within the existing legal framework.

Economic

An economic analysis has been carried out for the project. The analysis has been based on assumptions for funds and financing available in the national and international market, and the construction cost, as well as the present payment for energy made by the Nepal Electricity Authority to other small hydropower plants. The analysis shows that the project is economically viable and can provide an acceptable rate of return for the investors. In all, the economic indicators show that as it is proposed the project is economically viable.

Environmental

An Initial Environmental Examination (IEE) for the project is being carried out as per the Environmental Protection Regulations promulgated by His Majesty's Government of Nepal. The Ministry of Population and Environment will approve the IEE report along with the associated monitoring plans and mitigation measures.

1.2 BACK-GROUND OF THE STUDY

Nepal has enormous potential of hydropower development. The estimated gross potential is 83 GW of which 42 GW is economically viable. The present (2005) hydropower development in the country is around 600 MW comprising power generations from both the state utility, Nepal Electricity Authority (NEA) and the private developers. The private sector entered in developing hydropower projects after 1990 with the introduction of new Hydropower Development Policy (HDP) 1992. In line with the HDP,

Electricity Act and Regulation, Water Resources Act and Regulations were enacted to guide the hydropower development in the country. The new Hydropower Development Policy 2001 has been enacted and new Acts and Policies are being formulated in line with the new policy. The road map is prepared by Independent Power Producers' Association, Nepal (IPPAN) to help the private hydropower developers, the financial institutions and others who are interested in the development of hydropower in Nepal. This road map is intended to help the developers to know the steps in the development of hydropower in Nepal, the statutory provisions, the institutions involved and their roles and so forth.

In fact, the perennial nature of Nepali rivers and the steep gradient of the country's topography provide ideal conditions for the development of some of the world's largest hydroelectric projects in Nepal. Current estimates are that Nepal has approximately 40,000 MW of economically feasible hydropower potential. However, the present situation is that Nepal has developed only approximately 600 MW of hydropower. Therefore, bulk of the economically feasible generation has not been realized yet. Besides, the multipurpose, secondary and tertiary benefits have not been realized from the development of its rivers.

Although bestowed with tremendous hydropower resources, only about 40% of Nepal's population has access to electricity. Most of the power plants in Nepal are run-of-river type with energy available in excess of the in-country demand during the monsoon season and deficit during the dry season.

Nepal's electricity generation is dominated by hydropower, though in the entire scenario of energy use of the country, the electricity is a tiny fraction, only 1% energy need is fulfilled by electricity. The bulk of the energy need is dominated by fuel wood (68%), agricultural waste (15%), animal dung (8%) and imported fossil fuel (8%). The other fact is that only about 40% of Nepal's population has access to electricity. With this scenario and having immense potential of hydropower development, it is

important for Nepal to increase its energy dependency on electricity with hydropower development. This contributes to deforestation, soil erosion and depletion, and increased flooding downstream in the Ganges plain. Shortage of wood also pushes farmers to burn animal dung, which is needed for agriculture. Not only this, the development of hydropower will help to achieve the millennium development goals with protecting environment, increasing literacy, improving health of children and women with better energy. Growing environmental degradation adds a sense of urgency.

The key to prosperity lies in cashing in on the natural endowment provided to different countries in different forms. In Nepal's case, it is hydropower. Hydropower has a number of benefits. It is a renewable electrical energy source and is non-polluting, i.e., no heat or noxious gases are released. No fuel costs are involved, and given its low operating and maintenance cost, it is essentially inflation-proof.

Hydropower technology is a proven technology that offers reliable and flexible operation. Experience shows that hydropower stations have a long and efficient life. Efficiency of over 90 per cent has been achieved in hydropower stations, making it the most efficient of energy conversion technologies. Hydropower offers a means of responding within seconds to changes in the load demand.

At present, however, only about 40 per cent of the people have some form of access to electricity. The hydropower plants have mainly catered to the electricity needs of the urban or semi-urban areas. The country's enormous hydropower potential remains virtually untapped, creating a chronic imbalance between energy consumption and energy resource endowment. There are a number of problems and challenges that need to be addressed to make the hydropower sector the launching pad for higher economic growth and development in Nepal.

Nepal's power supply and demand patterns characterize a large imbalance in the form of power shortages during the dry months and surpluses during the wet months. Despite the introduction of some demand management measures, the imbalances are still very evident and expected to persist. Hydropower projects are capital-intensive, and most of the existing hydropower plants owned and operated by the Nepal Electricity Authority (NEA) has mainly come up through bilateral and multi-lateral sources of financing.

Financial constraints and inherent delay in hydropower project development are the common features. The existing hydropower projects are costly due to heavy reliance on external financing agencies; costly foreign consultants and contractors; limited manufacturing capability of power generation, transmission and distribution-related equipment; inefficient management; high cost of preparatory works and unfavorable geological conditions. The high cost of project development together with initially expensive power purchase agreements with Independent Power Producers (IPPs), transmission and distribution losses, non-payment or payment in arrears from public sector consumers and wastage of surplus power contribute to high electricity tariffs.

Besides, facilitating the flow of funds from the domestic financial sector to the hydropower sector, developing an appropriate institutional set up for power export, promoting a hydropower research and development centre to assist in the preparation of a national power system, and improving the NEA as a commercially viable entity remain the other challenges.

Financing and cost considerations provide major challenges in the process of materializing the hydropower potential of Nepal. It is estimated that the medium-sized hydropower projects developed by the government cost an average of US$ 3,400/KW while private generators have been able to produce power at US$ 2,200/KW. So, it is important to make hydropower

generation in government-funded projects comparable to that of the private sector.

Making hydropower available in sufficient quantity and quality constitutes another challenge. Once Nepal's needs are adequately met from hydropower development efforts within Nepal, it will enhance Nepal's bargaining power to get better tariffs during power export. State monopoly with no contractual accountability to supply reliable power in both quantity and quality needs to be discouraged. Hence, the challenge facing Nepal is to generate sufficient financial resources to develop its hydropower. This calls for a least cost approach that makes power affordable to domestic consumers and competitive in the export markets of the neighboring countries in the medium-term.

In this context, it is interesting to observe that attempts have been made to address these issues by way of power sector reform focusing on promotion of private investment, creation of competition through institutional restructuring and establishment of an independent regulatory authority, although the reform is progressing very slowly.

Use of environment-friendly technologies and implementation of sound legal and institutional issues are critical to improving the reach of the population to hydropower. Putting into place a favorable environment for increasing investments in cost-effective projects would definitely contribute to making this target a reality, for which directing more resources to the power projects focusing on the rural population remains the pre-requisite.

The major strategies of the power sector have been appropriately identified as promoting private sector participation in power generation and distribution, unbundling the activities of the NEA as well as improving its financial viability, integrating rural electrification with rural economic development programs, and strengthening the power infrastructure.

In the present global scenario, where oil prices are exceptionally high and the future provides an uncertain outlook with respect to oil, optimal utilization of the abundant natural endowment, i.e., hydropower, would reduce Nepal's import cost substantially and contribute to improving the relative competitiveness of the economy both on a regional and global basis.

1.3 Historical Back-ground of the Hydropower Generation

The availability of energy is an important pre-condition for developing the national economy and improving people's living standards. Nepal has a weak industrial, scientific and technological base. In rural areas, the level of commercial energy consumption per capita is only about 0.092 tons of coal equivalents (TCE), and the quality of existing energy resources is often poor. In short, both the quantity and the quality of existing energy resources are inadequate to meet the industrial and agricultural needs of the country.

Improving both the availability and utilization rates of energy resources is an important strategic task that will have significant impact on Nepal's ability to promote sustainable human development, that is, development that simultaneously promotes economic growth, improves people's living standards, and protects the natural resource base essential to the country's long-term future.

Eighty per cent of Nepal's people live in rural areas, where the shortage of fuel is most acute. The unavailability of energy in vast rural areas is the key factor hindering the development of the rural economy and preventing improvement in people's living standards. The extent to which Nepal can meet the growing demand for energy in these areas in ways that are sustainable will significantly affect its economic growth and the health and well-being of its people.

Before 1979, more than 70 per cent of the fuel used by farmers came from biomass - crop stalks, straws, grasses, and animal dung, which were burned directly. The efficiency of utilization rate of this form of energy is only 10 per cent, thus, resulting in significant waste of natural resources. At the same time, nearly half of farm households suffered shortages of available fuel for three to six months of the year. They resorted to collecting every conceivable kind of burnable material, creating serious environmental and human consequences.

First, because of the loss of large amounts of forest, vegetation was damaged, the soil became sandy, and grasslands deteriorated. The loss of crop stalks and other materials that could be used as feed for animals, as fertilizer for farmland, or as industrial raw material directly affected the production of agriculture, forestry, livestock, and industry.

Second, inefficient direct burning of fuelwood in traditional stoves increased emissions of carbon dioxide and flue gas into the atmosphere, damaging the balance between carbon and nitrogen in the agro-ecological system. This, in turn, also contributed to bringing about long-term climate change.

Third, because women always performed the household chores, such as fuelwood collecting and cooking, they were particularly affected. They shouldered the burden of collecting wood from ever greater distances and suffered from indoor air pollution, a condition aggravated during the early summer rains when wet wood did not easily burn. Eye disease was common. The fuelwood shortage meant that people often could only eat one or two hot meals per day, and gastric and intestinal disease seriously affected health.

Solving the fuelwood shortage and changing the structure of fuel are top priority development tasks in Nepal, both to increase agricultural production and to improve farmers' livelihoods. Since the introduction of more open policies, the government has made rural energy construction a high priority. The interests of both the state and the people dictate attention to exploitation of new and renewable energy sources as well as to conservation and rational utilization.

The construction of preliminary electrification using water resources had additional benefits: it promoted rural development, raised living standards in local communities, improved material and cultural life, developed small-scale industries in the towns, saved fuelwood, and protected the ecological environment.

In recent years, micro-hydropower generators have also become popular in Nepal's rural areas. Micro-hydropower stations have an installed capacity of 100 to 10,000 watts. They use small rivers in the high mountains and gorges, and are able to generate electricity with only one to three metres' drop. They can supply electricity to one or several families.
Nepal has enormous hydropower potential. Theoretically hydropower potential of Nepal's rivers, based on average flows, has been estimated at 83,000 MW which is one of the largest in the World. Despite of enormous hydropower potential, by the end of 2004 hydropower generation has reached only 650MW in the country, which is 0.3% of its potential. The demand for power is growing at about 10 percent annually. At present, electric power supply is available to only 42 percent of the total population. It is estimated that power demand of the country will grow to 1.64 million kilowatts by the year 2015. His Majesty's Government of Nepal has adopted liberal policy to attract private investment for the development of hydropower projects. Nepal Electricity Authority (NEA) has also announced its policy to purchase power at a fixed rate from the Private sector. In addition, banks and financial institutions have shown interest to lend on hydropower projects. With these new opportunities,

Arun Valley Hydropower Development Company has paced into the industry to develop, build, and operate hydropower projects.

1.4 Objective of the study

The study is under taken to analyze the financial part of the Project. It also undertake the problem and opportunities of financing institution and hydropower developers and government agencies in financing hydropower projects and in view of the issues explained above, the main objectives of the study to be fulfilled in the context of Nepal are as follows

- To analyze the financial part of the project.
- to study the existing status of hydropower development;
- to analyze generation and consumption pattern of hydropower;
- To study the present financing pattern of the hydropower projects in Nepal;
- To find out the problems of financing institutions for investment in hydropower projects;
- to examine the factors affecting production and consumption of electricity and investment in this sector;
- To analyze the problems of private sector hydropower developer in arranging finance for their hydro projects;
- to analyze the pattern of financial resource allocation to hydropower development;
- to address the role played by foreign assistance in the development of hydropower projects;
- To provide suggestion on the basis of the findings to hydropower developer, financing institutions and government;

1.5 Statement of problem

Hydropower is of central importance to Nepal's development concerns because gravity flow water is the one natural resource that the country has in abundance. It is estimated that the 6,000 streams and rivers that cascade down from the Himalayas could generate 44,000 megawatts of power.

Current Nepalese policy favors projects that are promoted by foreign donors or other interest groups and that are often funded by burdensome, high-interest "aid" packages. This costly method of funding increases both Nepal's already high foreign debt load and its reliance on foreign technical expertise. Little if any input concerning projects comes from local Nepalese because the project approval process occurs behind closed doors. Moreover, many Nepalese are hesitant to speak up–even when they are technically competent–due to fear of retaliation by official and other sources. In an atmosphere of corruption and widespread patronage, advocates of hydropower in Nepal are an influential lobbying group. Such practices contribute to a lack of accountability and lead to the approval of projects that are often inefficient and harmful to both the environment and the people.

Limited domestic market is the one of the major hurdles in hydropower development in Nepal. This may be attributed to the small size of the country and low level of industrialization. Nepal's potential electricity export markets are India Bangladesh and Tibet, autonomous region of china. But Nepal has not been able to export hydropower to the markets of these countries, due to high cost of electricity. this may be attribute to difficult topography of the country, lack of infrastructure costly consultancy fees, high cost of foreign equipment and construction materials, high fuel cost for thermal generation, high cost of operation and maintenance, commission for the mediators, less-competition among the bidders and high rate of power loss, etc.

There are many problems in the energy sectors of Nepal. These may be listed as heavy dependence on biomass sources, low per capita consumptions of electricity, low production and slow growth in supply, insufficiency of present growth to meet future demand, vast difference in the use of electricity as between urban and rural areas, and inefficiency in generation, transmission and distribution.

The next issue is the downstream benefit for the development of hydropower in Nepal. In this context, Nepal is upper riparian country and India and Bangladesh are low riparian countries. If high dams are constructed in Nepal, low riparian countries will get benefit of flood control, irrigation facilities and extra power generation from regular flow of water. The international law and practices also clarify the downstream riparian countries need to ay water holding charge to upper riparian country. If the issue is not settled the delay in the development of these projects will not Nepal much as compared to downstream run of river share, which may last fore eve.

Another issue in this context is big versus small projects. Politicians and experts differ in their opinion regarding the selection of hydro projects. But, it has been mentioned in ninth and tenth plan document that by developing export -oriented large multipurpose projects such as pancheswor, karnali, and saptakosi, about 22,000MW electricity would generated in the next 20 years (NPC, 1998:499). But necessary stapes are not taken for long term planning, programming, and estimation of financial requirements and sources of arranging finance.

The next major issue is the financial implication of hydropower development. Hydropower development is the most capital-intensive energy generation option, which requires huge amount of capital which bay not be possible to arrange internally. So external funding is a must. Regarding internal source, revenue mobilization is low and it is utilize for

meeting regular expenditure and for debt servicing. The share of revenue allocated to hydropower sector is very low. NEA has small contribution in exiting power development projects. It can not generate more capital for power sectors development due to various weaknesses in its management. Although some financial institution are facing the problem of high liquidity and the commercial banks are reluctant to accept long-term deposits, demands for capital to invest in hydropower sector is quite dormant. Individual investment is very negligible in this sector due to lack of knowledge about technology and risk bearing situation with exception of micro-hydropower and solar house system.

There is a lack of conductive financial and legal frame work in institutions involved in hydro electricity development to attract domestic as well as foreign investment in this sector. There is no competition among the private parties for hydropower development with a view to provide cheap electricity to the consumer. Foreign private investor does not come forward to invest with out protection and they prefer bilateral agreements that guarantee protection. There is no provision for separate transmission line to use existing national grid system for the private investors who are facing difficulties in selling and exporting the generated electricity.

Financial constraints beside the limited institutional capacity are the major factors affecting the development of the hydropower in Nepal. Realizing this fact GoN is encouraging private sector participation in generation, transmission and distribution of power. With the increasing participation, experience and competition among private companies in the development of hydropower may even lower the electricity tariff in the country.

1.6 Significance of the study

When a country is in economic difficulties, policymakers have a strong temptation to do one of two things: look for panaceas or find scapegoats. In Nepal's case, as the landlocked country slides down a slippery slope of poverty, unemployment, environmental degradation and a widening trade deficit, all eyes are on one potion that everyone seems to think will cure everything—hydropower.

Power demand analysis shows an increase of about 10% recently but power supply condition is still unstable and a chronic insufficiency of power supply has been continuing. Due to this, power supply to about 4 to 10 hours is being restricted. In addition, it is anticipated that power demand will increase about 10% annually in the future. Against this background of power demand and supply, the development of new hydroelectric power sources is urgently required.

The study on financing in hydropower Projects in Nepal facilitates the government, financing institutions, Hydropower developer and other concerned person/organizations through the providing fact and present data for their need. The study will point out the problems in the field that will enable the hydropower developer, financing institutions and the government for planning in future to move ahead in the field. It certainly helps the policy makers of the government of Nepal for formulating and amendment of hydropower policy and program in the future.

The aim of the study is to provide the status and financial facts in the hydropower Project. The sensitivity analysis of the project will help to the financial institutions and developer for taking right decision in the present Nepal situation.

In this study, many issue have been investigated which will benefit future researcher. The findings of the study may help to resolve some of the

problems in the management of financial resource for hydropower development. Similarly, this study may also useful to the domestic as well foreign investors, who may interest to invest in hydropower projects in Nepal. So futures researchers, planners, policy makers and investors directly or indirectly associated with hydroelectric energy sector in Nepal may be expected to benefit form this study.

In such a way the study will be beneficial to the government as well as for formulating the best strategy and policy; to the investor for selection of least cost and high return project; to the financer for least risk and high return projects; to the consumer for cheap electricity and to the student and researcher for providing real and authentic information for their study hence the study will be equally important to all of the above.

1.7 Limitations of the study

The basic objective of the study is to fulfill the academic requirement of master degree of Business studies. The research can be used for particular study and it can not be generalized. It is a collection of information and analysis of opinion of professional people, banks reports hydropower developer, financing expert.

This study presents an overall financial picture on hydropower project, but it is limited within a project. To be more specific, the study analyze the financial part of the project to decide to invest or not. Therefore, it investigates in detail the financial aspects of hydropower project.

The limitations of the study are as follows:

1. Only Upper Chardi Hydroelectric project is taken consideration in our study.
2. The study mainly depended on secondary data.

3. Only few financial and statistical tools are used it the analysis.
4. This study mainly focus on capital budgeting.
5. The study is concerned with management accounting; it doesn't consider the economic aspects of the companies.
6. The analysis of cash in-flow is taken only for 25 years it dose not consider the cash-inflow then after.

1.8 Organization of the Study

The study would be in five chapters. The title of each chapter is given under.

introduction: under this chapter introduction deals with the introduction of the project, back-ground of the study, Histrorical Back-ground of the Hydropower Generation, objective of the Study, statement of the problem , scope and limitation of the study, Significance of the study.

Review of literature: reviews of literature mainly focus on the emergence of financing of hydropower project in Nepal. It take some research, publications relation to financing and hydropower done in Nepal and abroad. It also tries to find out previous research works done about the same topics with reference to its past and present action to be carried out. All the research works, intellectual studies, paper presentation, government and non governmental publication, financing institutions issue and hydropower developer's publications are reviewed and presented. This chapter also includes the conceptual frame works of the study, which includes the basic concepts and components of financing of hydropower projects. In other words this chapter explains about fundamental aspects key factors and financing alternatives in the field of hydropower financing. It also explains the key points straits and different financing conditions for hydropower projects

Research methodology: research methodology is the main organ of this study. It includes research design, nature and source of data, method of data collection, presentation and analysis of data and data processing.

Presentation and analysis of data: The various types of data collected through different sources will be present in this chapter. The collected data will be presented, analyzed and interpreted by statistical tools. In this research works, simple arithmetic mean, financial ratio percentage shall be used as required to analyze the datas. Interpretation and findings will be listed at the end of this chapter.

Summary, Conclusions and Recommendations: summary and conclusion of are drawn on the basis of valuable information given by the experts. Some important recommendation will be presented for further improvement and immediate action in the field of financing of hydropower projects in Nepal.

CHAPTER II

REVIEW OF LITERATURE

A few relevant works on hydropower and resources for its development have been done in Nepal. Among several studies, some studies conducted for other countries are also considered in this study. Most or the available books are written either by Indians or by researchers outside Nepal and India. An effort has been made here to review briefly some of the relevant studies carried out in the past. This review of literature is derived into two parts: hydropower development and financial resources for hydropower development.

2.1 Hydropower Development

The history of hydropower development is not so old. It can be traced back to early 19th century, when 1831, for the first time, Micheal Faraday and Joshep Henry formulated the principle of electric power generation. The section deals with the studies made on hydropower development in the context of Nepal. Studies made in the context of other countries, particularly India, is also reviewed to gain an insight of relevant issues, methodologies, analytical tools etc already employed and to explore their usefulness in the context of present study. Literature in hydropower and its development made in the context of Nepal is scattered in the form of text books, articles researches papers magazines, dissertations, reports news papers and published and unpublished official records. The relevant materials have been arranged under (i) hydroelectric projects in general, (ii) consumption of electricity, (iii) market of electricity, (iv) issue of downstream benefits, (v) small versus large hydropower projects and (vi) agreements on hydropower projects.

2.1.1 General context

JICA (1974) drew up a master plan of hydroelectric power development in Nepal simultaneously with the feasibility study of kulikhani no 1 hydro electric power projects. The study report suggests that hydropower development in

Nepal can be classified, in to thee categories large scale medium scale and micro projects.

Sharma (1983) has analyzed various technical aspects of water and energy resources of the Himalayan block including Nepal. He argues that Nepal started the development of mini and micro hydropower plants with out a clear conceptual plan proper selection and phasing out of development programs.

Paudyal (1988) has analyzed foreign trade, aid and development in Nepal on the basis of various secondary data. He has attempted to bring out the relationship between investment and GDP obtained to estimate of capital output ratio and ascertain the determinants of aggregate investment. With regard to foreign aid, in addition to analyzing the trend and structure of foreign aid received by Nepal and bringing out the dimensions of aid dependence, the effects of aid on GDP and domestic savings are also examined. An innovative approach of the study is the estimation of some important micro-economic relationships in the framework of almon Lag scheme.

Khadka (1991) has analyzed the foreign aid, poverty and aid stagnation in Nepal with the objectives of examining the socio-cultural and political constraints to development, finding out the source wise and sector wise allocation of aid over the past three decades, evaluating the macro-economic impact of aid on the economy and analyzing the policy implications for aid and development in the future. The study is considered as a basic analytical research on the macro economic performance of foreign aid in neap. The study is based on both primary and secondary source of data. The primary data were collected from the Ministry of Finance HMG/N, central Bank Of Nepal and OECD data bank Paris, and form some west European donors. He concludes that one of the major failures of aid and consequently of the development strategies adopted by the government is he absolute shortfall in meeting basic needs of the majority populations.

Shrestha (1991) has examined the concept and planning or hydropower development in Nepal on the basis of past experience and present trends. He has stressed on the need for planning process for not only contributing to the development of the vast hydropower-electric potential but also for long term economic and environment and warm terms and benefits to neap. According to him, an alternative strategy for hydropower development in Nepal would be to open the sector for private investment increased development of Nepal would be open the sector for private investment. Increased competition and decreased bureaucratic control would lead to more efficient production.

Jha (1995) has analysed cost effectiveness and private sector partnership in small hydropower development in descriptive way in the basis of secondary data gathered from various organization such as NEA. He concludes that small projects have some distinctive advantage over then medium and large projects. Since the cost involved in the small hydropower is affordable, it is within the reach of all. The enormous cost involved in medium and large hydropower projects in most of the case become out of the reach of poor countries. Quick completion of individual projects and early commencement of with the view of benefits is aloes another advantage of small hydropower projects.

Nepal country reports prepared by institute for integrated development studies (IIDS, 1995) describes water resource development in Nepal. The study conducted with the objectives of exploring regional cooperation in hydropower among SAARC countries analyses need, prospects and modalities for the development for the development of water resources of the Ganga-Bramhaputra-Barak (GBB) river basin. The analysis is based on the secondary data gathered form various organization such as NEA World Bank, etc, and case studies of Koshi and Gandak Projects. The study recommends that the strategy for power development in Nepal should aim at maximizing the economic benefits form hydropower development of the countries river basins taking in to consideration the water requirement s in

other sectors particularly irrigation domestic industrial water supply and waterway transportation.

Dhungel (1996) has investigated the macro economic effects of hydropower development in Paraguay. He has examined the subjects through an analysis of national accounts data in the framework of partial equilibrium bowls and a macroeconomic model of Paraguayan economy. The findings shows that the construction period experience a higher inflation rate, a more rapid appreciation of real exchange rate compared to non tradable output, a decrease in exports and an rapid increase of construction sector wages.

Shrestha (1996) has made projection of per capita consumption and access to electricity by 2027. The per capita consumption is estimated to be 349 kH/Hr and access to electricity is estimated t be 80 percent. Based on the current trend of consumption of biomass and imported energy, the consumption of electricity in the national scene is estimated to increase to 9 percent from the current 1 percent.

NEA (1999) has estimated load forecast of electricity separately for domestic sector, industrial commercial and other sectors and irrigation using demand model the model for domestic sector including change price of electricity, change in GDI, new consumer and real income growth as the explanatory variables, while the model for industrial and other sectors adds large new ventures in the sector. Regarding irrigation, previous consumption and increase area under irrigation re take as the explanatory variables.

WRSF (200) has prepared a report on water resources strategy formulation in Nepal. The report presents a long-term macroeconomic perspective for harnessing water resources with a view to accelerating economic growth with stability and equity while maintaining water balance and resource balance at the same time. The study also marks projection of growth in real sector, external sector and fiscal sector using various functional forms.

One of the conclusions of the report is that there would be resource problem in the government sector if the present trend of public and private sector investment continues. Currently, 43 percent of the total investment made in hydropower and water is purposed to government contribution. According to the report, in order not to crowd out other competing areas of public sector investment like the social sector, the proportion of public spending to total spending, especially in the electricity sector must come down from the present level.

A report prepared by Bajracharya and company (2000) for NEA analyses alternate fund management through local source towards fulfillment of future investment requirements of NEA for hydropower projects. The report categories generation projects in to 3 groups☹1) projects which are exclusively developed by NEA with HMG assistance, (2) Projects fully developed by Independent power producers (IPPs) in private sector and (3) Joint venture projects. The investment outlay of NEA is huge and given the limited resources available with it. The huge requirements will have to meet from HMG Mainly by way of loan. In this parlance, a slight reduction in the cost would have vital effect in financial sustainability of NEA.

2.1.2 Consumption of Electricity

Gyawali (1992) highlights the sluggish pace of power development in Nepal despite the huge potentiality of hydropower; the per capita consumption of electricity in Nepal is not only very low, there is ironically problem of load shading. The author discusses the constraints in power development and inability of existing power plant to increases generation capability.

Thakur (1994) makes a comparison of energy consumption in developed and developing countries. By 2000, the US per capita consumption of energy is projected to be about 422 million BTU annually whereas in the least developed countries it will be only about 14 million BTU. Nepal lies among the low energy consuming countries.

Ahamand and malla (1994) mentioned that the per capita energy consumption in commercial sector in all south Asian countries is much lower than world average. A reported by the authors the world average per capita consumption of energy in 1950 was 1316 koe and that of industrial countries 4937 koe, but in Bangladesh it was 57 koe in India 231 koe and Nepal 25 koe.

Quoting data published by the World Bank, Jha (1995) also depicts low per capita energy consumption in SAARC countries. He says that in fact, Nepal's per capita energy consumption energy consumption is almost the lowest not only in the world but even in south Asia. Here they have not shown any sign of increment of per capita energy consumption of Nepalese people. Among SAARC countries India has the highest per capita energy consumption (242koe), followed by Pakistan (209koe), Srilanka (110koe) Bangladesh (59koe), and Nepal (22koe).

Al-khatib (1996) has presented that commercial energy consumption in 1995 was equivalent to 800 million of oil (m.t.o.e.). Out of his, the developing countries, bearing three quarters of world's population, had consumed only 28 percent. In 2020, it is expected that world commercial energy consumption will increase to over 11500 mtoe. . Where as developing countries will claim only half of this. However, the study does not say anything about the generation of hydropower and source of power for meeting the demand in future.

2.1.3 Market of Electricity

Market of Hydrro-eletric power is related to demand and consumption patterns it is one of the important factors for development of power projects. Demand consists of internal as well as external demand. Nepal does not have external market for power. in the Nepalese context, there is not any external market except limited exchange for power with India to meet the

demand of remote an isolated areas not reached by internal grid of either country.

The power sector master plan JICA (1974) states that the power market in India is large and growing at an annual rate of more than 10 percent, which may be mainly consumed by northern and eastern region of India alone. if power can e produced in Nepal at a competetitive cost compared to indial, Nepal will have access to huge Indian market along the border areas. he cites the example of Bhutan which has become richer than Nepal by selling hydro electricity to India from Chukha hydro project. Although an agreement concerning electricity power trade was reached between G/N and Indian Government during prime minister's visit to India, to be valid for 50 years and termination by mutual constant and review at each 10 years intervals but, its ratification is yet to be made.

Upreti (1993) also argues that since Nepal alone cannot consume its hydropower, hydropower can be sold to India as well as to Bangladesh. It would yield foreign exchange to Nepal. In this connection, verghas and Iyar (1994) opine that Nepal and Bhutan can find market for their hydropower while India and Bangladesh can benefit with access to hydroelectricity. They advocate for storage reservoirs in the upper reaches to the main and tributary river system, in order to cope with seasonal fluctuations and expected power output.

Rana (1996) holds different opinions. He says that Nepal' power market is India and with out letters constant foreign investment is impossible. So Nepal and India should have a understanding to development through foreign investment. Large and medium projects can be feasible only if India is ready to purchase power.

Malla (1996) while emphasizing the need for private sector participation in hydropower development to meet the growth in demand in future advocates for a long term plan to export power to neighboring counties. He argues that

Nepal’s requirements of hydropower being for less than its potential, surplus power may be exported to India for the country’s benefit.

Unlike many advocates emphasizing domestic market, Rana (1996) holds a different opinion. He says that Nepal’s power market in India and without letters consent foreign investment is impossible. So, Nepal and India should have an understanding to develop Nepal’s hydropower through foreign investment large and medium project can be feasible only if India is ready to purchase power.

There is a contrary view regarding whether Nepal should develop small poor projects creating to internal market of large projects oriented to wards external market. Nepal's external market is solely India. In this connection, thapa (1997) argues that Nepal per-occupation with big projects like karnali, and panchesower designed to export hydropower to India is not logical because of heavy investment and low benefits. The possibility of power export to India is also hugely uncertain.

Malla (2000) says tat the surplus power should be utilize in industrial sector like fertilizer, aluminum, etc. in similar sprit Shreatha (1991) opines that unless India takes the initiative as a buyer, Nepal should not purpose negotiation with India as it has no other buyers. Therefore it would be prudent to develop only those projects the out put of which can be used domestically.

Bhadra (2000) also states that the concept of power purchase by India from Nepal is wrong. In concurrence with other writers he also argues that hydropower must be utilized in ones productive activities.

Pun (2000) is not also in favor of development of power projects targeted to Indian market. He says that provision of export of 22000 MW of power to India over 20 years time frame will simply turn out a mirage.

Mehta (2000) also suggested that Nepal has river which should be used to generate hydroelectricity for export to India. Bangladesh has gas reserves, Pakistan cits as the gateway to gas pipeline from Iran to central Asia and republic of India has Gujarat, largest refinery center in the world. The coordinating roles has to be played by the south Asian forum for energy development (SAFED) to define and study potential opportunities and seeing how best natural resources could be harnessed for the benefit of these four countries.

2.1.4 Downstream Benefit

The issue of downstream benifit is an important matter in hydropower development all over the world. Its development depends on the attitude of co-riparian countries in Nepalese context, water rights, downstream benefits, submergence of land and loss of reservoir are the major issue in hydropower development in Nepal. Nepal is an upper riparian country and India and Bangladesh are lower riparian countries. When the high dams or reservoirs constructed in Nepal, low riparian countries like India and Bangladesh will get benefit of flood control in summer and irrigation facilities in winter including extra power generation from their regular flow. According to international practices, the benefits and costs of construction of dams including other losses are to be shared among the riparian countries.

According sharma (1983) in a situation of co-riparian countries not agreeing together for sharing the benefits the World Bank, would not be interested to investment in the project. The same is true for other donor agencies.

Upreti (1993) argues that conflict between upper riparian and lower riparian countries may affect the political relationship between them. Therefore, certain provisions need to be made according to international laws and resolve the water disputes regarding sharing of cost and benefits and maintenance of off-season flow to lower riparian countries. Giving example of Colombian river treaty he says that downstream country compensate

upper stream country for 50 percent of the additional benefits. The benefits of hydropower generation and flood control between the USA and Canada. He further gives the example that Itypu the biggest hydropower project in the world, with the capacity of 12600 mw is located in the common or border river between brazil and Paraguay, not having any consumptive use of water, has been constructed in both places of river with both the countries equally sharing the investment and benefits.

Ahmed and Malla (1994) argue that Nepal should be compensated for storage built within Nepal's territory. it also needs to assured of adequate return for the sown steam benefits on term of flood protection and regulated release of water supplied form its dams.

Highlighting the US-Columbian treaty concluded after 20 years of protracted negotiations in 1964, Verghas and Iyaer (1994) point out the United States had to bear the cost and pay for benefits, not just for the storage dams and hydro power generated in Canada but even for downstream benefits within the United States such as mitigation of flood control. Both sides so far have agreed not to divert water with out the consent of others. Writing about the treaty between the USA which was the upper riparian country and Mexico, Verghas and Iyaer (1994) have reviewed and pointed out that Rio Grande treaty that the Harmon doctrine of absolute right over flowing rivers within a country was well considered in the process of negotiation. How ever, in the long run, when the same river began to flow from Mexico to US, the letter becomes lower riparian countries. The treaty was modified in 1907, 1944, and 1972, with concessions to the weaker lower riparian country on the quantity of water to be made available and guaranteeing the quantity of water reaching Mexico.

The authors have also presented the example of Nepal, India and Bangladesh mentioned about Bangladesh's interest in "Joint Indo-Bangladesh approach towards exploring the feasibility of augmenting Ganga flow by means of storage in the Nepalese Himalaya. The proposed dams are Karnali Chisapani (265MW), Kaligandaki I (288MW) Kaligandaki II (233MW)

Trisuli Ganga (284 MW) Seti (180MW) Saptakoshi (327 MW) and Pancheswar (6480MW) Bangladesh had estimated these would increase dry season availability of water in Ganga by 70000 m.cu.m. but India did not accept these considerations. Although the JCE delegation of India and Bangladesh visited Nepal to discuss about the profit, but it did not produce and significant result. These cases show that weaker countries face difficult in the case of water sharing benefits whether the country is a lower or upper riparian country.

Sharma (1997) argues that by making reservoirs in Nepal, India and Bangladesh get extra irrigation facilities and flood control benefits. So it is justifiable for Nepal to seek share of benefits and stop investing in the study of multipurpose projects when lower riparian countries are not interested to pay for their share of benefits. The same can be said by the run of river which may last forever. He cited the example of Itypu and Yacerata where about 15 percent is added to the cost of electricity for submergence of land and loss of reservoir that 6 percent for the site and8.9 percent for land submergence. Downstream riparian countries need to pay water holding charges.

In another work Sharma (1997) describes that the lower riparian countries may exhaust their coal and gases to meet energy demand, but for water they have no option except to request Nepal to help store behind the dams in Nepal. Although Nepal has been negotiating for water resources projects with India since 1963, but no progress is made to date.

Rana (1997) is of the opinion that if India is not positive, the development of Nepal's water resources will be difficult. All identified projects of Nepal expect sunkoshi diversion involves riparian issue with India on matters of irrigation and flood control.

Acharya (1997) on development of that states the total benefits of Karnali Project is about US$ 17 Billon of which almost US$ 3 billion benefit will go to

India in irrigation and flood control. So there is a need to calculate benefits gained by the lower riparian country and settle the issues.

Analyzing the issue of down steam benefits of Karnalii Power Project, Thapa (1997) says that if the Colombian river treaty principle between USA and Canada is accepted by both Nepal and India, Nepal would be getting about US$ 33000 million from India for the down stream irrigation benefit. If agreement is reached between Nepal and India, Nepal can produce annually 20800 GWh. hydroelectric energy with out own investment and get energy sales revenue of about US$ 1 billion annually from sales at average energy cost of about 5 US cents per KWh. He cites the example of Colombia treaty that USA had to pay US 64.4 Million to Canada for flood control (Protection) out of total storage volume of about 18 billion cubic meters. At the same time, following the Colombia treaty Canada was given half of the extra power produce in the US. In the case of Karnali Projects the total storage volume would be about 39 billion cubic meters although Thapa has not calculated the benefits of flood control to India resulting from the Karnali projects, he argues that Nepal should get due return from India.

2.1.5 Small vs large hydropower projects

a. Small

Referring to master plan for power sector (1974) it is argued that large scale development will be planned to sell power to India while small and medium scale development should primarily be utilize to meet the growing domestic needs at all time and most of the hydropower generation below the capacity of 100kw shall be used for electrification of rural areas.

Dam (1981) has given the information that china and India are among the pioneers of small scale, decentralized hydropower projects of less than 1mw capacity.

Contrary to advocates of small power plant, inversion, Johnson and Reischauer (1984) comment that small hydropower schemes are costly to implement and have little chance to recoup the investment, low load factor lack of promotion of income generating activities, lack of co-ordination among relevant organization and difficult to even covering their recurring cost. Like this, Ramesh C Arya, in his paper presentation, has compared that the per KW cost of small hydropower on average is US$ 8,140, while the cost of medium and mega projects is US$ 3,243. He further added that due to the high repairing cost, NEA has given some of small hydropower projects to private sector in lease for operation.

Gyawali (1992) presents the view that for the economic and social development of remote and rural areas, the small hydropower projects are essential, but per unit cost of small hydropower plant is corporately high.

AIT (1996) also supports for small plants. He recommends 3.5 mw to 10 mw small scale power plants for the Palli Bidyut Samities in Bangladesh.

Sharma (1997) agrees that produced energy should be utilized in domestic sector giving incentives to the investors so that money may flow in for investment. He further adds that big reservoir schemes will not only make a big loss in investment but also will become a run-off-the-river after full sedimentation, and the benefits of flood and irrigation will be lost forever. So, run-off-river scheme is better for Nepal as compared to reservoir scheme.

On the other hand Sharma (1997) citing the example of Yeangtze river in china which is the world biggest dam “The Gorge Dam” with capacity to generate 25000mw of power equivalent to 25 nuclear plants, however china has stared to build small scale of hydropower units.

Acharya (1998) says that in Brazil despite dozens of small hydropower projects, producing more than 50000mw. Including Itypu of 12600 mw by foreign assistance, neither poverty has been reduced nor poor got benefited from it. But after 15 to 20 years, brazil become the first indebted country in

the world, so it is not better to be conscious of big projects like mahaklai and Karnali but priority should be given to medium and small type of hydropower projects.

Ghandi (1999) also says that due to various causes, large projects have collapsed within 20 to 25 years, so attention should be given to small projects. For SAARC, water resource is the main source, and distribution and share of benefits must be acceptable to each other. Similarly, paudel (1996) gyamwali (1998) are in favor of construction of medium and small power projects.

Edition (2000) also pleads in favour of small local power plants which offer cheaper power. It is reliable and uninterrupted in places where blackouts are an ever increasing problem. Besides, he is also in favor of small solar power plants. Micro power is already an attractive option. When he set up his first electricity plant in 1882 in London, he had thought that the best way to meet customer's need would be networks of nimble and decentralized world of micro power.

As mentioned in Encyclopedia Britannica from 1940s to the early 1970 many US hydropower plants (less than 1000kw capacity) where closed down because high maintenance and supervision costs which made them uneconomical as compared power plants that burn fossil fuels.

b. Large

Malla (1995) argues that about 30 perspective dam sites are in Nepal which have a potential to store about 77, 000 million cubic meters of water which amounts to 30 percent of run of the total surface run-off. If these are utilize as multiple benefits they can generate grater return.

Dixit (1995) argues against big hydropower projects. He says that Nepali rivers fill each reservoir within 30 to 75 years after implementation has begun

and at last 100,000 families about 600,000 individuals of 3 present of present population would have to be moved from the submergence zones.

Sharma (1996) opines that mega projects dedicated to export 6,450 mw form pancheshower and 10,800 form karnali chisapani hydro projects emerge as the national wheels to carry Nepal in the next country. They will produce light out of the darkness in the most back ward regions of Nepal.

Arguing in favor of large projects, Ahmed (1997) of Pakistan says that major hydropower projects are economical, however it would be realized that these have long gestation period, and are far from load centers and need huge amount of investment. He further advice that it may bee useful to look for short for short gestation projects, having proximity to load centers and minimum overall cost.

The Reporter (2001) writes that the draft guidelines of high dam are unfavorable to Nepal. It adds that without the consent of down riparian country, upper riparian country can not build high dam, so it will be very difficult to gain loan form international agencies for a country like Nepal River

1.1.6 Agreements on Hydropower Project

Many agreements have been made for the development of water resource among the countries of the world. Some of them are reviewed here in order to gain an insight the issue involved in such agreements.

The master plan JICA of Nepal (1974) mentions that if hydropower projects are implemented in Nepal, the price will depend upon the power station of India by that time. Only surplus secondary energy will be supplied to India. This kind of arrangement has been done for the name MGGUN projects in Laos. Laos is now selling energy to Thailand. If it can be done between Nepal and India, both parties will be benefited. There is no reason why this kind of management can not be made for the benefit of both parties.

Sharma (1996) is of the view on that mahakali project specifies the avoided cost principle, as against the cost plus principle agreed between Bhutan and India, a power purchased agreement has also been concluded enabling private power producers to generate power in Nepal and export to India.

Bikranta (1996) argues that agreements of water resources between Nepal and India from koshi to mahakali have shown that Nepal is not conscious on water resources from the perspective of an independent and sovereign nation. On the other hand, being state of one nation, state of India quarrel each other on the division and rights of water which can be seen in kabery river project. Some times, some agreed agreement s could not be implemented due to different causes. In this connection, Dr. gyovgy vajda states that environmental protection has become a powerful feature of Hungary's energy development in recent years. Public resistance caused the abandonment by Hungary of the joint Czechoslovak- Hungarian hydro electric schemes in the river danube between pozsony- bratislva and mafmaros. Due to protests by oppositions in Hungary, the Prague authorities considered abandoning this scheme.

Power trade agreement signed will make possible for any party, whether government or private to sell the power produce to a party across the border on its own terms and conditions. And it will be valid for 50 years and can be terminated by mutual consent which will be reviewed at 10 years intervals.

A report of World Bank (1997) says that relevant land mark treaties have been signed between Nepal and India which would remit joint development and sharing water resources and power exchange agreements between private parties in both countries. These agreements would provide major opportunities for Nepal to strength its balance of payments and accelerate its development process.

2.2 Financial Resource for Hydropower Development

2.2.1 Public Sector financing

Public sector financing domestic private individuals, joint venture companies (Private), public companies; government's own resources and domestic capital market constitute the major sources of local level financing.

Haggard (1994) opines that each country shall have to develop a power financing model to suit its needs, to be successful in developing local capital markets, where domestic savings are mobilized to finance domestic projects which determine the need for international commercial involvement. He emphasized to boot projects financing model derived from the United States. He further adds that energy projects financing involves government loans, domestic development finance institutions (DFIS) commercial banks loans, capital market borrowings, supplier credits and multilateral export, credit insurance loans. Today government grants and dftshave the limited resources and international commercial banks have limited cross-border appetite. And he suggested that international capital markets should be encouraged for financing the energy projects. He is not in favor of local financing in power development sector.

In the same way jechoutek and lamech (1994) have presented the objectives of domestic capital market for energy financing that depicts domestic capital market development and energy financing is to sift burden of saving away from the government on to house hold. Similarly it should sift the financing of the energy sector from the government to financial market and they have given emphasis on the promotion of private energy projects developers to trade their projects debt and equity in domestic market by which encourages the growth of lease financing institutions markets should be encouraged.

Sharma (1997) argues that Nepal should establish "energy development bank" like agriculture development bank were right to purchase share goes

to neplease only. The government should give guarantee of minimum 10 percent return from such bank but he has boot given any schemes for the development of such banks.

Local level financing in hydropower development has just begun in Nepal. In this connection Suseli (2000) mentions that Puwa Khola hydropower project of 62 mw capacity started generation with 25 percent of total cost being shared by government of Nepal and 75 percent by NEA. This project, for the first time, was completed under the entire supervision of neplese technicians, the per unit cost of power was stood Rs. 2.8 per kwh.

The total cost of Chilime hydropower is estimated to be Rs. 2.32 corore, and about this Rs 80 corore (34.5) percent has been financed by employee's provident fund 51 percent by NEA, the remaining 14.5 percent by general people (kantipur, 2002).

Experts on water resources (2002) argues that hydropower development should be decentralized to district level and effort should be initialed to produce and sell to the central grid. This will provide job to Nepali consultants and contractors as district level. They further ass that people have their own financial resources for hydropower development within their pockets but people should believe that government does not interface with it. And they have cited the potentiality of financial institution that provident fund alone can invest and produce electricity with annually capacity of about 15 to 20 mw this can fulfill the demand within the country. And again, they have suggested that the concept of hydropower development should be changed and there must be opened in every district for hydropower development. They have to sell the electricity to national system and it should distribute to needed areas.

Pun (2000) comments that due to the lack of vision of our decision makers the donor dependency syndrome will depend slowly in the power sector. But pun does not give alternative solutions to the above problem.

2.2.2 Private Sector financing

With the growing popularity of privatization in the world, the government of Nepal has given emphasis to private sector financing for the development of hydropower. For the sixth plan, this concept was incorporated in national planning and was reinforced in the successive plans, particularly from eight plans.

Uperati (1993) opines that water resources have the unique possibility as oil to attract multinational private companies for the companies for the development and management of hydropower sector. But he has not given any suggestion about the conditions required for attracting such companies.

Vendavalli (1994) explain about the models under the BOOT schemas, Private developers construct power generation station and sell power to the utility for an greed price, and transfer the project to the utility at a nominal price once the project debt has been repaid, but does not discus the merits and demerits of these systems.

Swamy (1994) days that funds from multilateral banks can help to reduce the perceived country risk by participating in the equity and debt financing of private sector projects without government guarantee.

Dunkerly (1995) opines that several countries like chile, philippins, mexico, south korea, Malaysia, turkey and argentina began to permit private capital to invest directly in the power sector. He further adds that financial problems give rise to demand for private financing for several developing countries.

Bonard and Carten (1995) Mention international finance Co-operation as the major source of project and corporate finance to private companies in developing countries providing loans, equity, other financial investments and advisory services. In this connection, IFC had approved 34 power projects

with a total project cost of US$7.4 billion including KHimpti khola hydropower project in Nepal.

Carstairs and Ehrhardt (1995) argue that the private financing of generation against long-term power purchase agreements have become a solution to the financial problem in Indian power sector.

In Nepal Khimpti hydropower project o 60mw is the first private sector project, which was undertaken and completed by Himal Power Company and Norwegian company “Intakraft” under the BOOT system. The estimation was US$ 98 million of which 30 percent of the cost was met by promoter and remaining 70 percent by the loan assistance of IFC and other international finance institutions. The project has been completed successfully.

Malla (1996) opines that private invests in power sector means to promote foreign investment and technology with maximum use of indigenous labor skills and resources. He further adds that the private power company may be the sole, or joint venture of domestic and foreign investors, where the government may also participate. He also suggests that capital market in Nepal should be developed so that the domestic private capital could be mobilized for the development of hydropower.

Himbeng (1996) explains that Overseas Private Investment Corporation (OPIC) is articipating in several privetly financed projects in power sector. He further says that Asia needs over US$1 trillion in iinvestment by the year 2010 to meet rising electricity needs. The OPIC funds provides to US forms for investment in more than 140 countries of asia, Africa, Latin America, countries of centeral and estern America and independent states of former USSR. But the disadvantages of such investment have not been anlaysed.

Abaza (1996) suggests that private foreign capital can be attracted by restructuring the financial and legal framework of electric energy institutions involving deregulation and privatization. An example of reform Build, OWN, Operate and Transfer system (BOOT).

Sharma (1997) advocates that Nepal should be effortful to attract international companies by giving 50 years lease under BOOT system. He also looks in to the issue of fund for regional prescriptive and argues for the creation of South Asian Development Fund for the construction of hydropower projects in Nepal and Bhutan. But this is yet to be created by the SAARC countries.

The World Bank (1998) advocated for setting up port development fund, as it would serve as a catalyst for long term private investment in small and medium projects. It also suggests that the government should explore options for private sector finance for large hydropower projects for export purpose.

Various project such as Bhote Koshi, Indrawati Chilime, Khudi, hydropower projects are under construction or operated by private sector participation. Like this, electricity development department' (2000) invited proposals of development and feasibility study of 22 hydropower projects and 62 proposals have been submitted by 20 local and foreign investors.

Elaborating on energy development fund, Aryal (2000) says that the main objectives of fund are to promote participation of private power in the hydropower projects development activities. He suggests that up to 40 percent of total estimated cost need to be met from the fund in the form of loan to the private sector developers who develop up to 50 mw.

China has also adopted Build Operate and Transfer (BOT) system in hydropower plants with generating capacity of less than 250 mw. with the view a view to attract foreign investment. The Japanese trading house Marubeni Corporation and US based independent power producer also have plans to invest in more than 50 power plants throughout Asia however, there is no substantial basis to suggest that the private financing is the best among the financial sources.

2.2.3 Foreign Aid financing

Foreign aid is an important source of financing and it has played a vital role in the economy of most of the developing counties. In Nepal it has also played ad important role in the development of all sectors of economy since the overthrow of Rana regime in 1951. Almost all the power projects, transmission lines, distribution lines and sub-stations have been implemented under the foreign financing (grants and loans), from both the bilateral and multilateral sources. Some critics argue that foreign aid has been beneficial to Nepal's socio-economic development while some others argue that foreign assistance following in to the country is not doing well to the country and is pushing the country in to a state of dependency.

Schmidt (1964) examines the arguments relating to loans versus grants and says that a rational government would be equally careful with loans and grants. But if governments are irrational, it is difficult to generalize about the comparative merits of loans and grants. Rational government might husband loans more carefully and invest loan funds only in revenue generating projects. He quotes "International Development Advisory Board", that according to it; loans are used more efficient than grants. Because loans are subject to interest and repayment requirements, governments will select for loan financing only those projects, which produces benefits in excess of the cost. He has given the version of kindleBerger that the issue of loans or grants is not an economic one but moral, ethical, and social.

Mihalay (1965) argues that economic assistance came in to use as a political device in the underdeveloped countries most especially after second war. He further adds that experience of neoal demonstrate an aid program designed to fulfill short-term political objectives would not enhance the prospects of economic growth. Mihalay says that the aim of aid by America and India to Nepal is the same as the "the exclusion" of Chinese influence. Indian planning commission did not accept the request for assistance of the then prime minister of Nepal M P Koirala with out formulating plans by Nepal. On the contrary, he adds that the adds that swiss government was a reflaction of

humaterian impulse and more over, the swiss were interested in Nepal because of the topographical similarity of the kingdom. Nepal is often called as Switzerland of asia. At the end, he express that huge amount would have been spent in hydropower sector and heavy dependence on foreign support could, in long run, jeopardize its independence and distort nepal's foreigns policy.

Balogh (1967) says that bilateral aid has the provision of interest free loans. Moreover loans do call attention to the need for more careful palnning and husbanding of investment. In fact we need both bilateral and multilateral channels because we need far greater and far more effective action. Bilateral aid is still for bigger than multilateral aid where discrepancy should be decreased, not increased. However, he has not given any alternative of financing but he is in favor of multilateral aid instead of bilateral aid which is relevant to this study.

Bhagwati (1970) has expressed the view that foreign economic aid is widely regarded as a weapon in the ideological war in which the US is now involved. The uncommitted underdeveloped and poor countries are seeking help for their economic development with or without outside help if we do not help them to achieve their aims by providing capital and technical assistance free of charge. Governments to government grants are likely to be adverse to economic development. They strengthen the government at the express of private sector and have to maintain environment favorable to private enterprise. However, he has related the political matter to the economic aid which was in practice during the post world war II. He has given emphasis on private sector participation. This work is important and also related to the study of hydropower development in the Nepalese context.

Rodam (1970) argues the purpose of an international program of aid to under developed countries is to accelerate their economic development up to the point where a satisfactory rate of growth can be achieved on a self sustaining basis. The function of foreign aid is to permit to make the transformation from economic stagnation to self sustaining economic growth

and general aim of aid is to provide a positive incentive to each under developed country for maximum national effort to increase its rates of growth. Aid should continue in under developed countries until those countries can mobilize a level of capital formation sufficient for self sustaining growth. This work done by rodam is very relevant to this study which is applicalble in developing countries like Nepal. He has given his views thet the main function of foreign capital inflow is to increase rate of domestic capital formation up to the level which can then be maintained with out any further aid. Then after additional resources and know how provided by foreign capital in flow can produce an additional product. He further adds that the capacity to absorb capital is more limited on low level developmemt, where a higher proportion of technical assistance must precede a large capital inflow. Single project may use foreign consultation and experts, other whole administrative and organizing efforts must be undertaken by the country's own personal, if it is to develop successfully where outside skills may supplement but not suitable for domestic abilities to organize and to administer. He again suggests that where the capacity to repay in low income underdeveloped countries is below their absorptive capacity, a proportion of aid will have to be given in grants or is below soft loans 40 to 99 years loans with a 10 to 20 years grace period and low rate of intrest or loans repayable in local currency. He has indicated problems and solution of foreign aid in developing countries like Nepal which can be considerd and applied for the development of hydropower in Nepal

Development Assistance Committee (DAC-1975) has mentioned that the purpose of confessional aid is to help the poorer people in the world. From the aid point of view, economic growth is not and absolute objective in itself, but a means to an end. The end is rising of living standard of mass population.

DAC (1979) mentioned that non confessional flows. Which provide 2/3 of the net internal resource receipts of developing countries play a crucial role in the development process. They have topped to finance large balance of

payment deficits of the middle and higher income countries and thus have supported their growth and import capacity.

Poudyal (1988) argues that in developing countries like Nepal, investment is heavily influenced by foreign aid because of limited availability domestic funds. Total investment or at least public sector component is determined by the inflow of foreign aid. Foreign aid is used to finance imports of capital goods which are not predictable and in the absence of which investment plans may be realized.

Hein (1990) explains that financing of electricity in post war was mainly done from the treasury. This trend continued till the power companies could raise their own funds.

Shrestha (1991) opines that foreign assistance is needed not only for hydropower generation but also for the operation and maintenance of all such projects. But he has not given any suggestion for the generation of local source for maintenance and operation of complete hydro projects.

Khadka (1991) says foreign aim is not free from interest. When foreign aid is used to achieve political objectives, the purpose of development aid will be over shadowed. However, the study has not suggested any alternative model for the use of development aid. He explains that inflow of foreign aid in Nepal depends on investment in capital oriented growth generating projects. Similarly, it also depends historically on political change in two neighboring countries and political changes in Nepal from 1950, until the mid seventies, aid was mainly bilateral which was 60 percent of the total aid inflow, After that share of multilateral sources has begun to increase. He further adds that heavy dependence on aid affects mobilization of internal resource. However, the study does not have given the solutions to the above problems.

Poudyal (1992) traces the history of foreign aid in Nepal and says that the country started to receive foreign aid from early 1950s. The first plan was

totally financed by foreign aid but financing of plan expenditures by foreign aid declined gradually up to 1960/61. In the early years, aid flow to Nepal was entirely in grant from but since 1970s the loan component continued to increase and the sources of foreign aid also changed from bilateralism to multilateralism. Establishment of Nepal Aid Group in 1976, multilateralization of bilateral aid contributes to enhance the utilization of foreign aid with the increase in loan the burden of debt servicing has also increased.

Shrestha (1996) writes that Nepal has been mobilizing foreign resources since the first five year plan for the development of power. GON has covered about 15 to 25 percent of total investment and foreign assistance about 75 to 85 percent. The major problems in foreign aid are: constraints in exporting power, Risk of investment, frequent changes of government policies, inadequate legal provisions, geographical complexity, lack of accessible roads, trained manpower and technology and lack of national consensus among the political parties. The commercial banks in Nepal cannot take the risk of financing this sector. Like this, it is also difficult to bear the investment by a single donor agency and managing joint venture usually takes longer time. He estimates investment requirements in electricity for the nest 30 years (1997-2027AD) investment estimates, assuming specific costs of run off river and storage schemes, are UD$2.2and 1.5 million per mw respectively and on the basis of this, the total estimated investment is US$9718 million. Of the total cost, 23 percent (US$2235million) will be contributed by HMG and 77 percent (US$7483million) will be contributed by external assistance. Of the external assistance, 18 percent (US$1347million) will be available as the bilateral assistance and the rest 82 percent (US$6136million) will be in the form of multilateral loan.

2.2.4 Foreign Direct Investment

Chen (1993) argues that there is no guarantee that foreign direct investment would benefit host countries, as it depends on government policies of that country which ensures that FDI contributes positively to economic

development where benefits are maximized. He has not, however, given any analysis for the impact of FDI on economic growth. He has not also given measurement of investment in hydropower and output.

Pant (1994) opines that FDI has papered attractive to developing countries, which have low saving and cost of foreign borrowing may be high and current restructuring their economies to promote private sector participation. He further adds that FDI is an equity investment of multilateral corporations which are about 35000 in the world can become driving force of international economy. FDI stimulates local productivity, economic development, package of capital, technology and market access and capital flow to host country but it needs economic and political stability. But pant has not mentioned the measures for attracting foreign direct investment.

The news bureau 1996) says that Nepal and India are dependent on assistance from multilateral institutions like World Bank and ADB for the development of hydropower projects the World Bank suspended the promised assistance both to the Saradha Sarovar dam in India and Arun III in Nepal. The best way for hydropower project is arrange finance and operate by the commercial entities like Enron>such projects will give an opportunity to Nepal for export of power and reduce huge trade deficit with India.

The bureau has not given anything about the merits and demerits of FDI to the developing countries like Nepal and India.

Gupta (1996) in the Indian context suggests that the important lesson for India in power sector is to generate its own resources and attract FDI from global power players and for FDI, counter guarantee has to put in place to simplify the procedural hurdles and should take necessary steps for foreign investment. These suggestions can be applied in Nepalese hydropower sector also.

Thapa (1997) presents a skeptical view on the possibility of obtaining international financing for large water resources projects especially hydropower projects, without commitment to reforms. But he does not elaborate what the reforms would be.

The reporter (1997) citing the report of the transparency international (TI) says that corruption affects the flow of foreign investment in a country. A rise in corruption perception index from Singapore's level to Mexico's has an impact equivalent to that of rising the marginal tax by 20 percent but increase in the marginal tax rate say by 1 percentage point reduces inward flow of foreign investment by 5 percent. Owing to low level of corruption, Singapore attracts two times higher level of foreign investment than Mexico did. But the report does not present the methodology of measurement of marginal tax and foreign investment.

2.3. GOVERNMENT POLICIES & LEGAL EVULATION

Following the promulgation of Nepal's constitution of 1990, numerous Acts, Regulation and policies have been enacted to promote the hydro power sector through the participation of the local and foreign private investors. Acts and Regulations introduced by the Government of Nepal for the promotion of the hydropower sector and assess how they facilitate the development of the sector in general. Review of existing policies, Acts and Regulation has been illustrated below shortly for the development of small hydropower schemes through the private sector comprising of local and international investors. The policy and Acts related with Hydropower financing has been summarized as under.

2.3.1 Hydropower Development Policy-1992

Although a polity does not have legal validity as law, it does provide the

Necessary guidelines to the lawmakers to formulated appropriate legislation. The Hydropower Development Policy 2001 was the basisfor the water Resource Act 1992 and the Electricity Atc 1992. Its main objectives have been outlined as;

i. Objectives

A. Utilization of water resource potentiality of the country by producing Electricity in low cost
B. Supply of qualitative and reliable electricity within the country in reasonable price
C. Linking of electrification with economic activities
D. Expansion of rural electrification projects for the economic development of rural sector
E. Development of hydro electricity as export commodity.

ii. Main Policies

A. Encouragement provided to operate hydroelectricity on the basis of BOOT (Build-Operate-Own-Transfer) principle.
B. Implementation of multipurpose big storage project to gain maximum achievement out of down stream benefit
C. Introduction of procedure, which is transparent and incentive, oriented in order to attract local and foreign investors
D. Capital market in the country will be encouraged to invest in hydroelectricity.
E. Encouragement will be provided to export electricity on the basis of bilateral and multilateral assistance

2.3.2 Electricity Act-1992

Primary objectives of the Electricity Act are to develop electric power by regulating the survey generation, transmission and distribution of electricity and to standardize the quality of electricity. With the promulgation of the

electricity act 1992, the development of hydropower projects in Nepal through public sector as well as private sector participation became possible.

Basic features of electricity Act 1992 are:

A. The Act requires hydropower projects larger than1000KW to obtain license for survey generation, transmission and distribution.
B. The Act stipulates that survey license should be issued within 30 days tendering the application and it may be provided for a period of five years.
C. Generation license to be issued within 120 days of submitting the application and may be provided for a period of to 50 year.
D. Repatriation facility of foreign exchange for principle& interest on debt, return on equity and sale of proceeds of the equity are permissible.
E. When income tax holiday period is completed, corporated tax shall be levied ten percent less than the prevailing corporate tax.
F. The Act stipulates that NRs100 for each installed KW plus 2 percent of the average tariff per kilowatt-hour shall be paid as royalty by the developer for the first 15 years. Thereafter NRs1000 for each installed KW plus 10 percent of the average tariff per kilowatt-hour shall be paid.
G. Only one percent custom duties to be levied for the import of construction equipment, machines tools required for the project. No other charge shallbe levied for such imports.
H. It allows land acquisition for period of license, no structure shall be nationalized.
I. It restricts the creation of substantial adverse impacts on environment.

2.3.3 Water Resource Act 1992 and its Regulation-1993

The water Resource Act and regulations are key legislation formulated to develop the hydropower resource of the country. The Act and Regulations

have made arrangements for rational utilization, conservation, management and development of the water resources available on the country. Likewise legal provisions have been made for the beneficial use of water resources and for the prevention of environmental and hazardous impact on the sources of water.

2.3.4 Foreign investment and Technology Transfer Act-1992

GoN has enacted foreign investment and technology transfer Act1192 with the Intention of mobilizing foreign resources in terms of money and technical knowledge and how for the upliftment of the national economy. The act has provision regarding the promotion of private sector participation in the utilization, Conservation, development and management of water resources. The main features of the act are summarized below.

A. 100% of foreign investment is allowed.
B. Foreign investment in large and medium scale industries is allowed.
C. Full remittance of profits dividends and repatriation of capital is allowed.
D. Provision for the transfer of Technology in cottage and small industries has been made.
E. Security of foreign investment is guaranteed.
F. Attractive facilities, incentives, concessions are given to the industries.
G. No income tax shall be imposed to a foreign investor on the interest income earned from foreign loan.

Special Facilities Provided To Attract Private Sector Investments

I. Types of Licenses and validity:

Study/Survey-within 30 days with 5- year's validity; Project License-within 120 days with 30-years validity for domestic supply and 30 years for export; Transmission & Distribution License 25 year's validity.

II. Incentives: In come Tax

Generation	: 5- year tax holiday
Transmission	: 10- year tax holiday
O&M contracts	: 5- year tax holiday
After tax holiday period	: 10% less than prevailing rate
Project reinvestment	: 50% capital cost allowance
Foreign lenders	: No tax on interest earned
Equity investors	: No tax on dividends

III. Incentives: Import Concessions

For plant & equipment, including construction equipment 1 % custom duty; No import license fee; No sales tax VAT not charged on imported materials & equipment if not included in electricity tariff.

IV. Royalty Payments

Period	1-15 years
Installed Capacity	NRS 100/KW
Energy Generated	2% of Ave. tariff/KWh
Period	15 + years
Installed Capacity	NRS 1000/KW
Energy Generated	10% of Ave. tariff/KWh

2.3.5 Industrial Enterprise Act-1992

The industrial Enterprise Act 1992 is an umbrella act that governs the overall Industrial sector, which considers hydropower as an industry as well. The main features of this act are:

A. The act assures the private investors financiers and developers that no industries shall be nationalized.

B. Facility & income tax holiday have been provided

2.3.6 Electricity Regulation- 1993

The Government of Nepal has enacted Electricity Regulation 1993 which along with other provision has also elaborated the procedure of obtaining license for survey generation, transmission and distribution. The following are provisions related to the promotion of private sector participation in the utilization, conservation, development and management of hydropower.

a. The regulation provides for the exemption of license for developing a project up to 1000KW.
b. It Stipulate the need for survey license required for the production, transmission and distribution of Electricity.
c. Feasibility study report to be accompanied by EIA for acquiring the license.
d. Permission is required for import of Electricity
e. Ensures the licenses right to use the water for the production of electricity as specified in the license.

2.3.7 NEA Policy regarding small hydropower-1998

The Nepal Electricity Authority has formulated a policy to encourage small hydropower developers from the private sector. The policy was first announced in July 1998 and was subsequently amended in December of the year. The main features of the policy are:

A. Fixed buy back rates for plants up to 1 MW.
B. Standard power purchase agreement for power plants of up to 5 MW.
C. Commitment to buy all power generated by power plants of up to 10 MW capacity for the first 50 MW.
D. Escalation fixed at 6% for the first 5 years of generation.

E. Incase of joint venture of Nepali and foreign partner, fifty percent of tariff will be provided in foreign currency and fifty percent in Nepalese currency.

2.3.8 Company Act – 1996

Company Act 1996, stipulates that a potential hydropower project developer shall have register his company at the office of the company register.

2.3.9 Constraints and Short Comings in existing Policies and Legalization

The legislations mentioned above are related to the hydropower sector and have been enacted after 1990 to facilitate the promotion of the sector through local and international private investment. However, there are some inherent conflicts and shortcoming in that legislation. The main conflicts and short coming in the legislation are listed below.

Hydropower Development Policy 1992:

The hydropower development policy makes no difference between the size, capacity and national needs of hydropower projects. It would have been better had the government made different policies for the development of various types of hydropower projects such as micro, mini, small, medium & large .The treatment & facilities should have been given different priorities and facilities as per the need of the country.

Electricity Act 1992 and Electricity Regulation 1993:

Electricity Act states that Government of Nepal may specify national Transmission line of grid by notification published in Nepal Gazette. Nepal Electricity presently owns such transmission lie or grid. Specific guidelines or other norms concerning the use of such line have not yet been formulated.

Electricity Act 1992 is vague and problematic as it states that 10% custom duties shall be levied for the import of materials, which are not produced in

Nepal and no charge for import license. But most of the investors find this a hurdle because one percent custom facility is given only on the machines and tools but not for the construction materials.

Electricity Regulation states that the amount equal to two percent of net profit shall have to be distributed as bonus to the employees every year. With this provision the developer of hydropower project shall have to distribute a large amount of money as bonus because even 2% could be a very high amount earned by power projects. This provision has reduced the motivation of developer because of the reduction in return on investment. NEA's policy for small hydropower plants is silent on escalation of tariff after the fifth year of generation. This is not attractive to investors who see their expenses rising on an annual basis for power plant operation.

Institutional problems & Constraints:

Lack of coordination between various GoN Ministries, Department and Institution in providing service to the developers & finances. The one window policy requires further refinement. In conclusion, GoN has promulgated numerous legislation for the development of hydropower sector, although, there are some inherent conflicts, contradictions and shortcoming in the legislation. There are also adequate provisions to attract the private developers in to the sector. The existing legal structure has Ben adequate to draw numerous international and national developers to acquire license for survey as well as production of hydropower.

With the existing regulation, many local developers and international institutions have shown interest in developing the hydro resources of the country. Large projects such as west seti, Khimti, Bhotekoshi, Uppermodi,Chilime, Piluwakhola, Madi, Lower Nyadi, Sunkoshi, Mailung are being promoted and some are completed by private sector. Except some weakness and shortcoming, the legislation is successful. GoN has to amend the legislation with the feedback of private investors and professional people on that field.

2.4 Capital Budgeting Theory and Technique

2.4.1 Capital Budgeting Theory

Capital budgeting is a decision making process for an investment on fixed assets. It can be defined as the firm's decision to invest its current funds most efficiently in the long term assets in anticipation of on expected flows of benefits over a series of years. It concentrates on the allocation of scarce resources between alternative used in order to obtain best objectives.

Capital Budgeting involves the outlay of current funds in anticipation of future cash-inflow benefits. Collection of cash-flow information is essentials for the evaluations of investment proposals. The key is to measure the incremental cash flows with and with out the investment proposal being analyzed. Depreciation under the accelerated cost recovery system has a significant effect on the pattern of cash flows, and hence, on the present value. Also affecting the pattern of cash flow is the presence of salvage value and working capital requirement.

Welsch, Hilton and Gordon, (2006) write in their book, Capital budgeting is the process of planning and controlling the strategic (long-term) and tactical (short-term) expenditure for expansion and contraction of investment in operating (fixed) asset.

Hampton (1994) says Capital budgeting as "the decision making is the process by which firms evaluate the purchase of major fixed assets including building machinery and equipment. It is also covers decision to acquire other firms either thought the purchase of their common stock or groups of assets that can be used to conduct an ongoing business.

Khan and jain (2003) also says Capital budgeting is of paramount importance as a framework of future development, and as a major determinant of efficiency and competitive power of firm. It is relates to fixed or long-term asset, which are defined as assets that are in operation and

yield returns over a period of time. It therefore, involves a current outlay in return for a series of anticipated future benefits.

Goyal and Man Mohan, (1999) also writes the main exercise involved in capital budgeting is to relate the benefits to costs in some reasonable manner, which would be consistent with the value maximizing objectives of the business. Capital budgeting decision is the most important area of managerial decision as it involves more extended estimation and prediction of things to come requiring a high order of intellectual ability of their economic analysis. Heavy spending on capital assets since the Second World War has stimulated a genuine and lively interest on the part of the economists' financial analysis, and accountants in managerial approaches to capital budgeting decisions.

Horngree (2002) also says "Capital budgeting consists in planning for development of available capital for the purpose of maximizing the long term profitability (return on investment) of the firm".(M Lynch, 1984) It as "Long term planning for making and financing proposed to capital outlay".

Weston and Brigham (1998) say that Capital Budgeting, the processes of planning expenditures on assets whose cash flows are expected to extend beyond one year. He also says capital budgeting is the process of analyzing projects and deciding which are acceptable investment and which actually should be purchased.

Generally capital project classification categories are used for:

a. **Replacement Decision;** whether to purchase capital assets to take the place of existing assets to maintain existing operations.
b. **Expansion Decision;** whether to purchase capital projects and add them to existing assets to increase existing operation.
c. **Independent Projects;** Projects whose cash flows are not affected by the acceptance or not acceptance of other projects.
d. **Mutually Exclusive Projects;** A set of projects in which the acceptance of one projects means others can not be accepted.

2.4.2 Capital Budgeting Evaluation Techniques

After collecting necessary data, then we can used following technique for analysis of the project and taking decision whether to accept or reject.

1. Accounting Rate of Return
2. Pay back Period
3. Internal Rate of Return
4. Net Present Value

Average Rate of Return
This accounting measure represents the ratio of the average annual profits after tax to the investment in the projects.

Pay Back Period
The length of time before the original cost of an Investment is recovered from the excepted cash flows.

Internal Rate of Return
A method of evaluating investment proposals using the rate of return on an asset investment, which is calculated by finding the discount rate that equates the present value of future cash flow to the investments cost. IRR, the discount rate that forces the present value of a project's accepted cash flows to equal its cost

Net Present Value
A method of evaluating capital investment proposals by finding the present value of the net cash flows, discounted at the rate of return required by the firm.

Discounted Cash flow (DCL) Techniques Methods of evaluating investment proposals that employ time value of money concepts; two of these are the net present value and internal rate of return methods.

2.5 Environmental Scenario of Nepalese Power & Market

2.5.1 General Background

Though Nepal has the capacity to generate 83,000 megawatts of electricity, generation of only 42,000 megawatts is technically and economically feasible today. The successful procreation of water resources in Nepal will undoubtedly transform Nepal's entire economy positively.

Today, hardly two percent of the total energy consumed comes from hydropower. It shows the Nepal's first priority should be fulfilling the energy needs at home rather than exporting.

The energy needs of the country are largely met by fuel wood, which accounts for 77.7 percent of the energy needs of the country. Moreover, Nepal uses 487,000 tones of oil equivalent of dried animal dung as fuel, which is an important source of manure for farmers. This means the country uses animal dung equivalent to 2,000 MW of hydropower.

Though the history of hydropower production in Nepal dates back to 1911, when 500 kilowatts was generated in Pharping for the first time, Nepal currently generates a lowly 600 Megawatts of electricity, which amounts to a meager 1.31% of the total technically feasible capacity of the country. If the consumed energy currently being produced by traditional fuel and petroleum products was to be substituted with hydropower, the country needs to generate more than 20,000 Megawatts of electricity to meet the demand.

Hydropower development experienced a boost when the government of Nepal decides to open doors to the private sector, involving both local and foreign investors in 1992. Nepal's Integrated Power System is currently predominantly based on hydropower, with mainly run of river type of hydropower plants. This production is currently meeting the domestic power market demand. Nepal also has plan to develop storage type hydropower plants, which will provide inherent advantages to Nepal for delivering high quality, reliable saleable energy at all times this will also solve the problem of load shedding by supplying energy even when there is little flow in the run off livers. There are two basic markets for power generated in Nepal; domestic demand and India's power market. While creating the domestic demand is the highest priority, taking advantage of market opportunities for power export to India need to be given due consideration. There is tremendous potential for Nepal to become of major power exporter to India and on revenue to develop its own economy. The government-owned Nepal Electricity Authority (NEA), which has been a monopoly for many years, can not meet the energy demand alone. Full utilization of the potential of hydropower generation and distribution will undoubtedly contribute to the economy of Nepal is a major way, and will

eliminate the major problem of load shedding that the citizen of the country facing. For this, private sector involvement is essential.

Table: 2.1:

Power Development in Nepal (Private sector)

IPP Projects Connected to INPS

S. N.	Name of Company	Name of Project	Capacity (KW)
1	Himal Power Ltd.	Khimti Khola	60,000
2	Bhotekoshi Power Company Ltd.	Bhotekoshi Khola	36,000
3	Chilime Hydro Power Company Ltd.	Chilime	20,000
4	Butwal Power Company Ltd.	Jhimruk Khola	12,000
5	National Hydro Power Company Ltd.	Indrawati - III	7,500
6	Butwal Power Company Ltd.	Andhi Khola	5,100
7	Khudi Hydro Power Ltd.	Khudi Khola	3,450
8	Arun Valley Hydro Power Company Ltd.	Piluwa Khola	3,000
9	Sanima Hydro Power Company Ltd.	Sunkoshi Khola	2,500
10	Thoppal Khola Hydro Power Co. Pvt. Ltd.	Thoppal Khola	1,650
11	Alliance Power Nepal Pvt.Ltd.	Chaku Khola	1,500
12	Unified Hydropower (P) Ltd.	Pati Khola	996
13	Khoranga Khola Hydro Power Co. Ltd.	Pheme Khola	995
14	Unique Hydel Co. Pvt.Ltd.	Baramchi Khola	980
15	Task Hydropower Company (P.) Ltd.	Seti-II	979
16	Gautam Buddha Hydropower (Pvt) Ltd	Sisne Khola	750
17	Rairang Hydro Power Development Co. (P) Ltd.	Rairang Khola	500
18	Kathmandu Small Hydropower Systems P. L.	Sali Nadi	232
19	Syange Bidyut Company Limited	Syange Khola	183
		Total =	**158,315**
Under Construction			
1	Sunkoshi Hydro Power Co. Pvt. Ltd.	Lower Indrawati	4,500
2	Himal Dolkha Hydropower Company Ltd.	Mai Khola	4,455
3	Gandaki Hydro Power Co. Pvt. Ltd.	Mardi Khola	3,100
4	Ridi Hydropower Development Co. (P.) Ltd.	Ridi Khola	2,400
5	Centre for Power Dev. And Services (P.) Ltd.	Upper Hadi Khola	991
6	Baneshor Hydropower Pvt. Ltd.	Lower Piluwa	990
	Total =		**16,436**

PPA Concluded

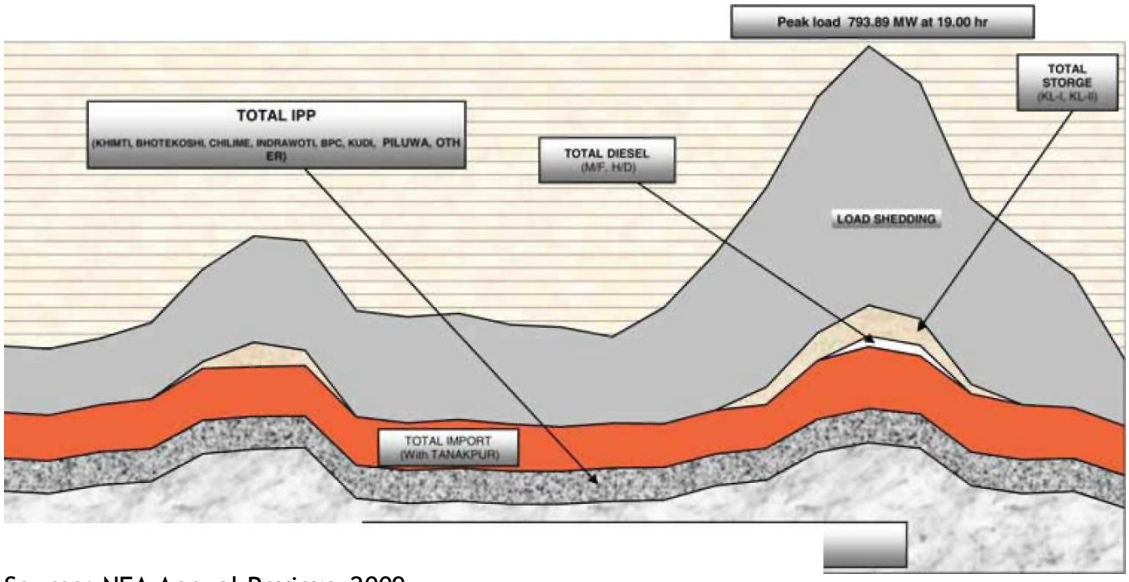
S.N.	Name of Company	Name of Project	Capacity (KW)
1	Annapurna Group Pvt. Ltd.	Madi-1Khola	10,000
2	United Modi Hydropwer Pvt. Ltd.	Lower Modi I	9,900
3	Synergy Power Development (P.) Ltd.	Sipring Khola	9,658
4	Ankhu Khola Jalbidhut Co. Pvt. Ltd.	Ankhu-1	6,930
5	The Gorkha Hydro Power Pvt.Ltd.	Daram Khola	5,000
6	Mailung Khola Hydro Power Co (P.) Ltd.	Mailung Khola	5,000
7	L K. Power (P.) Ltd.	Dapcha-Roshi	5,000
8	Shivani Hydropower Company (P.) Ltd.	Phawa Khola	4,950
9	Nyadi Group (P.) Ltd.	Siuri Khola	4,950
10	Bavarian Hydopower Nepal(Pvt.) Ltd.	Lower Nyadi	4,500
11	Bhagawati Hydropower Dev. Co. Pvt. Ltd.	Bijayapur-1	4,500
12	East Nepal Development Endeavour (P) Ltd	Upper Mai Khola	3,100
13	Barun Hydropower Development Co. (P.) Ltd.	Hewa Khola	2,400
14	Nikhil Jalshakti (P.) Ltd.	Bhairab Kunda	1,850
15	Laughing Buddha Power Nepal (P.) Ltd.	Lower Chaku	1,765
16	IMama Buddha Hydropower (P) Ltd	Tinau Khola	990
17	Bojini Company Private Limited	Jiri Khola	990
18	Garjang Upatyaka Hydropower (P.) Ltd.	Chake Khola	990
19	Joshi Hydropower Development Company P.Ltd.	Upper Puwa-1	985
20	Gayatri Hydro Power (P.) Ltd.	Charanawati	980
21	Aadishakti Power Dev. Company (P.) Ltd.	Tadi Khola	970
22	Universal Power Co. Pvt. Ltd.	Ladku Khola	700
23	Mansarowar Powers (P.) Ltd.	Golmagad	580
24	TMB Energietechnik	Narayani Shankar	500
25	Multipurpose Food Industry Co. (P) Ltd.	Belkhu	320
		Total =	**87,508**
Under Termination Process			
1	Gitec Nepal Pvt. Ltd.	Upper Modi Khola	14,000

Source: NEA Annual Review 2009

2.5.2 Hydropower Generation: Existing Status of Nepal

The total installed capacity in Nepal Electricity Authority's(NEA) integrated system is 615 MW, which includes the 152.614 MW offered by hydropower plants owned by the private sector and NEA's thermal (diesel) power plant of 55 MW. Although total hydropower capacity in the system is 556 MW, only about 452 MW can be generated from hydropower stations during the winter season when the power demands at its peak. During the time of power deficit, about 50 MW is imported from India as per the indo-Nepal power exchange agreement. Nepal and India have agreed in principle to increase this level of exchange from 50 MW to 150 MW. Nepal is also entitled to 70 million units of energy annually from Tanakpur in the far west under the Mahakali treaty. NEA continues to be the sole purchaser of Independent Power Producer's (IPP) power from India.

Figure 2.1:
System Load Curve of Typical Dry Season
March 8, 2009 (Falgun 25, 2065), Sunday



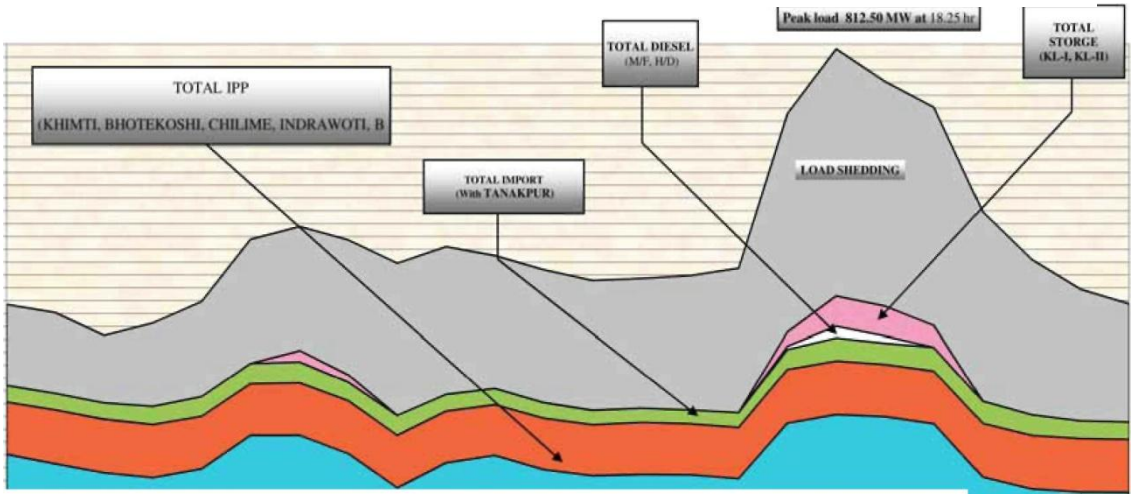
Source: NEA Annual Review, 2009

2.5.3 Operational Performance

Integrated Nepal Power System (INPS) experienced an energy demand of 3,134 GWh in FY 2006/2007, which is an increase of 8.60% compared to the previous year. NEA managed to serve 3,051.82 GWh of this demand through various sources. With contribution of 1,747.42 GWh from hydropower plants and 13.31 GWh from thermal plants, NEA's own generation reached

a record 1,760.73 GWh in FY 2006/2007, registering an 11.12% increase compared to the previous year.

Figure 2.2:
System Load Curve of Peak Day of the Year
Jan. 20, 2009 (Magh 7, 2065), Tuesday



Source: NEA Annual Review, 2009

Power purchased from private producers was 962.26 GWh, and import from India amounted to 328.83 GWh. Generation capacity increase by 4.43 MW through 2 IPP projects in FY2006/07. NEA was forced to opt for load shedding as the last resort to contain the demand that could not be met. Though the NEA endeavoured, utilizing all means at its disposal, to increase power supply, the load shedding hours increased continuously. With 2,258.14 GWh of energy sales in FY 2006/07, an 11.10% increase in sales was recorded over the previous year. Category-wise, domestic customers with a share of 96% of total customers accounted for 911.51 GWH, amounting to 45.22% of total sales. The number of NEA's Customers reached 1.39 million, which is an increase of 8.97% over the previous year. Though not significant, the system losses reduced to 24.94% in FY 2006/07.

Experts have forecast that the energy demand in Nepal will reach more than 13,000 GWh by the year 2025. It is clear that the present approach and system cannot fulfill this ever –growing demand for electrical power. Being unable to fulfill the demand will mean a definite increase in load shedding hours, as well as higher dependency on imported petroleum products. Thus, there is an urgent need to pay strong attention to increase our own domestic power generation by exploiting our water resources.

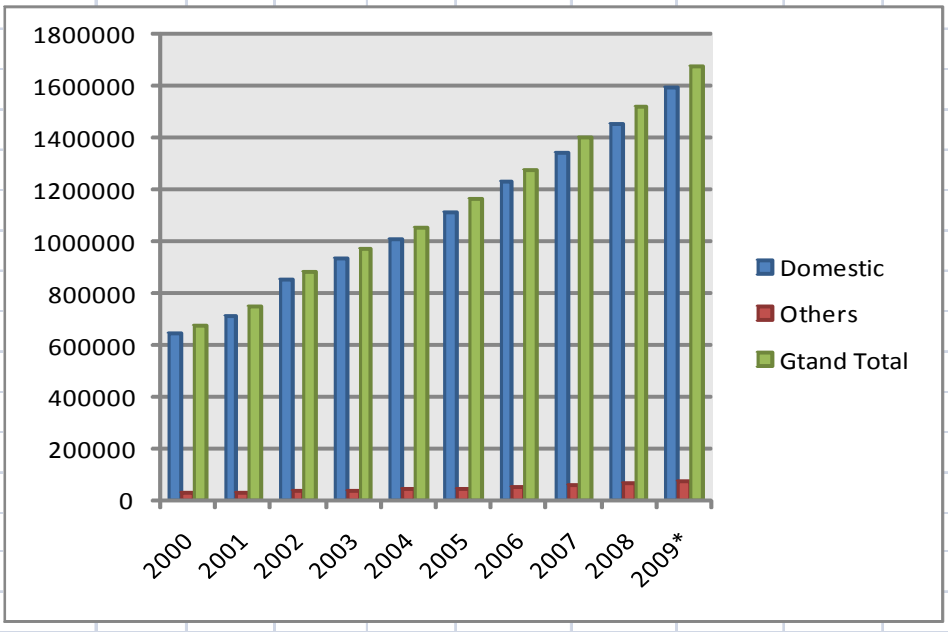
Table 2.2:

Growth of Consumers

Particulars	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009*
Domestic	643,314	713,307	848,540	930,554	1,010,719	1,113,740	1,227,295	1,339,253	1,450,254	1,595,015
Non-Commercial	7,815	7,643	8,629	9,722	9,865	9,950	10,010	10,215	10,556	10,518
Commercial	3,096	3,386	3,898	5,317	5,454	6,000	6,170	6,000	6,052	7,305
Industrial	16,179	17,701	18,789	19,833	21,374	22,500	23,020	24,089	25,548	28,559
Water Supply	232	236	251	305	352	370	380	414	434	584
Irrigation	967	1,083	1,353	1,721	2,557	3,400	6,450	13,183	18,614	22,335
Street Light	932	1,012	1,048	1,229	1,437	1,500	1,550	1,608	1,961	2,339
Temporary Supply	144	141	172	138	150	155	165	210	300	403
Transport	47	37	49	48	48	50	54	39	38	42
Temple	1,248	1,441	1,800	1,738	1,959	2,150	2,290	2,628	2,746	2,911
Community Sales	-	-	1	1	15	35	58	169	375	594
Total Others	30,665	32,685	35,995	40,057	43,216	46,115	50,152	58,560	66,629	75,595
Total (Internal Sales)	673,974	745,987	884,530	970,606	1,053,930	1,159,850	1,277,442	1,397,808	1,516,878	1,670,605
Total (Internal Sales)	673,974	745,987	884,530	970,606	1,053,930	1,159,850	1,277,442	1,397,808	1,516,878	1,670,605
Bulk Supply (India)	5	5	5	5	5	5	5	5	5	5
Grand Total	673,979	745,992	884,535	970,611	1,053,935	1,159,855	1,277,447	1,397,813	1,516,883	1,670,610

Note : * Provisional figures; subject to final audit.

Figure 2.3: Growth of Consumers



Source: NEA Annual Review, 20009

Presently, Nepal faces a severe power crisis, with consumers facing more than seven hours of load shedding every day. This has derailed the normal lifestyle of the Nepalese people, resulting in serious inconveniences. Important essential services like hospitals and telecommunications were

disrupted, and schools, factories and many such institutes were unable to function, depriving the Nepalese people of basis services and amenities. This also led to a high degree of inflation, resulting in all sorts of problems associated with sudden inflation. This survey was undertaken to assess the full impact of the power crisis and to collect the opinion of consumers about it.

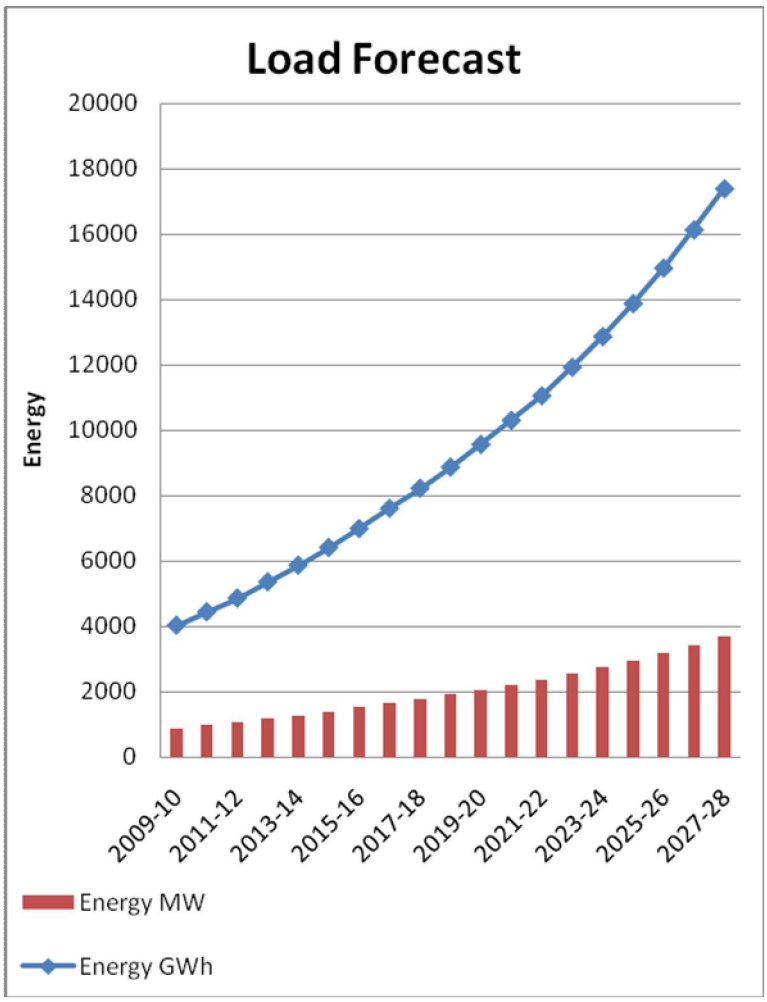
Table 2.3:

Load Forecast

Year	Energy (GWh)	Peak Load (MW)
2009-10	4018.4	878.8
2010-11	4430.7	967.1
2011-12	4851.3	1056.9
2012-13	5349.6	1163.2
2013-14	5859.9	1271.7
2014-15	6403.8	1387.2
2015-16	6984.1	1510
2016-17	7603.7	1640.8
2017-18	8218.8	1770.2
2018-19	8870.2	1906.9
2019-20	9562.9	2052
2020-21	10300.1	2206
2021-22	11053.6	2363
2022-23	11929.1	2545.4
2023-24	12870.2	2741.1
2024-25	13882.4	2951.1
2025-26	14971.2	3176.7
2026-27	16142.7	3418.9
2027-28	17403.6	3679.1

Source: NEA Annual Review, 2009

Figure: 2.4



Nepal's water resources possess the total capacity to generate 83,000 megawatts of electricity. How ever, technical and economic feasibility stands at only 42,000 megawatts of electricity generation as of now. At present, total energy requirement of Nepal is more than 35,000 megawatts. It was noticed that hydropower development picked up substantially when the government of Nepal decide to open its doors to the private sector in 1992, involving both local and foreign investors.

There are two basic markets to power generated in Nepal: domestic demand and India's power market. While catering to the domestic demand is of the highest priority, taking advantage of market opportunities for power export to India need to be given due consideration. There is high potential for Nepal to become a major power exporter to India and earn revenue to develop its own economy. The government owned Nepal Electricity Authority (NEA), which has a monopoly, cannot meet the energy demand alone. Full utilization of the potential of hydropower generation and distribution will undoubtedly contribute to the economy of Nepal in a major way. For this, private sector involvement is essential.

2.6 REVIEW OF RELATED THESIS, ARTICALS & RESEARCH REPORTS

2.6.1 Review of related Thesis

Baral, R N (2004) had conducted a research on the topic of ***"Financing of Hydropower Project of Nepal)."*** Some remarkable finding pointed out by Mr. Baral is as follows;

Findings:

1. Nepal Power system supplies less than 20 percent of population at present.
2. Problems of hydropower development of Nepal are not-availability of large fund and lack of technical knowledge.
3. Regarding the concern about the financing through foreign investor or government was fund to be attractive but need to improve on providing governmental service.

Recommendations:

1. Local financial institutions are advised to work on the project financing concepts.
2. Project financing must be done through the consortium of financial institutions.
3. Real costing of project components, do not bear the cost to cover everything from loan
4. An independent center to establish for excellence in hydropower to help developers and lenders.
5. There should be strict and friendly regulation and commitment of government employee and developers and lenders.

6. Separate study for private and public hydropower could be done to show the influence and impact of liberalization of open policy on hydropower in Nepal.

Rajbhandari, S L (2006) had conducted a research on the topic of *"Hydropower Projects of Nepal and It's Financing" Some* remarkable finding pointed out by Mr. Rajbhandari is as follows;

Findings:

1. It is observed that Nepal's electricity is expensive. The generation cost was very high and then huge loss in transmission and distribution, which again added to electricity tariff thus Nepalese electricity, is one of the expensive in the region.
2. Nepal has been facing a lot of socio-political problems since 1990 when multiparty system is introduced in the country .Though the country is opened for the liberalized polices and fronts for the investment to rest of the world.
3. When hydropower generation was opened to private parties in around 1996-97, a whim has started to capture more and more license for development of hydropower projects.
4. Hydropower generation project are capital intensive, need all the capital at the beginning or during construction, take long to pay back and is full of risks. The development of the hydropower project involves a numbers of government ministries and departments.
5. There is no clear-cut coordination between the different ministries even the level of information flow and integrated approach to support one main policy.

Recommendations:

1. As the project is technically, economically and financially feasible, it is recommended that the Detailed Engineering Design should be conducted for the implementation of the project.
2. Pegging should be done along the alignment of waterways and other structures for land acquisition and detail design of all structures including weir, intake, desander, headrace pipe, powerhouse, tailrace and switchyard.
3. Establishment of a gauging station near headworks is recommended. And periodic cross sections of the river as well as daily height should be observed.
4. In the case, where Power Purchase Agreement (PPA) fixes energy price for the entire life of the project, the benefit or the profitability of the hydropower projects depends mainly on the initial project construction cost. Because, the operation and maintenance cost of Hydropower Project

is quite low compared to initial investment. Therefore, it is recommended that project engineering and management for design and construction of the project should be assigned to experienced and competent engineering agency.

Paudel, P (2008) had conducted a research on the topic of "***Capital Budgeting of Hydroelectric Project With reference to Chilime Hydropower Project"*** *Some* remarkable finding pointed out by Mr. Paudel is as follows;

Objective of Study:

1. To evaluate investment worth in rupees.
2. To plan the Future Net Cash Flow.
3. To decided the project investment
4. To point out the suitable recommendations and suggestions.

Findings:

1. Chilime Hydropower Project has Positive Net Present Value (NPV) Rs.7, 252,411,465.70with 7.75% discount rate.
2. It has short time discount payback period nearly 4.7174 years after commercial operation.
3. The Chilime Hydropower project has 28.2044 % Accounting Rate of Return; it has greater than minimum required rate of return(7.75%).
4. The Internal Rate of Return (IRR) of project CHP has 27.777986%.
5. Chilime Hydropower Company previous decision should be acceptable.
6. The company should be controlled operating cost effectively.

Recommendations:

1. Chilime Hydropower project should be utilized all its available capacity which helps to increase its ales revenue by help of effective capacity management.
2. Chilime Hydropower Company Should practiced Capital budgeting tools to make long-term-investment decision.
3. Chilime Hydropower Company should practiced Tax Law and Tax Planning.
4. Loss of the electricity should be controlled. Meter joining system should be improved and transmissions and distribution line should be refurbished and modernized to control the leakage.
5. CHP project should maintain its periodic performance report

systematically and variance analysis should be effective.

6. CHPC should be invest such kind of projects and used all available resource properly.
7. CHPC should try to minimize its overall expenditure to maximize profit.
8. The management should give training and take carrot and stick strategy for good performance.
9. To increase the production of electricity CHPC should upgrade the project.

Uprety, B (2009) had conducted a research on the topic of ***"A FINANCIAL PERFORMANCE EVALUATION OF INDEPENDENT POWER PRODUCERS OF NEPAL (With Special Reference to Butwal Power Company Limited and Chilime Hydropower Company Limited)"***, Some remarkable finding pointed out by Mr. Uprety is as follows;

Objectives of the Study

1. To analyze the financial performance of BPC and CHPCL and draw comparative conclusions through financial analysis taking relevant variables.
2. To identify major strengths and weakness of BPC and CHPCL.
3. To find out the past and present challenges undergone by IPPs in Nepal.

Findings:

1. The current and quick ratios of the companies seem to be inconsistent. While CHPCL has failed to maintain conventional standard of liquidity position (2:1) throughout the study period, BPC has failed to do so in last couple of years. Liquidity position of CHPCL is feeble than that of BPC which shows the incapability of CHPCL to meet its current liabilities as compared to BPC.
2. With almost the same coefficient of variation, CHPCL has twice higher EPS compared to BPC. However BPC, being more liberal in distributing the earnings in form of dividends, one might confuse to pick the preferable investment between BPC and CHPCL.

Recommendations:

1. The IPPs should maintain research budgets to study new hydroelectric projects across the country. There should be proper cost control on maintenance activities.
2. The IPPs should introduce SWOT analysis to improve their capability of dealing with external forces and managing internal issues of strengths and weaknesses.

3. The IPPs should maintain a separate human resource department to make sure that there is an effective system of handling grievance of employees and conduction of management development and training programs.
4. The IPPs should follow the practices of setting financial goals for future activities and should develop major programs to accomplish them.

Goet, J (1999) had conducted a research on the topic of ***"Revenue Planning in Management in Nepal: A case study of Nepal Electricity Authority."*** Some remarkable finding pointed out by Joginadar Goet is as follows:

Findings:

1. NEA has not considered major demand determinants of electricity such as family income, price of electricity, connection charges, cost of alternative, and cost of auto generation and reliability of NEA's services.
2. No plan and program have been made about possible consumption of electricity in agricultural sector.
3. Target growth is sales revenue was never achieved except in the year 1995/96. This shows that NEA has failed to convert sales unit into sales revenue.
4. There is absence of actual meter reading by dint of which, the charged bills are very low and non reconciliations have been made between units and units billed as well.
5. Revenue and not recognized on accrual basis.

Recommendations

1. NEA should consider demand determinants such as family income, price of electricity, connection charges, cost of alternative available, cost of self generating of electricity and reliability of NEA service while forecasting demand.
2. NEA should prepare programs and plans for agricultural sector which is capable of massive consumption of electricity.
3. NEA should introduce programs and action plan for the reduction of transmission loss, both technical and non technical.
4. NEA can improve its efficiency in the meter device instantly either by changing old meters or utilizing only efficient matter readers or by improving its transmission system. Non technical loss can be reduced by adopting effective managerial, social, legal and others measures.
5. Billing should be based an actual matter reading or reasonable estimates of past consumption in the absence of actual meter reading. Revenue should

be recognized an accrual basis to comply with present accounting manual.

Sharma, D R (2000) has submitted his research work on the topic of ***"Revenue collection of NEA"*** had the following findings and recommendations:

Findings:

1. The revenue of NEA is increasing yearly.
2. There has been fluctuating trend of revenue in NEA.
3. The revenue from industrial sector is more fluctuating.
4. There is no important in the revenue collection of NEA despite the government efforts in this field.

Recommendations:

1. To improve revenue collection of NEA, the government should issue circular to all officers to pay their outstanding bill to time.
2. Adequate counter facility is necessary for revenue collection.
3. Payment facility is also a factor it saves the customers' time and transportation cost, NEA should make necessary arrangement for payment of bill through bank.
4. Leakage should be controlled for the improvement of the revenue.
5. Line connecter producer should be made shorter.
6. Assessment of electricity tariffs should be specified.
7. Line disconnection should be properly managed.

2.6.2 Review of Research Reports and Articles

Head, C (2000) has study on ***"Issue and challenges related to the private financing of Hydropower Project in Developing Countries"*** for World Bank discussion paper. This study provides an overview of the issues and challenges related to the private financing of hydropower projects in developing countries. From the very limited pool of projects that have already reached or are nearing financial closure, ten have been chosen for the study from five countries with the most active in promoting private hydro development. Collectively the case study projects provide a reasonable cross-section of private hydro schemes that have been or are being developed. The financing of greenfield private infrastructure on a limited-recourse basis in developing countries faces certain common issues

irrespective of the type of project. However, hydropower faces additional difficulties caused by the site-specific nature of projects, high construction risk and long construction periods, their capital-intensive nature with a high proportion of local costs, unpredictable output subject to river flows and broader water management constraints, complex concession process to achieve transparency in the award and pricing of output, and environmental sensitivities. The study suggests the need for longer-term financing to better suit hydropower characteristics, a regulatory framework and realistic public-private risk-sharing arrangements responsive to the requirements of hydropower projects, and the careful preparation of projects by the public sector to enable their formulation on an adequate technical and contractual basis for development as a private concession.

New Business age (August 2006), for its regular article ***"Visiting Business People"*** *with heading* ***'it is not easy to bring investment in Nepal.'*** Writes it's not easy to bring investment in Nepal. From a Western perspective, there are two major issues. First is the devaluation of Nepali Rupee which is hitting us. It is inevitable, but it can be compensated in some creative manners so that everybody has a win-win situation and the Nepali people would not have to pay too much for the electricity they use. The second point is the country's stability. Though I stayed for a long time in Nepal, I realize that the more I know about Nepal, the more I don't know about it. I know enough to be comfortable in many situations as an investor. But I also know that things look totally different for an outsider. And it will take a lot for somebody to attract investment here. It will take a lot to promote a positive investment image about Nepal.

Nepal, B.H. (2005) in his article "Managing Nepalese Waters" has presented two logics to verify the impossibility for Nepal alone to harness water for hydropower in a large scale. First, it has been estimated that the cost for the production of Nepal's capacity of 42,000 MW would come roughly to US$ 80.00 billion and for 25,000 MW; it would be around US$ 50,000.00 billion. And second, Nepal's Fiscal Budget for 2004/2005 was just nearly US$ 1.6 billion. He has also mentioned that due to poor motivation of the local investors, Nepal's cheapest projects like Upper Tamakoshi have been wasted. The Norwegian Feasibility Study reveals that nearly US$ 300.00 million is necessary for the project including 65 KM road black topping, 33

KM of which is to be newly constructed to connect the site. The cost per unit thus comes nearly 89 Nepali Paisa. Money can be allocated from: the remittances of the Nepalese workers abroad, banks, provident fund reserves, etc., if the government has zeal (B.H. Nepal, 8 April/June 2005, South Asian Journal).

Pandey, B (2003), in his article *"People power||*, has pointed out three main reasons why locally designed projects are less expensive:

- The cost of capital borrowed from local banks is at its lowest point in many years.
- Developers had complete flexibility in where they source their equipment and how they pick contractors, and they can get the best prices.
- Smaller projects mean fewer technical complications and the ability to breakdown contracts into small components that could be bid out among a large number of competitive Nepali, Indian and Chinese companies.

Pandey has added that besides being cheaper, local investments also benefit the national economy through much stronger backward linkages in construction and manufacturing. Usually, it is only the equipment (25-40 percent of total cost) which has to be imported from overseas. Today, projects like Piluwa and Chilime are living proof that the paradigm shifts in Nepali hydropower planning have brought real change. These and other projects have extensive involvement of both in-country financial institutions and technical manpower. And the beauty is their cost of electricity generation is $1,500 per kW, less than half that of larger aid-funded projects.

Sangroula, D P (2006) PhD, Associate Professor, Pulchowk Campus, Institute of Engineering, Tribhuvan University, in his research reports ***"HYDROPOWER DEVELOPMENT AND ITS SUSTAINABILITY WITH RESPECT TO SEDIMENTATION IN NEPAL"*** writes, sustainable hydropower development is the basic for the economic development of Nepal. The current generating capacity of hydropower projects in Nepal is about 600 MW. Despite adequate availability of surface water, several water resources projects have not been yielding expected output primarily due to sedimentation problems, which were underestimated at design stage in most of the cases. Sediment production in Nepalese watersheds has

generally been acknowledged to be the highest in the world and little reliable data of actual sediment production is available. Attempts were made to study the sedimentation processes in the Kulekhani Reservoir, Nepal and efforts were made to find appropriate sediment management options to keep Kulekhani Reservoir Sustainable. This paper provides historical development of hydropower, opportunities and challenges in this sector. Problem associated with sediments in developing hydropower has been addressed.

Ruziev, R (2003-2004) in his research reports "Economic, Environmental, and Political Aspects of Hydropower Infrastructure Expansion in Central Asia" writes, the need for the economic development and improvement of living standards in the upstream Central Asian states calls for the expansion of their hydropower infrastructure. These two republics see a better economic future in the development of hydro-resources and subsequent export of energy to the neighboring countries. Benefits, costs, and risks undoubtedly increase with size of a dam. Therefore, the development of the hydropower sector should take place in the context of comprehensive analyses of economic, environmental, and political considerations. While the study of adverse impacts of dams has not taken place in the absence of knowledge, these general standards and criteria of dam development cannot be applied uniformly. Thus, Central Asian states must develop specific guidelines for dam construction and operation with due regard to its economic, environmental, and political situation. As stated by Helene Carrere d'Encausse, an author and professor of politics, "water, via the Aral Sea and more importantly the Amu Darya and Syr Darya rivers, acts as cultural, economic, geographical and political core for Central Asia."

MINISTERIAL CONFERENCE ON WATER FOR AGRICULTURE AND ENERGY IN AFRICA: THE CHALLENGES OF CLIMATE CHANGE Sirte, Libyan Arab Jamahiriya, 15-17 December 2008 on a research paper of "***HYDROPOWER RESOURCE ASSESSMENT OF AFRICA".*** The major conclusions and recommendations are listed below:

1. Africa is currently using 20% of its hydropower potential with non-uniform regional distribution. Some regions are more endowed than others. A few countries with installed capacities more than 1 000 MW constitute about 65% of the total energy installed. The energy imbalance needs to be

addressed through regional integration.

2. Financing of energy projects is low due to low level of hydropower technology and huge cost of power projects in Africa.
3. Private public partnership option to raise capital and share investment risk should be adopted.
4. The power sector should be reformed to attract private sector participation and financial flow.
5. Africa is characterized by low level of technology on hydropower, in particular SHP development. Hydropower technology is widely available elsewhere worldwide and technology transfer is the immediate option to enhance development.

Sawhney, V (2007) in his research reports of ***"PROJECT FINANCING"*** writes Project Financing is a unique financing technique that has been used on many high-profile corporate projects, including Euro Disneyland and the Euro Tunnel. Employing a carefully engineered financing mix, it has long been used to fund large-scale natural resource projects, from pipelines and refineries to electric-generating facilities and hydroelectric projects. Increasingly, project financing is emerging as the preferred alternative to conventional methods of financing infrastructure and other large-scale projects worldwide. Project Financing discipline includes understanding the rationale for project financing, how to prepare the financial plan, assess the risks, design the financing mix, and raise the funds. In addition, one must understand the cogent analyses of why some project financing plans have succeeded while others have failed. A knowledge-base is required regarding the design of contractual arrangements to support project financing; issues for the host government legislative provisions, public/private infrastructure partnerships, public/private financing structures; credit requirements of lenders, and how to determine the project's borrowing capacity; how to prepare cash flow projections and use them to measure expected rates of return; tax and accounting considerations; and analytical techniques to validate the project's feasibility.

Khennas, S and Barnett, A (2000) Prepared a research reports for **Department for International Development, UK. And ITDG, Practical answer to Poverty** of ***"BEST PRACTICES FOR SUSTAINABLE DEVELOPMENT OF MICRO HYDRO POWER IN DEVELOPING COUNTRIES"***. Some findings are listed below.

Key Findings

1. While the data were not perfect, the report probably represents the most

complete *comparative* review to date of micro hydro experience across a range of different countries and conditions.

2. Micro hydro technology is now a mature technology that has benefited from substantial improvements over the past 30 years. However, it remains relatively 'unfashionable' and to some extent has been neglected by both major funding programmes and governments.
3. The data shows that in certain circumstances micro hydro can be more appropriate and profitable than other energy supply options, and therefore should be treated as part of the 'full menu' of energy options to be considered in meeting the needs of rural people.
4. Investment in micro hydro has occurred in three broad phases:
   - o a technological phase to improve and demonstrate the viability of the technology;
   - o a social phase where the objectives are largely to meet the needs of rural people in just the same way that investments have been made in health centres and feeder roads;
   - and,
   - o a financial phase, where the emphasis is on financially sustainable micro hydro investments.

Independent Power Producers Association Nepal (IPPAN) 2009 prepared a survey report of ***"power Crises in Nepal"***. This study has set an objective to get a clear picture of the following four areas: (1) existing situation of the power crisis; (2) its impact on consumers; (3) consumer's perspective on the solution; and (4) consumer's opinion about various power- related issues like privatilization and improvements in qualities. On the basis of these objectives and findings, the study team strongly recommends the Government of Nepal (GON) and executing organizations of implement the following policies for effective management and methodical elimination of the prevailing crisis in Nepal:

1. This study finds that the majority of the respondents have been facing six to nine hours of load shedding in a day, and it has affected their daily lives and activities in the domestic, agricultural, industrial, commercial and other sectors. Nepal being the second richest country in the world in water resources, this situation should have been implausible. Therefore, the study team strongly recommends the implementing agencies and the government of Nepal to reduce load shedding hours immediately by controlling the leakage of power; developing proper power distribution mechanism, and by promoting the involvement of the private sector in power distribution and production.
2. The existing situation of power crisis of Nepal affects all areas. According to the findings of this study, many people have lost their company goodwill, and many parents report that their children's education has been adversely affected. The study team strongly recommends solving these problems by promoting CFL awareness regulating existing power and

involving the private sector for better distribution and production of power in Nepal.

3. This study finds that there is very little access to people in power distribution at present, and that the majority of the respondents favor privatization. Hence, the study team strongly recommends that the government come up with mechanisms to increase the participation of – and give ownership to - the people in the management of power distribution by calling upon the private sector.
4. A prominent finding of this study is that the majority of the respondents demand that the government focus on the availability of power. On the basis of this finding, the study team strongly recommends that the government take initiative to increase the capacity of power.

2.7 Research Gap

These studies don't find any research about the financial analysis of particular Hydropower Project. In this thesis the researcher analyze overall Nepalese Hydropower Project with reference to a Particular Project. The researcher used capital budgeting technique for analysis of Upper Chardi Hydroelectric Project. Over all studies mentioned about the forecasting of total project cost, Total Project revenue & profit planning and its control. It also covers scenario of Nepalese Hydropower and its financial analysis and financing pattern. It is basically concern about finding financial indicator and analyzes them. It also concern to analyze sensitivity of cost due to increasing pattern of cost and a static pattern of electricity rates. The thesis recommends for maintain cost efficiency. With the reference of the analysis of the Project any developer, lender and government authority and agency can forecast their project and review of policies.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

The research methodology is the way to solve the research problem in order to make any type of research systematically, which fulfills the objective of the study. Research methodology is a way of systematic and objective analysis and recording controlled observation that may lead to the development of generalizations principles or theories resulting in the prediction and possibly ultimate control events. The basic research methodology adopted in the study is collection and analysis of primary and secondary data through the structured questionnaire method. Secondary data shall be collected through the desk study. The main purpose of this research is to analyze, examine and interpret the financial part of Nepalese hydropower project, for this the researcher have take a 10MW Upper Chardi Hydroelectric Project. This study has intense relation with the application of capital budgeting technique. The research methodology is followed to achieve the basic objectives and goals of this research work. This section deals with the research design, period covered, the nature and sources of data used and research variables.

3.2 Research Design

Research design is the strategy for conducting research. It includes the general frame works for collecting, analyzing and evaluating data. Research Design is the plan, structure and strategy fir investigation conceived so as to obtain answer to the research problem. The descriptive research design will be adopted in the study. The research design adopted in the study will be collection of information through the primary and secondary data source. Research design is the plan, structure, and strategy of investigation conceived so as to obtain answer to research question and to control variance. The plan is the overall schemed or program of the research like the structure of research is more specific. It is the out line, the scheme, the paradigm of the operation of the variable and strategy

implies how the research objective will be reached and how the problem encountered in the research will be tackled. Research design is an analytical as well as descriptive approach to achieve the objective. Thus research design is a plan to obtain the answer of research questions through analysis of data.

This study is manly focus on future research design of Upper Chardi Hydroelectric Project. The research is concerned with the future cash out-flow and cash in-flow. It is a process of collecting and evaluating the data objectively to reach a conclusion.

Accuracy of gathered information is the main ingredient of success in collected data. There are two main sources collecting data. One is the primary source, where the researcher was a direct observer of the some of the data and the other is the secondary source, where he or she is reporting the observations of others. In most cases, the researcher has to depend upon the data observed by others rather than by him or herself. At the same time, the researcher must also be aware that inappropriate and biased information results in faulty conclusion and findings.

The research is unique among he various types of research in that the source of data being studied are usually not available for the researcher's direct study. The researcher bears a special burden of impartial interpretation. Furthermore, the researcher must be sure that he or she understands the perspective of the sources of information.

3.3 Nature and Source of Data

In this study, both primary and secondary source of data will be used to fulfill the objectives. But mostly secondary data has been used. The data have been collected from Published and unpublished articles and studies.

3.3.1 Source of primary data: the primary data will be collected from the personal interview and structured questionnaire method.

3.3.2 Source of Secondary Data: the secondary data shall be collected through published materials in the hydropower of Nepal but materials will be the reports, paper presentation and articles related to financing of hydropower projects. Main source of secondary data are internet, NEA library, Nepal hydropower Association (NHA) and alternative energy promotion center, collage library, and NEPSE library. Published materials like profile of banks and hydropower company; bulletins i.e. Nepal Rastra Bank, NABIL Bank, Nepal Investment Bank, Agriculture development Bank Nepal industrial development corporation, Broachers, company profile and news letters, websites of various companies.

3.4 Period Covered

The study period cover the time period of twenty nine years from 2009 to 2038 for the purpose of long term cash inflow and analysis data are taken from various sources, where first 4 years will construction period. At construction period there is cash-out flow and next 25 years is generation period and there is cash in-flow. Which are assumed to be corrected and true.

3.6 Data Processing Technique

The relevant statistical information collected form selected sources for the project Upper Chardi Hydroelectric Project have been processed using Microsoft Excel Spreadsheets. Initially, data were entered in the spreadsheet at disaggregated level. In the Process of entering time series data the figures have been rounded off.

After processing the collected data, the researcher had developed several sheets in Microsoft Excel for calculating Capital Budgeting of the project using above mentioned formulas.

Most of the outputs of analysis are presented here in table format.

3.5 Data Analysis Technique

After the desk and field studies on the basis of secondary and primary data and information these were analyzed to meet the requirement of above-mentioned objective. In the analysis Capital Budgeting Technique are used to present and understand. Then conclusion will be drawn on the basis of analysis to explain the real crux of the problems and financial facts of hydropower project, which will ne much more helpful to Hydropower Developer in arranging the found and financing institution.

The data collection and arranged in proper from have been analyzed and interpreted through budgetary approach, financial tools and techniques are used. They are:

Cash-Flow Forecast

One of the most important tasks in capital budgeting is estimating future cash flows for a project. The final results we obtain are really only as good as the accuracy of our estimates. Because cash, not income, is central to all decisions of the firm, we express what ever benefits we expect form a project in terms of cash flows rather than income. The firm invests cash flow in the hope of receiving cash return in a greater amount in the future. In setting up the cash flow analysis, a computer speed sheet program is invaluable. It allows one can change assumptions and quickly produce a new cash flow stream.

Cash flow generally indicates a cash inflow and a cash outflow. The key point in investment analysis is to focus exclusively on the differences in expected future-cash flows that result from implementing a project. All cash flows are treated as the same whether they arise from operations, purchase or sale of equipment or investment in or recovery of working capital. The opportunity cost and the time value of money are tied to the

cash flowing in or out of the organization and not to the source of the cash.

Procedures of Cash Flow Estimation

According to concept of capital budgeting, first of all, it is necessary to estimate the cash flow in the process of analysis investment proposal. While analyzing the cash flow, it is also necessary to estimate the outflow as well as inflow. After the cash flow estimation, it can be finalized about investment. The following three steps are involving cash flow estimation:
Step 1: determination of net investment or initial cash outlay or net cash outlay. Step 2: Determination of annual net cash flow or cash flow after tax.

Payback Period (PBP)

The payback period, defined the expected number of years required to recover the original investment. This method is oldest and formal method used to evaluate capital budgeting projects. It is the simplest and perhaps the most widely employed quantitative method for appraising capital expenditure decisions. This method answers the questions: how many years will it take for the cash benefit to pay the original cost of an investment?

$$\text{Pay Back Period} = \text{Year Before full recovery of original Investments} \quad \frac{\text{Unrecovered cost at start of year}}{\text{Total cash flow during year}}$$

Average Rate of Return

This accounting measure represents the ratio of the average annual profits after tax to the investment in the projects. The Average Rate of Return refers to the earning or net profit after tax. It is consider net earning instead of net cash flows. It is called the accounting rate of return because it evaluates the purpose on the basis of net profit determined financial account.

For calculating average rate of return;

$$\text{Average Rate of Return} = \frac{\text{(Total Income after tax for the period/Years)}}{\text{Total Investments}}$$

Net present value

Net present value, what remains after discounting all cash flows by the required rate of return. The Net Preset Value method is a discounted cash flow approach to capital budgeting. With the present value method all cash flows are discounted to present value of an investment and return. The net present value (NPV) method is a discounted cash flow approach to capital budgeting that discounts all expected future cash flows to the present using a minimal desired rate of return. To apply the net present value (NPV) method to proposed investment proposal a manager first determines some minimum desired rate of return. The minimum rate is called the required rate of return, hurdle rate, discount rate or cost of capital. Then all expected cash flows from the project are discounted to the present, using this minimum desired rate. If the sum of the present values of the cash flow is zero, or positive, the project is desirable and if negative it is undesirable. When choosing from among several investments, the one with the largest net present value is the most desirable.

To correct for the major defect of any nondiscounting technique, ignoring the time value of money, methods were developed to include consideration of the time value of money. One such method is Net Present Value Method, which relies on discounted cash flow technique to implement this approach we proceeds as follows;

1. Using the rate of return required by the form, compute the present value of all the cash flows, whether in-flows or out-flow, associated with a project during its life.
2. Sum the cash flows' present value to get the project's NPV
3. A project is acceptable if its NPV is positive; it is not acceptable if its NPV is negative.

NPV is computed using the equation:

$$NPV = CF_o + \frac{CF_1}{(1+K)^1} - \frac{CF_2}{(1+K)^2} \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad \frac{CF_n}{(1+K)^n}$$

Here, CF is the expected net cash flow at period, and K is the rate of return required by the firm to invest in this project.

Internal Rate of Return (IRR)

Internal rate of return, the rate that equates the PV of cash flows or the IRR is the interest rate that equates the present value of the expected future cash flows or receipts to the initial outlay. The IRR formula is the same as the NPV formula, except is sets the NPV equal to zero and solves for the discount rate. If the IRR is greater then cost of capital, the value of the firm increase and the project should be accepted.

IRR is computed using the equation:

$$CF_o + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} \cdots\cdots\cdots\cdots \frac{CF_n}{(1+K)^n} = 0$$

Here, CF is the expected net cash flow at period, and IRR is the internal rate of return.

The cost of the project (cash-outflow) has been estimated by converting them in the present value of 2009A.D. in order to find out the present construction cost per/mw and generation cost pre/unit of hydro project assuming the prevailing interest rate on 12 months deposit, depreciation rate, and operational and maintenance rate.

The income (cash-inflow) of the project also has been converted in the present value of 2009 A.D.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

4.1 Introduction

Nepal is rich in water resources with vast potential for generation of hydroelectricity, but its present exploitation is very low. This shows the urgency of exploitation of hydropower for meeting energy needs and increasing supplies to industrial and domestic use. Hydropower generation is most capital intensive energy generation option, which requires huge amount of internal as well as external financial resources. There are numbers of constraints which are in habiting the proper exploitation of hydropower potential of the country. One of the major constraints inhibiting the development of hydroelectricity of the country is inadequacy of financial resources.

In view of the above mentioned problems, this study attempts; (i) to study the Financial part of Hydropower Project; (ii) to study the existing status of hydropower development regarding generation and consumption; (ii) to examine the factors affecting production and consumption of electricity and investment in this sector; (iii) to analyze the pattern of financial resource allocation on hydropower development; (iv) to assess the role played by foreign assistance in the development of hydropower projects.

This study is mainly concerned with analysing the financial part of hydropower project. For this the researcher takes a 10MW Upper Chardi Hydroelectric Project as reference of Nepali Hydropower Projects. To analyses the project the researcher uses the Capital Budgeting in the context of Upper Chardi Hydroelectric Project

Capital budgeting is one of the most powerful tools of profit planning and control. The term capital refers to long term assets used in production, while a budget is a plan which details projected inflows and outflows during some future period. So, the capital budget is a planned expenditure

on long term assets, and capital budgeting is process of evaluating and selecting long term investments. Capital budgeting may define as the decision making process by which firms evaluate the purchase of major fixed assets, including buildings, machinery, and equipment. Capital budgeting describes the firm's formal planning process for the acquisition and investment of capital and result in a capital budget that is the firm's formal plan for the expenditure of money to purchase fixed assets.

The main objective of this study as mentioned in the introduction chapter that to analyse of financing of hydropower project is depends on estimation of the future cash-outflow (investment) and cash-inflow (income). The study mainly focused on long-term capital budgeting decision for this purpose, the study covers 29 years from 2009 to 2038.

4.2 Cash-Flow Forecast

One of the most important tasks in capital budgeting is estimating future cash flows for a project. The final results we obtain are really only as good as the accuracy of our estimates. Because cash, not income, is central to all decisions of the firm, we express whatever benefits we expect form a project in terms of cash flows rather than income. The firm invests cash flow in the hope of receiving cash return in a greater amount in the future. Only cash receipt can be reinvested in the firm or paid to stock holders in the form of dividends. In capital budgeting, food guys may get credit, but effective managers get cash. In setting up the cash flow analysis, a computer speed sheet program is invaluable. It allows one can change assumptions and quickly produce a new cash flow stream.

4.2.1 Pattern of cash flows

A huge capital investment needed for develop hydropower project. Initial years are investment years and the company can get regular cash inflow. First 4 years is construction year, in these year cash is disbursed. And next 25 year is generation year in these year cash is in-flow.

4.2.2 THE COST ESTIMATE

One of main part of capital budgeting is estimating cash out flow or investment. This section of the report describes the methodology used for derivation of the project cost and the estimated costs. This final estimate is based on the detailed layout and study of the optimum project configuration selected from the optimization studies. The rates are based on different projects in Nepal, planned or under construction in the past five years. The rates are based on 2009 price level.

Quantity take offs were carried out on the final drawing with plan metering, as required. The estimate process was carried out in parallel with Construction Planning presented in earlier chapter as these two activities are complementary to each other

4.2.2.1 Criteria, Assumptions and cost components

The following criteria and assumptions are the basis of the cost estimate:

- All costs are derived from the recently completed projects.
- wherever applicable, district rates fixed by Nepal Government for the current fiscal year were used
- The cost estimate and financial analysis have been calculated in US dollar & NRs.
- For currency conversion, US $1 equals to NRs. 75.00 has been used.
- transportation from the nearest Terai market was consider
- no allowances are included to cover cost premiums either to favour local supply or to obtain supplier financing.
- Identifiable Nepalese taxes and custom duties are included.
- Royalties and cost associated with rights of way for quarries, borrow and disposal areas are not included.

It is anticipated that open competitive bidding will be sought for awarding of major contracts. A key assumption is that the project management and procurement policy will stress open competitive bidding and that government policies will not hinder cost-effective construction.

4.2.2.2 Cost Estimating Methodology

The project is divided into a number of major components for the estimating process as follows:

- Support facilities, access roads and other general items
- Main civil construction works
- Hydro mechanical equipments
- Electromechanical equipments
- Transmission lines
- Environmental mitigation measures
- Camp, housing and accommodation facilities
- Engineering, management and administration
- Contingencies

4.2.2.3 Cost Estimating Process

For main civil construction works, a contractor type estimate was prepared. The estimating process was carried out in the following steps:

a) division of the project into a number of distinct structures like headworks, desander, headrace canal, forebay, penstock, powerhouse and tailrace etc.

b) identification of distinct construction tasks or measurable pay items, such as overburden excavation, rock excavation, stone masonry, fill work, concrete works etc.

c) calculation of the appropriate quantity of each item from map and drawings by planimetering

d) development of unit rate of construction works based on prevailing market rates appropriately adjusted for the project area, adopted method of construction as described in the section-Construction Planning and standard norms and practices of the country.

e) Calculation of cost for each activity by multiplying quantity obtained in (c) by rates derived in (d)

f) Calculation of cost for each structure by summing up costs calculated in (e) of different works required for the structure

4.2.3 Capital cost

4.2.3.1 Land acquisition, access road, camp and construction power facilities

The project needs about 54 Ropani land for intake, desilting basin, penstock alignment, powerhouse, switchyard, office, staff quarter, godown, guard house etc. Land will be purchased from their owners under bilateral negotiation. A total of NRs. **15,750,000.00** has been allocated for land purchase and development as part of mitigation cost.

Access road development NRs. **45,375,000.00,** camping or Housing **19,462,669.00** and construction power NRs. **22,835,216.00** are the major components under infrastructure development cost.

4.2.3.2 Labour Rates

For estimating purposes, the labour force was subdivided into four categories of workers, namely unskilled, semi-skilled, skilled and highly skilled. It is also assumed that work force required for the project will be form the local market and only specific skilled labour will be outside.

Considering the overall construction requirements for the project, a 6 days x 10 hours work week was selected as the basis for planning and estimating the major construction activities. For this rate the researcher take Kasi Distric Development Committee approved district rates.

4.2.3.3 Construction Equipment

The access roads will be required constructed first to transport the heavy machineries and equipment. For rate analysis purpose, equipment rates were derived from the Cost Reference Guide for Construction Equipment, a widely used publication.

4.2.3.4 Construction Material

It has been assumed that most of the construction materials like cement, reinforcement steel will be supplied from local market and specific materials like penstock liners, gates will be imported from India or

overseas. The more complex items such as drill material and rock support will be imported from overseas industrial countries.

4.2.3.5 Electrical and Mechanical Equipment

The costs of the electrical and mechanical equipment were estimated by a combination of methods including:

- Interpretation of budget prices supplied by potential suppliers, mainly for the large and more expensive equipment such as turbines, generators, power transformers, and main inlet valves.
- In-house estimates using established international prices and/or relationships for routine items. The in-house information is based on years of collection of price data, and often eliminates the errors of variations of prices occurring due to changes in supply and demand.
- Percentage of lump sum provisions on a ratio basis based on experience, for lesser miscellaneous items.

4.2.3.6 Switchyard and Transmission Lines

The costs of the switchyard components were based on:

- Partly on budget prices supplied by potential suppliers, and
- Partly on in-house estimates using established international prices

The cost of the transmission lines were based the current costs incurred in transmission line construction by NEA.

In order to account for the cost incurred for the construction of the camps and operation, a sum of 5 % of the civil construction cost has been considered based on in-house estimates using established standard prices applicable in the region.

A provision has been made for the health and security item covering the costs of coveralls, construction boots, helmets and gloves as well as consumables at the first aid centres supplied by the contractor and owner.

4.2.3.7 Unit Rates

Unit rates have been derived for the major construction activities. Standard norms of practice and consultant's in-house experience have been utilized in derivation of the unit rates. The prices of material and other equipment were obtained from local market and also collected from projects under construction.

4.2.3.8 Contingencies

The estimated costs include contingencies which allow for unforeseen cost increases that may become necessary as more information is obtained and evaluated. In view of the extent of investigations carried out to date, the present stage of preliminary designs and cost analysis performed, the following contingencies have been allowed:

- Tunnel works 20%
- Civil and Hydro mechanical & Transmission 10 %
- Electromechanical 5 %
- Others 5%

4.2.3.9 Resettlement and Environmental Mitigation Programs

An allowance of 5% of the total construction cost for various resettlement, relocation and environmental programs have been included.

4.2.3.10 Engineering and Management

An allowance of 4.5 % on average of the total construction cost has been included to cover the following:

- Detailed field investigations
- Model testing of major structures
- Preparation of detailed designs and tender documents
- Preparation of detailed construction drawing
- Prequalification of tenders
- Evaluation of tenders
- Supervision of construction, testing and commissioning
- Management of procurement

- Administration of construction contracts
- Measuring the work
- Reviewing and approving contractor's submittals
- Cost of owner's and consultant's equipment, supplies, communication and transport

4.2.3.11 VAT and taxes

As per the VAT practices in Nepal, 13% of the VAT complying portion of different contract amounts have been considered under VAT payable amount.

Furthermore, 1% of custom duty, 1.5% of local taxes and 0.1% of godown charges have been applied to the amount which is not considered for paying the VAT.

4.2.3.12 indirect cost

The unit costs include profit, and overhead, which the contractor would charge. Along with that, Value Added Tax (VAT) will be applicable to all construction materials procured. Therefore, 13% VAT has been included in the cost estimates, which the contractor would be subjected to. As per the facilities provided by the Electricity Act 1993, VAT has been excluded from electromechanical equipment, and all plant and machinery, which the contractor would import for the completion of works. However, 1% of custom duty, 1.5% of local taxes and 0.1% of godown charges have been applied to the amount which is not considered for paying the VAT. A contingency sum has been added to the total civil, electromechanical and other cost.

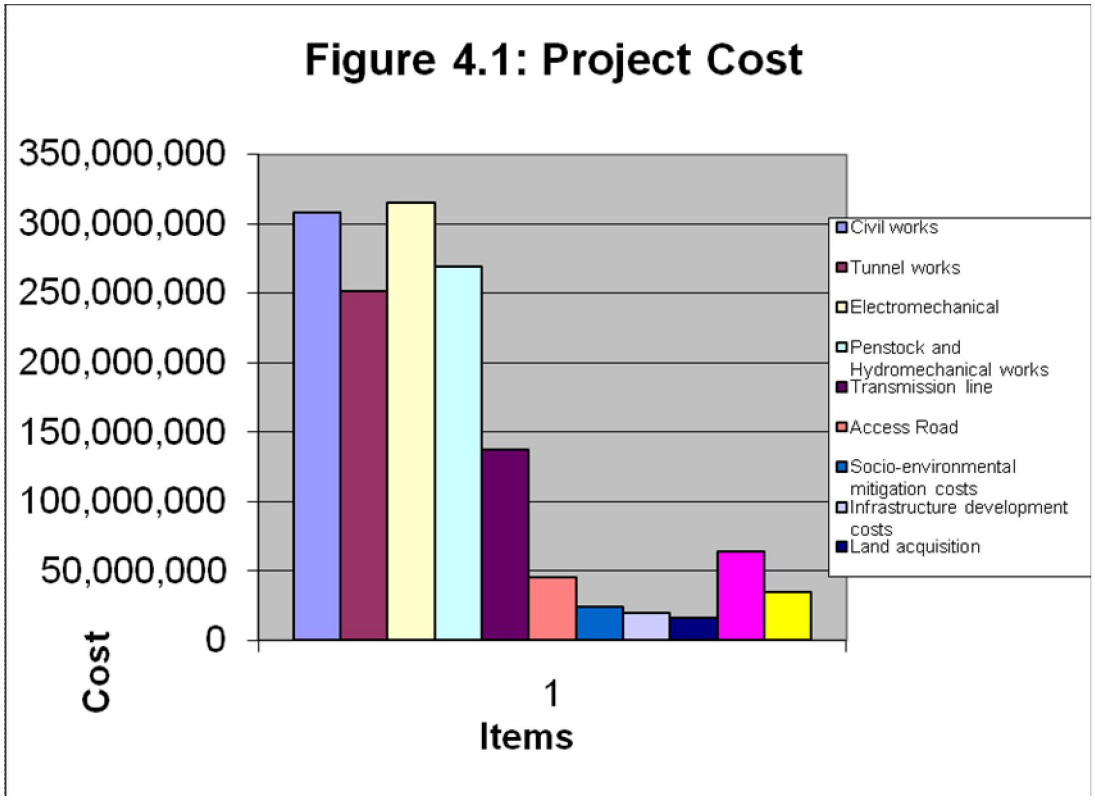
4.2.3.13 Total Estimated Cost

On the basis of the analysis described above, the cost of the 10 MW Upper Chardi Hydroelectric Project, including contingencies, engineering and administration, has been estimated at NRs 1,659,033,000 excluding Interest During Construction and financial fees and expenses.

Table 4.1 Total project cost showing various items of the cost

UPPER CHARDI HYROELECTRIC PROJECT (UCHEP)						
PROJECT COST ESTIMATE (UPDATED)						
Installed Capacity (kW)			**10000**	**54%**	**UD$ 1=**	**75**
	%	**NRs**	**Total**	**VAT complying %**	**VAT complying NRs equivalent**	**% Allocations**
SUMMARY CONTRACTS						
Civil works		280,386,706				
Contingency sum	10%	28,038,671				
Sub - Total			***308,425,377***	100%	***308,425,377***	18.59%
Tunnel works		209,700,000				
Contingency sum	20%	41,940,000				
Sub - Total			***251,640,000***	100%	***251,640,000***	15.17%
Electromechanical		300,000,000				
Contingency sum	5%	15,000,000				
Sub - Total			***315,000,000***	10%	***31,500,000***	18.99%
Penstock and Hydromechanical works		244,748,363				
Contingency sum	10%	24,474,836				
Sub - Total			***269,223,199***	50%	***134,611,600***	16.23%
Transmission line		124,576,198				
Contingency sum	10%	12,457,620				
Sub - Total			***137,033,818***	50%	***68,516,909***	8.26%
Access Road		41,250,000				
Contingency sum	10%	4,125,000				
Sub - Total			***45,375,000***	50%	***22,687,500***	2.74%
Construction Power		21,747,825				
Contingency sum	5%	1,087,391				
Sub - Total			***22,835,216***	10%	***2,283,522***	1.38%
Socio-environmental mitigation costs		22,500,000				
Contingency sum	5%	1,125,000				
Sub - Total			***23,625,000***	25%	***5,906,250***	1.42%
Infrastructure development costs		18,535,875				
Contingency sum	5%	926,794				
Sub - Total			***19,462,669***	100%	***19,462,669***	1.17%
Land acquisition		15,000,000				
Contingency sum	5%	750,000				
Sub - Total			***15,750,000***	0%	***0***	0.95%
TOTAL CONTRACTS			**1,408,370,279**			
ENGINEERING FEES	4.5%		**63,376,663**	100%	**63,376,663**	3.82%
TOTAL CONTRACTS & ENGINEERING COST			**1,471,746,941**			
TOTAL VAT COMPLYING NRs EQUIVALENT					**908,410,488**	
VAT	13%				118,093,363	
TDS on Engineering fees	1.5%				22,076,204	
local tax & 0.1% godown charge)	2.6%				12,652,341	
TOTAL TAX AND VAT			**152,821,909**		**152,821,909**	
TOTAL CONTRACTS & ENGINEERING			**1,624,568,850**		**1,624,568,850**	-
Owner's development costs			**34,464,000**			
TOTAL PROJECT COST (Nearest NRs 1000)			**1,659,033,000**			
		Unit cost	**2,212**	**US$/kW**		
Notes		Unit cost	**165,903**	**NRs/kW**		
Unit rates are based at the site local to construction.						
Unit rates include cost of labour plant and materials						
Contingency sum cover forseen and unforseen risks. It does not cover cost overrun.						
Risks - Rock type in tunnel alignment, strikes, material shortage, political instability, manpower shortage etc.						

The summary of estimate is given in Table 4.1 and details of estimate of expenses and rates are given in annexure.



4.2.4 Source of funds

It has been estimated the source of funds for the construction of project is Equity and Loan. For equity share, promoter share holder make bank balance as per required. The ratio of equity and loan is estimated 25:75. For bank loan, there are 7/8 commercial (National A Class) banks make a consortium to invest to the project. The consortium banks issue loan to the project as work in progress (WIP). As per the collateral for the loan the banks takes the work in progress of the project. There is no personal guarantee for the loan.

4.2.5 Disbursement

It has been estimated that the construction work will be completed in four years time. The total expenditure on the first year will be 20% and 30% on 2nd year, 30% on 3rd and the remaining 20% will be spend on the 4th year. These cost disbursement includes advances provided to suppliers and contractors.

4.2.6 Depreciation Effect

Depreciation is noncash expenses that affect the taxes paid in cash. Because a machine of this short has a useful life in excess of 1 year, we cannot charge its costs against income for tax purpose but must depreciate it. We then deduct depreciation from income in order to compare taxable income. Under the tax laws, when this research was written, capita assets fall into defined cost recovery classes depending on their nature.

Deprecation Allowance (Nepal Tax Act. 2058 sec 19)

Depreciation is the depletion in the value of assets by wear and tear, obsolescence, or the passing of time. Deprecation at prescribed rate is allowed on used depreciable assets owned by the person. The block wise details and rate of depreciation are given in the following table:

Table: 4.2: Deprecation Rate

Block	Particulars of assets	Rate of Dep.%
A	Building, structures, and similar works of a permanent nature	5%
B	Computer, data processing equipments, furniture, fixtures and office equipments	25%
C	Automobiles, Bus and Mini Bus	20%
D	Construction and earth moving equipments, portion of pollution control cost and research and Development cost and any tangible assets not included in above blocks (Plant and Machinery, etc)	15%
E	Intangible assets other than not included in block 'D' (Patent, Design, Software, etc)	Original cost Useful life

Source: Tax Act, 2058

4.2.7 THE INCOME ESTIMATE

Other main part of capital budgeting is estimating cash out-inflow or income generation.

In Nepali energy market there is not possible to distribute generated energy to end user or consumer. The distribution transmission line takes huge capital investment more than building hydropower. These types of infrastructures should be developed by Government. For this Nepal

government has a government holding organization and authority, Nepal Electricity Authority (NEA). That why only market of electricity generated by these type of small hydropower project is Nepal Electricity Authority.
NEA and Nepal Government had makes a policy to purchase electricity generated by private hydropower below 25MW.
From the meeting no.505 of NEA Board held on 2065.09.05 had been fixed the Power Purchase rate for commercial energy generated from Private Hydropower developer was NRs. 7.00 for dry energy and NRS. 4.00 for wet energy. There has been 6% escalation on above rate for 9 times once every one fiscal Year[1].

4.3 PROJECT EVALUATION

This section of the report describes the financial analysis carried out in order to determine viability of the project in terms of expected returns. Financial evaluation uses the real term monetary values of the cost and benefits and is inclusive of taxes, transfers, duties and escalation. The financial evaluation concerns only with the developer of the project and monetary evaluation of the project. Hence, from the perspective of a private developer, financial evaluation is the most important aspect of the project to determine whether to finance it or not.

The evaluation method is based on conventional practice of developing the cost and the benefit streams for a period of time on the same basis. The financial evaluation procedure involves a number of assumptions. These parameters are described in the following paragraphs.

4.3.1 Project Financial Cost

The project capital cost has been taken as the project financial cost with modification of electro-mechanical cost to reflect national policies of taxation.

1. Work Procedure Paper for Contract Agreement of Purchase of generated Energy upto 25MW Private Hydropower developer with Nepal Electricity Authority, 2065 PP:6

4.3.2 Project Financial Benefits

Financial evaluation requires use of energy selling prices in real terms, that is, the price the developer gets in the market. It is generally governed by the Power Purchase Agreement (PPA) between the Developer and the power distribution agency and is quite often negotiable after the feasibility study. For the feasibility study purpose, current prevailing rates should be used. NEA has entered into the following PPA with various agencies:

For Khimti (60 MW)	5.94 USc/kWh in 1994
For Bhote Koshi (36 MW)	6.00 USc/kWh in 1995
For Indrawati (7.5 MW)	5.7881 USc/kWh in 1997
For Upper Modi (14 MW)	5.4 USc/kWh in 1999
For Upper Marsyangdi (50MW)	5.6 USc/kWh in 2007

These energy prices are for bulk supply without differentiation between the firm and the secondary energy. However, for projects of 25 MW capacity or less, NEA has published rates of NRs 7.00 per kWh in dry season of mid-December to mid –April and NRs 4.00 per kWh in the rest of months with 3% escalation per annum for first 9 years after COD.

4.3.3 Discount Rate

The discount rate is also an important parameter in the financial evaluation. The reference discount rate of capital selected for the study is 10.5%.

4.3.4 Cost Datum

All cost and benefits are expressed in constant prices (i.e., excluding general escalation)

4.3.5 Planning Horizon

The financial life of the project has been taken as the license period granted with a maximum value of 35 years. This period is expected to be long enough to fully include all benefits from the project and also equals

or exceeds the expected economic life of the facilities. Replacement of electrical and mechanical components is considered after 25 years of operation. Costs and benefits may occur after the planning horizon, however, their inclusion will have little effect on the evaluation results because of the discounting procedures employed in the analysis.

4.3.6 Currency Exchange Rate

The exchange rate used in the economic analysis is NRs 75.00 per US dollar (Nov 2009). This rate has been used as the "official" exchange rate in the conversion of all costs to and from the US dollars to the Nepalese Rupees. Exchange rate for subsequent years has been derived based on the local and foreign escalation.

4.3.7 Operation and Maintenance Cost

It has been assumed that 2.5% of the project cost will be required annually to meet operation and maintenance cost including repair and replacement costs. This value has been derived from the experience of hydropower projects in the country.

4.3.8 Taxes, Duties and VAT

Taxes, duties and VAT payable to the government or its agencies have to be considered in the financial evaluation. At present, the government charges 1% custom duties for import of machinery and equipment for use in the project.

4.3.9 Royalties

Royalties are payable to the government for natural resource usage. As per Electricity Regulation 1992, the following royalties are levied:

Table : 4.3 Royalty for Hydropower Projects	
For the first fifteen years	
Capacity royalty	NRs 100 per kW of the installed capacity per year
Energy royalty	2% of energy sales revenue
From the sixteenth year onwards	
Capacity royalty	NRs 1000 per kW of the installed capacity per year
Energy royalty	10% of energy sales revenue

4.3.10 Debt Equity

As hydropower projects are highly capital intensive, funds has to be obtained from various financial institutions. Such a project could not be built solely on loans as the lenders will require the developer also put some funds. Generally, loan portion of the cost varies from 70 to 85%. For the present study, debt-equity ratio of 70:30 has been assumed.

4.3.11 Interest Rate

The loan amount will require some interest to be paid on the amount borrowed. The interest will be capitalized till the project starts producing revenue. Generally, the banks charge 10 to 12 % for such loans. For the present study, an interest rate of 10.5% has been considered.

4.3.12 Loan repayment Period

The repayment starts after the revenue generation starts. It will take 5 to 8 years for total repayment of the loan for small projects and may extend to 15-20 years for larger projects. For the UMCHEP, the loan repayment terms has been taken as 12 years starting from the first year of repayment.
Other charges

In addition, the banks may charge guarantee money for the loan provided, insurance charges, registration charges, if any, to be levied from the project. These charges are bank specific and are unknown at this stage. Hence, such charges have not been considered in the study.

4.3.13 Financing Structure

The total capital expenditure is expected to amount approximately NRs. 1,968,676,000.00 and will be financed by a combination of equity and debt as follows. The debt is a local currency commercial bank loan. The financing structure of 70% debt and 30% equity (of the capital investment excluding the financing fees and IDC) are assumed.

Table 4.4: Financing Structure

TOTAL CONSTRCTION COST		1000xNRs	1,656,961.00
TOTAL CONSTRCTION COST		US$	22,092,813.00
Cost/kW		NRs/kW	165,696.10
Cost/kW		US$/kW	2,209.00
	Interest during construction	1000xNRs	304,466.00
	Financing and other fees	1000xNRs	7,249.00
	Total cost with IDC and financing fees	1000xNRs	1,968,676.00
	Total cost with IDC and financing fees	US$	26,249,013.00
	Cost/kW with IDC and Financig Cost	NRs/kW	196,867.60

4.4 Financial Indicators

In the analyses, project costs and benefits are compared using discounting measures of project worth. In general, three important economic indicators used in the analysis are:

Average rate of Return

Payback Period

Internal Rate of Return

Net Present Value

The Benefit-Cost Ratio (B-C Ratio)

Debt Service Coverage Ratio

Average Rate of return: Once the average rate of return for a proposal has been calculated, it may be compared with a required rate of return to determine if a particular project should be accepted or rejected.

The principal virtue of the average rate of return is its simplicity it means use of readily available accounting information. Once the average rate of return for a project has been calculate, it may be compared with a required rate of return to determine if a particular proposal should be accepted or rejected. The principal shortcomings of the method are that it is based on accounting income rather than on cash flows and that if fails to take account of the timing of cash inflows and cash outflows. The time value of money is ignored; besides in the coming year are valued the same as benefits in the first year.

Pay Back Period: Payback is a popular (but crude) measure of liquidity. The payback period of an investment projects tells us the number of years required to recover our initial cash investment. It is the ration of the initial fixed investment over the annual cash inflows for the recovery period. Shortcomings; if the calculated payback period is less than some maximum acceptable payback period, the project are accepted; if not, it is rejected. The major shortcoming of the payback method is that it fails to consider cash flows after the payback period; consequently, it cannot be regarded as measure of profitability. The payback method continues in use, nevertheless, frequently as a supplement to other, more sophisticated methods. It does afford management limited into the risk and liquidity of a project. The shorter payback period, supposedly, the less risky project and the grater its liquidity. The company that is cash poor may find the method to be very useful in gauging the early recovery of funds invested. There is some merit to its use in this regard, but the method does not take in to accounts the dispersion of possible outcomes relative to the original investment. Therefore, it cannot consider an adequate indicator of risk. When the payback method is used, it is more appropriately treated as a constraint to be satisfied then a profitability measure to be maximized.

The Internal Rate of Return (IRR), the rate that equates the PV of cash flows. Because of the various shortcomings in the average rate of return and pay back methods; it generally is felt that discounted cash flow

methods provide a more objectives basis for evaluating and the timing of expected cash flow in each period of a project's life. IRR is the discount rate which makes the NPV of the incremental net benefit stream equal to zero, that is, the discount rate at which the discounted benefits equal the discounted costs. The IRR indicates the economic profitability of the investment project. If the IRR is less than the discount rate, which has been used, the project is thought to be uneconomic as the discounted benefits do not outweigh the discounted costs.

The Net Present Value (NPV): Net present value, what remains after discounting all cash flows by the required rate of return. Like the internal rate of return method, the net present value method is a discounted cash flow approach to capital budgeting. With the present value method all cash flows are discounted to present valued of an invested proposal.

NPV is the present value of the incremental net benefit stream, that is, the sum of the discounted flow of project benefits net of project costs. A positive NPV indicates that the project generates benefits in excess of those required by the discount rate. A project with a positive NPV is, therefore, considered economical.

Another way to express the acceptance creation is to say that the project will be accepted if the present value of cash inflows exceeds the present value of cash out flows. The rationale behind the acceptance creation is the same as the behind the internal rate of return method. If the required rate of return is the return investors expect the firm to earn on the investment proposal, and the firm accepts a proposal with a net present value greater than zero, the market price of the stock should rise.

The Benefit-Cost Ratio (B-C Ratio) is the ratio of the present value of the benefit stream to the present value of the cost stream. The B-C ratio indicates the extent to which the discounted stream of benefit exceeds the discounted stream of costs. A ratio greater than one indicates that benefits

exceed costs, while a ratio that is less than one indicates that costs exceed benefits.

Debt Service Coverage Ratio is the ratio of income after tax, which should pay loan instalment with interest. This ratio indicates the loan repayment capacity of the project.

Besides, other financial indicators like Rate of return on Equity (ROE) will also be calculated.

4.5 Financial Analysis

A preliminary financial analysis was carried out as cash flow of revenue and expenditure. It has been assumed that debt equity ratio will be 70:30 with an interest rate of 10.5% on debt. Royalties and taxes, where applicable, have been deducted from the revenue to derive net cash flow. Escalation factors based on price index have also been considered. **Error! Reference source not found.**Table 4.5 shows the summary of output of financial analysis.

Table 4.5: Financial Analysis Outputs @ Base Case

Summary of Key Indicators (Output)			NRs. '000	US$ '000
Project IRR			16.7%	
Equity IRR			21.7%	
Benefit to Cost Ratio			1.97	
Debt Service Coverage Ratio:				
	Minimum		1.2	
	Average		1.7	
Net Present Value (NPV)			913,414	12,179
Simple Payback Period	Year(s)		5.2	
Average Rate of Return			18.3%	

The analysis showed that the IRR is 16.7 %, Net Present Value is NRs. 913,414,000.00, Average rate of return is 18.3% Benefit cost ratio is 1.97, debt service ratio is minimum 1.2 & Average 1.7 and for a simple payback period of 5.2 years, for a debt-equity ratio of 70:30.

Table 4.6: Financial Analysis (Base Case) - INPUT ASSUMPTIONS

INPUT SHEET

Projet Name	Upper Chardi HEP
Installed capacity (MW)	10
Dry energy per year (GWh)	16.00
Wet energy per year (GWh)	58.00
Total energy per year (GWh)	74.00
Price of dry energy (NRs/kWh)	7.00
Price of wet energy (NRs/kWh)	4.00
Escalation of energy price (rate %)	6.00%
Duration of escalation , from year 1 to year	10

ECONOMIC AND FINANCIAL ASSUMPTIONS

Discount rate	11%
Inflation rate	0%
Tax rate	21.5%
Account receivable (days)	30
Account payable (days)	30
Days in a year	365
Exchange rate (NRs/USD)	75

Summary of Key Indicators (Output)	NRs. '000	US$ '000
Costruction Cost (NRs)	1,656,961.00	22,092.81
Interest during construction (NRs)	304,466.00	4,059.55
Financing and other fees (NRs)	7,249.00	96.65
Total cost with IDC and financing fees (NRs)	1,968,676.00	26,249.01
Cost/kW without IDC and Financig Cost	165,696	2209
Cost/kW with IDC and Financig Cost	196,868	2624
Project IRR	16.7%	
Equity IRR	21.7%	
Benefit to Cost Ratio	1.97	
Debt Service Coverage Ratio:		
Minimum	1.2	
Average	1.7	
Net Present Value (NPV)	913,414	12,179
Simple Payback Period Year(s)	5.2	
Average Rate of Return	18.3%	

CAPITAL DISBURSEMENT SCHEDULE

Construction Period: **4 years**

	TOTAL	Year 0 2008	Year 1 2009	Year 2 2010	Year 3 2011	Year 4 2012	Year 5 2013
OK	**100%**	**0%**	**20.0%**	**30.0%**	**30.0%**	**20.0%**	

DEPRECIATION

Depreciation period 20 years
Salvage value 0

PROJECT FINANCING

Equity (% of total capital cost)	30.00%
Loan A (% of total capital cost)	70.00%
	OK

Loan A

Grace Period (years)	0
Repayment period after construction (ie after COD)(years)	12
Financing fee (% of loan amount)	0.0%
Commitment fee (% of undisbursed amount)	0.00%
Insurance (during construction)	0.25%
Interest duing construction (%)	10.5%
Interest during operation (%)	10.5%

WORKING CAPITAL LOAN

Amount, 1000 USD	-
Interest (%)	11%
Terrm (years)	0

OPERATION AND MAINTENANCE COST

		Years	
O&M cost, % of investment for first years	1.5%	5	
O&M cost, % of investment for remaining years	1.5%		
Insurance cost/year (% of construction cost)	0.5%		3,505.85

ROYALTY

Capacity royalty, for initial years (NRs/kW)	100	15	years for royalty1
Capacity royalty,remaining years (NRs/kW)	1000	Remaing years	
Energy royalty, for initial years (NRs/kWh)	2%	15	years for royalty1
Energy royalty,for remaining years (NRs/kWh)	10%	Remaing years	

MAINTENANCE RESERVE ACCOUNT

Maintenance year, from COD	20	th
Annaul deposit, in 1000 NRs, starting from the year of COD	0	5 th

Table 4.7: Financial Analysis (Base Case) - FINANCING ASSUSMPTIONS

Equity (% of total capital cost)	30%
Loan A (% of total capital cost)	70%
Loan B (% of total capital cost)	0%
Loan C (% of total capital cost)	0%
Loan A	
Grace Period (years)	0
Repayment period after construction period (years)	12
Financing fee (% of loan amount)	0%
Interest during construction (%)	10.5%
Interest during operation (%)	10.5%
Loan B	
Grace Period (years)	0
Repayment period after construction period (years)	0
Financing fee (% of loan amount)	0%
Interest during construction (%)	0%
Interest during operation (%)	0%
Loan C	
Grace Period (years)	0
Repayment period after construction period (years)	0%
Financing fee (% of loan amount)	0%
Interest (%)	0%
Interest during operation (%)	0%

SUMMARY OF RESULTS:

Sources:	In 1000 Nrs.	
Total capital cost without IDC	1,656,961.0	84.17%
IDC	304,466.6	15.47%
Financing and other fees	7,249.2	0.37%
Total capital cost with IDC & financin fee	**1,968,676.8**	100.00%
Loan A	1,464,339.3	74.38%
Loan B	0.0	0.00%
Loan C	0.0	0.00%
Uses:		
Total debt	1,471,588.5	74.75%
Equity	497,088.3	25.25%
	1,968,676.8	100.00%

In 1000 Nrs.

Total Capital Outlay	100%	1,656,961.00
Debt	70%	1,159,872.70
Equity	30%	497,088.30

CONSTRUCTION DRAW FOR EQUITY FIRST CASE

In 1000 Nrs.

Year ending	0	1	2	3	4	5	6	7	8
Total projecr capital outlay		331,392.20	662,784.40	662,784.40	-	-	-	-	-
Beginning Balance of Equity Draw		497,088.30	165,696.10	-	-	-	-	-	-
Equity Draws		331,392.20	165,696.10	-	-	-	-	-	-
Ending Balance of Equity Draw	497,088.30	165,696.10	-	-	-	-	-	-	-
Beginning Balance of Construction Facility		1,159,872.70	1,159,872.70	662,784.40	-	-	-	-	-
Debt Draws		-	497,088.30	662,784.40	-	-	-	-	-
Ending Balance of Construction Facility	1,159,872.70	1,159,872.70	662,784.40	-	-	-	-	-	-
Beginning Cumulative Draw Balance	0	1656961.00	1325568.80	662784.40	0.00	0.00	-	-	-
Draw for the Period	0	331392.20	662784.40	662784.40	0.00	0.00	-	-	-
Ending Cumulative Draw Balance	1,656,961.00	1325568.80	662784.40	0.00	0.00	0.00	-	-	-

in 1000 NRs

Construction Period 4 years | Operating Period = 24 Years

Year Ending	TOTAL	Year 0 2008	Year 1 2009	Year 2 2010	Year 3 2011	Year 4 2012	Year 5 2013	Year 6 2014	Year 7 2015	Year 8 2016	Year 9 2017	Year 10 2018	Year 11 2019	Year 12 2020	Year 13 2021	Year 14 2022	Year 15 2023	Year 16 2024	Year 17 2025	Year 18 2026	Year 19 2027	Year 20 2028	Year 21 2029	Year 22 2030	Year 23 2031	Year 24 2032	Year 25 2033	Year 26 2034	Year 27 2035	Year 28 2036
Construction Draw : PRO RATA Case																														
Direct Capital Outlay (Escalated)	1,656,961.0		331,392.2	497,088.3	497,088.3	331,392.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity Outlay	497,088.3		99,417.7	149,126.5	149,126.5	99,417.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt Outlay	1,159,872.7		231,974.5	347,961.8	347,961.8	231,974.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan A																														
Interest rate			10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
Beginning Balance			0.0	256,911.8	667,216.8	1,114,927.6	1,471,588.5	1,404,812.6	1,331,025.2	1,249,490.2	1,159,394.0	1,059,837.6	949,827.9	828,267.2	693,942.5	545,513.8	381,500.1	200,264.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan Drawdown	1,159,872.7		231,974.5	347,961.8	347,961.8	231,974.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Construction (IDC)	304,466.6		24,357.3	60,893.3	97,429.3	121,786.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Fees	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commitment fee (% of undisbursed amount)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
Insurance (during construction)	7,249.2		579.9	1,449.8	2,319.7	2,899.7	0.0	0.0	0.0	0.0																				
Repayment of Principal	1,471,588.5		0.00	0.00	0.00	0.00	(66775.90)	(73787.37)	(81535.04)	(90096.22)	(99556.32)	(110009.73)	(121560.76)	(134324.64)	(148428.72)	(164013.74)	(181235.18)	(200264.88)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End Balance End			256,911.8	667,216.8	1,114,927.6	1,471,588.5	1,404,812.6	1,331,025.2	1,249,490.2	1,159,394.0	1,059,837.6	949,827.9	828,267.2	693,942.5	545,513.8	381,500.1	200,264.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Operation (IDO)	(1,183,923.8)		0.00	0.00	0.00	0.00	(154516.79)	(147505.32)	(139757.65)	(131196.47)	(121736.37)	(111282.95)	(99731.93)	(86968.05)	(72863.96)	(57278.95)	(40057.51)	(21027.81)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan B																														
Interest rate			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Beginning Balance			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan Drawdown	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Construction (IDC)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Fees	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commitment fee (% of undisbursed amount)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
Insurance (during construction)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
Repayment of Principal	0.0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End Balance End			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Operation (IDO)	0.0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan C																														
Interest rate			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Beginning Balance			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan Drawdown	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Construction (IDC)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Fees	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Commitment fee (% of undisbursed amount)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
Insurance (during construction)	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
Repayment of Principal	0.0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
End Balance			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Operation (IDO)	0.0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Debt Long Term																														
Total Long Term Debt Beginning Balance			0.0	256,911.8	667,216.8	1,114,927.6	1,471,588.5	1,404,812.6	1,331,025.2	1,249,490.2	1,159,394.0	1,059,837.6	949,827.9	828,267.2	693,942.5	545,513.8	381,500.1	200,264.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan Drawdown	1,159,872.7		231,974.5	347,961.8	347,961.8	231,974.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Construction (IDC)	304,466.6		24,357.3	60,893.3	97,429.3	121,786.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing and other fees	7,249.2		579.9	1,449.8	2,319.7	2,899.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Repayment of Principal	(1,471,588.5)		0.0	0.0	0.0	0.0	(66,775.9)	(73,787.4)	(81,535.0)	(90,096.2)	(99,556.3)	(110,009.7)	(121,560.8)	(134,324.6)	(148,428.7)	(164,013.7)	(181,235.2)	(200,264.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Debt End Balance			256,911.8	667,216.8	1,114,927.6	1,471,588.5	1,404,812.6	1,331,025.2	1,249,490.2	1,159,394.0	1,059,837.6	949,827.9	828,267.2	693,942.5	545,513.8	381,500.1	200,264.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest During Operation (IDO)	(1,183,923.8)		0.0	0.0	0.0	0.0	(154,516.8)	(147,505.3)	(139,757.6)	(131,196.5)	(121,736.4)	(111,283.0)	(99,731.9)	(86,968.1)	(72,864.0)	(57,278.9)	(40,057.5)	(21,027.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Long Term Debt Service	(2,655,512.3)		0.0	0.0	0.0	0.0	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt Short term (Working Capital)																														
Total Short Term Debt Beginning Balance			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loan drawdown	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest repayment			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Principal repayment			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Short Term Debt End Balance		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Debt Service			0.0	0.0	0.0	0.0	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	(221,292.7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 4.8: Financial Analysis (Base Case) - Depreciation Calculation

		Period	Salvage Value
Civil Construction	308,410.00	20	0
Tunnel Works	251,640.00	20	0
Electro-Mechanical	315,000.00	20	0
Hydro-mechanical	269,210.00	20	0
Transmission line/ substation	134,530.00	20	0
Construction Power	22,820.00	20	0
Access Road	45,370.00	20	0
Land Acquisition & Development	15,750.00	0	0
Infrastrecture & Development	19,450.00	20	0
Socio-Environment & Mitigation Costs	23,620.00	20	0
Engineering & Construction Mgmt	63,261.00	20	0
VAT and other taxes	153,440.00	20	0
Owners cost	34,460.00	20	0
IDC & financial fees & Cost	311,715.00	20	0
Total costs	**1,968,676.00**		

in 1000 NRs

Construction Period 4 years | Operating Period = 24 Years

Year Ending	TOTAL	Year 0 2008	Year 1 2009	Year 2 2010	Year 3 2011	Year 4 2012	Year 5 2013	Year 6 2014	Year 7 2015	Year 8 2016	Year 9 2017	Year 10 2018	Year 11 2019	Year 12 2020	Year 13 2021	Year 14 2022	Year 15 2023	Year 16 2024	Year 17 2025	Year 18 2026	Year 19 2027	Year 20 2028	Year 21 2029	Year 22 2030	Year 23 2031	Year 24 2032	Year 25 2033	Year 26 2034	Year 27 2035	Year 28 2036
Civil Construction	308,410.0	0.0	0.0	0.0	0.0	0.0	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	15,420.5	0.0	0.0	0.0	0.0
Tunnel Works	251,640.0	0.0	0.0	0.0	0.0	0.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	12,582.0	0.0	0.0	0.0	0.0
Electro-Mechanical	315,000.0	0.0	0.0	0.0	0.0	0.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	15,750.0	0.0	0.0	0.0	0.0
Hydro-mechanical	269,210.0	0.0	0.0	0.0	0.0	0.0	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	13,460.5	0.0	0.0	0.0	0.0
Transmission line/ substation	134,530.0	0.0	0.0	0.0	0.0	0.0	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	6,726.5	0.0	0.0	0.0	0.0
Construction Power	22,820.0	0.0	0.0	0.0	0.0	0.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	1,141.0	0.0	0.0	0.0	0.0
Access Road	45,370.0	0.0	0.0	0.0	0.0	0.0	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	2,268.5	0.0	0.0	0.0	0.0
Land Acquisition & Development	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Infrastrecture & Development	19,450.0	0.0	0.0	0.0	0.0	0.0	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	972.5	0.0	0.0	0.0	0.0
Socio-Environment & Mitigation Costs	23,620.0	0.0	0.0	0.0	0.0	0.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	1,181.0	0.0	0.0	0.0	0.0
Engineering & Construction Mgmt	63,261.0	0.0	0.0	0.0	0.0	0.0	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	3,163.1	0.0	0.0	0.0	0.0
VAT and other taxes	153,440.0	0.0	0.0	0.0	0.0	0.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	7,672.0	0.0	0.0	0.0	0.0
Owners cost	34,460.0	0.0	0.0	0.0	0.0	0.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	1,723.0	0.0	0.0	0.0	0.0
IDC & financial fees & Cost	311,715.0	0.0	0.0	0.0	0.0	0.0	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	15,585.8	0.0	0.0	0.0	0.0
Depreciation for the year	**1,952,926.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**97,646.3**	**0.0**	**0.0**	**0.0**	**0.0**
Cumulative depreciation		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**97646.3**	**195292.6**	**292938.9**	**390585.2**	**488231.5**	**585877.8**	**683524.1**	**781170.4**	**878816.7**	**976463.0**	**1074109.3**	**1171755.6**	**1269401.9**	**1367048.2**	**1464694.5**	**1562340.8**	**1659987.1**	**1757633.4**	**1855279.7**	**1952926.0**	**1952926.0**	**1952926.0**	**1952926.0**	**1952926.0**

Table 4.9: Financial Analysis (Base Case) - Income Statement

in 1000 NRs

Construction Period 4 years | Operating Period = 24 Years

Year		Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
Ending	TOTAL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		
Revenues																																		
Income from sale of power	13,867,956	0	0	0	0	0	344,000	364,640	386,518	409,710	434,292	460,350	487,971	517,249	548,284	581,181	616,052	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181
Total Revenues	13,867,956	0	0	0	0	0	344,000	364,640	386,518	409,710	434,292	460,350	487,971	517,249	548,284	581,181	616,052	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181	581,181
Expenses																																		
O & M Costs	646,215	0	0	0	0	0	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854	24,854
Capapacity royalty	125,000	0	0	0	0	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Energy royalty	788,798	0	0	0	0	0	6,880	7,293	7,730	8,194	8,686	9,207	9,759	10,345	10,966	11,624	12,321	11,624	11,624	11,624	11,624	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118	58,118
Insurance	91,152	0	0	0	0	0	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506	3,506
Total Expenses	1,651,165	0	0	0	0	0	36,240	36,653	37,091	37,554	38,046	38,567	39,120	39,705	40,326	40,984	41,681	40,984	40,984	40,984	40,984	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478	96,478
Operating Income (loss)	12,216,791	0	0	0	0	0	307,760	327,987	349,428	372,155	396,246	421,782	448,851	477,544	507,958	540,197	574,370	540,197	540,197	540,197	540,197	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
Depreciation	1,952,926	0	0	0	0	0	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	97,646	0	0	0	0	0	0	0	0
Operating profit (or loss) before interest & tax	10,263,865	0	0	0	0	0	210,113	230,341	251,781	274,509	298,600	324,136	351,205	379,897	410,311	442,551	476,724	442,551	442,551	442,551	442,551	387,056	387,056	387,056	387,056	387,056	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
Interest Expenses	(1,183,924)	0	0	0	0	0	(154,517)	(147,505)	(139,758)	(131,196)	(121,736)	(111,283)	(99,732)	(86,968)	(72,864)	(57,279)	(40,058)	(21,028)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating profit (or loss) before tax	9,079,942	0	0	0	0	0	55,597	82,835	112,024	143,312	176,863	212,853	251,473	292,929	337,448	385,272	436,667	421,523	442,551	442,551	442,551	387,056	387,056	387,056	387,056	387,056	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
Income Taxes	(1,952,187)	0	0	0	0	0	(11,953)	(17,810)	(24,085)	(30,812)	(38,026)	(45,763)	(54,067)	(62,980)	(72,551)	(82,833)	(93,883)	(90,627)	(95,148)	(95,148)	(95,148)	(83,217)	(83,217)	(83,217)	(83,217)	(83,217)	(104,211)	(104,211)	(104,211)	(104,211)	(104,211)	(104,211)	(104,211)	(104,211)
Net Income	7,127,754	0	0	0	0	0	43,643	65,026	87,939	112,500	138,838	167,090	197,406	229,949	264,896	302,438	342,783	330,895	347,402	347,402	347,402	303,839	303,839	303,839	303,839	303,839	380,491	380,491	380,491	380,491	380,491	380,491	380,491	380,491
Dividend		0	0	0	0	0	49,218	87,222	102,288	118,182	134,948	152,627	171,267	190,913	211,614	233,421	256,386	231,086	445,049	445,049	445,049	406,047	401,485	401,485	401,485	401,485	380,491	380,491	380,491	380,491	380,491	380,491	380,491	380,491
Retained Earnings for the year		0	0	0	0	0	(5,575)	(22,196)	(14,349)	(5,682)	3,890	14,462	26,139	39,037	53,282	69,017	86,398	99,810	(97,646)	(97,646)	(97,646)	(102,207)	(97,646)	(97,646)	(97,646)	(97,646)	0	0	0	0	0	0	0	0
Cumulative retained earlings		0	0	0	0	0.0	(5,575.1)	(27,771.5)	(42,120.5)	(47,802.6)	(43,912.5)	(29,450.2)	(3,310.9)	35,725.7	89,007.9	158,025.2	244,422.8	344,232.6	246,586.3	148,940.0	51,293.7	(50,913.8)	(148,560.1)	(246,206.4)	(343,852.7)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)	(441,499.0)

Table 4.10: Financial Analysis (Base Case) - Cash Flow Statement

in 1000 NRs

			Construction Period= 4 Years											Operating Period 25 Years																				
	Year Ending	TOTAL	**Year 0 2008**	Year 1 2009	Year 2 2010	Year 3 2011	Year 4 2012	Year 5 2013	Year 6 2014	Year 7 2015	Year 8 2016	Year 9 2017	Year 10 2018	Year 11 2019	Year 12 2020	Year 13 2021	Year 14 2022	Year 15 2023	Year 16 2024	Year 17 2025	Year 18 2026	Year 19 2027	Year 20 2028	Year 21 2029	Year 22 2030	Year 23 2031	Year 24 2032	Year 25 2033	Year 26 2034	Year 27 2035	Year 28 2036
1	**Operating Income**	12,216,791	0	0	0	0	0	307,760	327,987	349,428	372,155	396,246	421,782	448,851	477,544	507,958	540,197	574,370	540,197	540,197	540,197	540,197	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
2	Change in working capital	(39,839)	0	0	0	0	0	(25,295)	(1,663)	(1,762)	(1,868)	(1,980)	(2,099)	(2,225)	(2,358)	(2,500)	(2,650)	(2,809)	2,809	0	0	0	4,561	0	0	0	0	0	0	0	0	0	0	0
4	Cash cash flow before interest & tax	12,176,953	0	0	0	0	0	282,464	326,324	347,666	370,287	394,266	419,683	446,626	475,185	505,458	537,547	571,562	543,006	540,197	540,197	540,197	489,264	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
7	Income Taxes	(1,952,187)	0	0	0	0	0	(11,953)	(17,810)	(24,085)	(30,812)	(38,026)	(45,763)	(54,067)	(62,980)	(72,551)	(82,833)	(93,883)	(90,627)	(95,148)	(95,148)	(95,148)	(83,217)	(83,217)	(83,217)	(83,217)	(83,217)	(83,217)	(104,211)	(104,211)	(104,211)	(104,211)	(104,211)
8	Direct Capital Outlay	(1,656,961)	0	(331,392)	(497,088)	(497,088)	(331,392)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Working capital loan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Net cash flow before debt service	8,567,804	0	(331,392)	(497,088)	(497,088)	(331,392)	270,511	308,515	323,580	339,475	356,240	373,920	392,559	412,205	432,907	454,714	477,678	452,378	445,049	445,049	445,049	406,047	401,485	401,485	401,485	401,485	380,491	380,491	380,491	380,491	380,491	380,491
11	Repayment of Principal	(1,471,588)	0	0	0	0	0	(66,776)	(73,787)	(81,535)	(90,096)	(99,556)	(110,010)	(121,561)	(134,325)	(148,429)	(164,014)	(181,235)	(200,265)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Interest expenses on long term loan/ other fees	(1,183,924)	0	0	0	0	0	(154,517)	(147,505)	(139,758)	(131,196)	(121,736)	(111,283)	(99,732)	(86,968)	(72,864)	(57,279)	(40,058)	(21,028)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Interest expense on working capital loan		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	**Cash Available after Debt Service**	5,912,292	0	(331,392)	(497,088)	(497,088)	(331,392)	49,218	87,222	102,288	118,182	134,948	152,627	171,267	190,913	211,614	233,421	256,386	231,086	445,049	445,049	445,049	406,047	401,485	401,485	401,485	401,485	380,491	380,491	380,491	380,491	380,491	380,491
15	**Free Cash flow before debt service, maint res & tax**	10,519,992	0	(331,392)	(497,088)	(497,088)	(331,392)	282,464	326,324	347,666	370,287	394,266	419,683	446,626	475,185	505,458	537,547	571,562	543,006	540,197	540,197	540,197	489,264	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
16	Maintenance reserve account beg balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Deposits		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Withdrawals		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Maintenance reserve account end balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	**Free Cash flow before debt service & tax**	10,519,992		(331,392)	(497,088)	(497,088)	(331,392)	282,464	326,324	347,666	370,287	394,266	419,683	446,626	475,185	505,458	537,547	571,562	543,006	540,197	540,197	540,197	489,264	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702	484,702
21	Pre-tax project nominal Internal Rate of Return	**18.3%**																															
22	Pre-tax Net Present Value (NPV)	1,240,210																															
23	**Net cash flow before debt service**	8,567,804	0	(331,392)	(497,088)	(497,088)	(331,392)	270,511	308,515	323,580	339,475	356,240	373,920	392,559	412,205	432,907	454,714	477,678	452,378	445,049	445,049	445,049	406,047	401,485	401,485	401,485	401,485	380,491	380,491	380,491	380,491	380,491	380,491
24	Post-tax nominal project Internal Rate of Return	**16.7%**																															
25	Post-tax Net Present Value (NPV)	913,414																															
26	**Cash Flow To Equity**	7,072,165	0	(99,418)	(149,126)	(149,126)	(99,418)	49,218	87,222	102,288	118,182	134,948	152,627	171,267	190,913	211,614	233,421	256,386	231,086	445,049	445,049	445,049	406,047	401,485	401,485	401,485	401,485	380,491	380,491	380,491	380,491	380,491	380,491
27	Post-tax nominal equity Internal Rate of Return	**21.7%**																															
32	**Total debt service**	(2,655,512)	0	0	0	0	0	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	(221,293)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Debt Service Coverage Ratios (DSCR)																																
	Coverage after Tax	**Minimum**	**Average**																														
43	of Debt Service	**1.2**	**1.7**	0.0	0.0	0.0	0.0	1.2	1.4	1.5	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.0	na	na	na	na	na	na	na	na	na	na	na	na			
	Pay back Period																																
35	**Cashflow**	8,567,804.4	0.0	(331,392.2)	(497,088.3)	(497,088.3)	(331,392.2)	270,511.1	308,514.8	323,580.4	339,474.9	356,240.3	373,920.0	392,559.5	412,205.5	432,906.8	454,713.7	477,678.2	452,378.3	445,048.5	445,048.5	445,048.5	406,046.5	401,485.4	401,485.4	401,485.4	401,485.4	380,491.4	380,491.4	380,491.4	380,491.4		
36	Cumulative cash flow		0.0	(331,392.2)	(828,480.5)	(1,325,568.8)	(1,656,961.0)	(1,386,449.9)	(1,077,935.0)	(754,354.6)	(414,879.7)	(58,639.4)	315,280.6	707,840.1	1,120,045.5	1,552,952.3	2,007,666.0	2,485,344.3	2,937,722.5	3,382,771.0	3,827,819.5	4,272,868.0	4,678,914.6	5,080,399.9	5,481,885.3	5,883,370.6	6,284,856.0	6,665,347.4	7,045,838.8	7,426,330.2	7,806,821.6		
37	**Simple payback time**	**5.16**		0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Table 4.11: Financial Analysis (Base Case) - Balance Sheet

in 1000 NRs

		Construction Period= 4 Years																															
		Operating Period = 24 Years																															
Year Ending	TOTAL	Year 0 2008	Year 1 2009	Year 2 2010	Year 3 2011	Year 4 2012	Year 5 2013	Year 6 2014	Year 7 2015	Year 8 2016	Year 9 2017	Year 10 2018	Year 11 2019	Year 12 2020	Year 13 2021	Year 14 2022	Year 15 2023	Year 16 2024	Year 17 2025	Year 18 2026	Year 19 2027	Year 20 2028	Year 21 2029	Year 22 2030	Year 23 2031	Year 24 2032	Year 25 2033	Year 26 2034	Year 27 2035	Year 28 2036	Year 29 2037	Year 30 2038
ASSETS																																	
Current assets																																	
Cash and bank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Accounts receivable	1,139,832	0	0	0	0	0	28,274	29,970	31,769	33,675	35,695	37,837	40,107	42,514	45,064	47,768	50,634	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768
Total current assets	1,139,832	0	0	0	0	0	28,274	29,970	31,769	33,675	35,695	37,837	40,107	42,514	45,064	47,768	50,634	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768	47,768
Fixed assets																																	
Total plant value	47,223,389	0	331,392	828,481	1,325,569	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961	1,656,961
Interest and financing expenses	8,715,573	0	24,937	87,280	187,029	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716	311,716
Cumulative Depreciation		0	0	0	0	0	(97,646)	(195,293)	(292,939)	(390,585)	(488,232)	(585,878)	(683,524)	(781,170)	(878,817)	(976,463)	(1,074,109)	(1,171,756)	(1,269,402)	(1,367,048)	(1,464,695)	(1,562,341)	(1,659,987)	(1,757,633)	(1,855,280)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)	(1,952,926)
Total fixed assets		0	356,329	915,761	1,512,598	1,968,677	1,871,030	1,773,384	1,675,738	1,578,092	1,480,445	1,382,799	1,285,153	1,187,506	1,089,860	992,214	894,567	796,921	699,275	601,629	503,982	406,336	308,690	211,043	113,397	15,751	15,751	15,751	15,751	15,751	15,751	15,751	15,751	15,751
Total assets	24,855,515	0	356,329	915,761	1,512,598	1,968,677	1,899,304	1,803,355	1,707,507	1,611,766	1,516,141	1,420,636	1,325,260	1,230,020	1,134,925	1,039,982	945,202	844,689	747,043	649,397	551,751	454,104	356,458	258,812	161,165	63,519	63,519	63,519	63,519	63,519	63,519	63,519	63,519
LIABILITIES AND SHAREHOLDERS EQUITY																																	
Current liabilities																																	
Accounts payable	135,712	0	0	0	0	0	2,979	3,013	3,049	3,087	3,127	3,170	3,215	3,263	3,314	3,369	3,426	3,369	3,369	3,369	3,369	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930
Corporate tax payable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total current liabilities		0	0	0	0	0	2,979	3,013	3,049	3,087	3,127	3,170	3,215	3,263	3,314	3,369	3,426	3,369	3,369	3,369	3,369	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930
External debt	13,314,521	0	256,912	667,217	1,114,928	1,471,588	1,404,813	1,331,025	1,249,490	1,159,394	1,059,838	949,828	828,267	693,943	545,514	381,500	200,265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Liabilities		0	256,912	667,217	1,114,928	1,471,588	1,407,791	1,334,038	1,252,539	1,162,481	1,062,965	952,998	831,482	697,206	548,828	384,869	203,691	3,369	3,369	3,369	3,369	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930	7,930
Shareholder's equity																																	
Equity investment		0	99,418	248,544	397,671	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088	497,088
Retained earnings		0	0	0	0	0	(5,575)	(27,772)	(42,121)	(47,803)	(43,912)	(29,450)	(3,311)	35,726	89,008	158,025	244,423	344,233	246,586	148,940	51,294	(50,914)	(148,560)	(246,206)	(343,853)	(441,499)	(441,499)	(441,499)	(441,499)	(441,499)	(441,499)	(441,499)	(441,499)	(441,499)
Total shareholders' equity		0	99,418	248,544	397,671	497,088	491,513	469,317	454,968	449,286	453,176	467,638	493,777	532,814	586,096	655,113	741,511	841,321	743,675	646,028	548,382	446,175	348,528	250,882	153,236	55,589	55,589	55,589	55,589	55,589	55,589	55,589	55,589
Total liabilities & shareholders' equity	24,855,515	0	356,329	915,761	1,512,598	1,968,677	1,899,304	1,803,355	1,707,507	1,611,766	1,516,141	1,420,636	1,325,260	1,230,020	1,134,925	1,039,982	945,202	844,689	747,043	649,397	551,751	454,104	356,458	258,812	161,165	63,519	63,519	63,519	63,519	63,519	63,519	63,519	63,519
Return on Assets (ROA)			0.0%	0.0%	0.0%	0.0%	1.1%	3.0%	4.5%	6.2%	8.3%	10.8%	13.8%	17.4%	21.8%	27.3%	34.1%	39.9%	45.4%	53.5%	63.0%	71.7%	85.2%	117.4%	188.5%	478.3%	538.7%	599.0%	599.0%	599.0%	599.0%	599.0%	599.0%
Control line	(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

4.6 Sensitivity Analysis

Sensitivity analysis has been carried out for the project's cost component. Results of the financial indicators of the project are outlined in are given below. Looking at financial indicators it can be seen that the B/C ratio, NPV and post tax IRR goes down when the project cost increases and vice versa if the cost decreases.

Sensitivity tests were performed, keeping all other financial parameters constraint, on the base case financial analysis: 1) by decreasing the Project investment cost by 10 percent and 2) by increasing the investment cost by 10 percent 3) by increasing the investment cost by 20 percent. The financial analyses for these sensitivity tests are given in Tables 4.12, 4.13 and 4.14 respectively. The results of the financial analyses are summarized below:

4.6.1 10% Decrease in Project Cost

4.12: Summary of Key Indicators (Output) on 10% Decrease at cost

Key Indicators	NRs. '000	US$ '000
Costruction Cost (NRs)	1,491,244.45	19,883.26
Interest during construction (NRs)	274,016.00	3,653.55
Financing and other fees (NRs)	6,524.00	86.99
Total cost with IDC and financing fees (NRs)	1,771,784.45	23,623.79
Cost/kW without IDC and Financig Cost	149,124	1988
Cost/kW with IDC and Financig Cost	177,178	2362
Project IRR	18.1%	
Equity IRR	24.6%	
Benefit to Cost Ratio	2.21	
Debt Service Coverage Ratio:		
Minimum	1.3	
Average	1.9	
Net Present Value (NPV)	1,033,865	13,785
Simple Payback Period Year(s)	4.7	
Average Rate of Return	19.9%	

The analysis showed that the total construction cost is NRs. 1,491,244,450 and Total Project cost with IDC & Financial fee is NRs.IRR 1,771,784,450., where cost per kW in NRs. 177,178. IRR is 18.1 %, Net Present Value is NRs. 1,033,865,000.00, Average rate of return is 19.9% Benefit cost ratio is 2.21, debt service ratio is minimum 1.3 & Average 1.9 and for a simple payback period of 4.7 years, for a debt-equity ratio of 70:30 at 10% decrease on base investment cost. At 10 percent decrease in cost, the project is seems sound and economical but it is heard there cannot expect to decrease in market price of Nepal in this situations.

4.6.2 10% Increase in Project Cost

The results of the financial analysis with 10 percent increase in investment cost are summarized in the following table:

4.13: Summary of Key Indicators (Output) on 10% Increase at cost

Key Indicators		NRs. '000	US$ '000
Costruction Cost (NRs)		1,822,667.55	24,302.23
Interest during construction (NRs)		334,915.00	4,465.53
Financing and other fees (NRs)		7,974.00	106.32
Total cost with IDC and financing fees (NRs)		2,165,556.55	28,874.09
Cost/kW without IDC and Financig Cost		182,267	2430
Cost/kW with IDC and Financig Cost		216,556	2887
Project IRR		15.6%	
Equity IRR		19.3%	
Benefit to Cost Ratio		1.78	
Debt Service Coverage Ratio:			
	Minimum	1.1	
	Average	1.6	
Net Present Value (NPV)		792,970	10,573
Simple Payback Period	Year(s)	5.6	
Average Rate of Return		17.0%	

The analysis showed that the total construction cost is NRs. 1,822,667,550 and Total Project cost with IDC & Financial fee is NRs.IRR 2,165,556,550., where cost per kW in NRs. 182,282. IRR is 15.6 %, Net Present Value is NRs.

792,970,000.00, Average rate of return is 17.0% Benefit cost ratio is 1.78, debt service ratio is minimum 1.1 & Average 1.6 and for a simple payback period of 5.6 years, for a debt-equity ratio of 70:30 at 10% increase on base investment cost.

The Project's economic internal rate of return under this sensitivity test is still well above the opportunity cost of capital of 10.5 percent and therefore the Net Present Value is positive and Benefit Cost Ratio more than one as well. Therefore the project is still economically viable even with 10 percent increase in investment cost.

4.6.3 20% Increase in Project Cost

Among these three sensitivity tests performed, the sensitivity test with investment cost increased by 20 percent is more critical. The results of the financial analysis are summarized in the following table:

4.14: Summary of Key Indicators (Output) on 20% Increase at cost

Key Indicators		NRs. '000	US$ '000
Costruction Cost (NRs)		1,988,384.55	26,511.79
Interest during construction (NRs)		365,365.00	4,871.53
Financing and other fees (NRs)		8,699.00	115.99
Total cost with IDC and financing fees (NRs)		2,362,448.55	31,499.31
Cost/kW without IDC and Financig Cost		198,838	2651
Cost/kW with IDC and Financig Cost		236,245	3149
Project IRR		14.5%	
Equity IRR		17.2%	
Benefit to Cost Ratio		1.62	
Debt Service Coverage Ratio:			
	Minimum	1.0	
	Average	1.5	
Net Present Value (NPV)		672,452	8,966
Simple Payback Period	Year(s)	6.0	
Average Rate of Return		15.8%	

The analysis showed that the total construction cost is NRs. 1,988,384,550 and Total Project cost with IDC & Financial fee is NRs.IRR 2,362,448,550., where cost per kW in NRs. 236,245. IRR is 14.5 %, Net Present Value is NRs. 672,452,000.00, Average rate of return is 15.80% Benefit cost ratio is 1.62, debt service ratio is minimum 1.0 & Average 1.5 and for a simple payback period of 6.0 years, for a debt-equity ratio of 70:30 at 20% increase on base investment cost.

Although the Project's economic internal rate of return under this sensitivity test is still well above the opportunity cost of capital of 10.5 percent and the Net Present Value is positive and Benefit Cost Ratio more than one as well but the debt coverage ratio is 1.0, therefore the project is not attractive at cost increased by 20 percent. The consortium bank cannot assure for repayment of loan.

4.7 Acceptance of Project

Acceptance creation generally employed with the internal rate of return with a required rate of return method is to compare the internal rate of return with a required rate of return, known also as the cut-off, or hurdle, rate. If the internal rate of return exceeds the required rate the project is accepted; if not, it is rejected.

From the financial analysis and sensitivity tests performed, as the sensitivity test with investment cost increased by 20 percent is more critical, the IRR on equity investment is higher than the required rate of return, the Net Present Value is positive and Benefit Cost Ratio is more than one. These indicator values seems favorable, we can conclude that the Upper Chardi Hydroelectric Project is financially an attractive project.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY

The electricity demand is expected to increase rapidly. Nepal Electricity Authority forecasts that the present day increase of electricity demand amounts to approximately 10 percent per annum giving deficits of approximately 60MW yearly. Apart from domestic requirements, the fast developing India could be an important hydropower energy market for Nepal in near future. It is estimated that by 2013 almost 220,000MW installed capacity of electrical energy is required to cope with India's rapidly growing economy. Until 2003, India's installed capacity of electrical energy was approximately 148,000MW and hydropower contributes only about 30,000MW.

Besides, India is one of the major countries in the world that contributes to global emissions of carbon dioxide. Nepal's hydropower potential could be an alternative and environmentally friendly energy source that could help fulfil part of the India's energy demand and reduce carbon emission.

Foreseeing the immense demand for electricity from the increasing population and growing economy, entering the regional power business in South Asia lies in the ability to produce mega power in a cost-effective way. In this vast arena, NEA plays a key role in Nepal’s power sector and finds a niche that promises substantial business in the future. The immense proportions of “clean” hydro in Nepal’s territory and its established links with India form the cutting edge of NEA’s business. Meanwhile, NEA finds that electricity rates in south Asia have to be revised not to make public undertakings face squarely the challenge of paying IPPs their asking price for power while simultaneously providing low rates for electricity to their customers. When contemplating regional trade in electricity, the power generated should, therefore, be available at prices competitive for export to neighbouring countries and the affordability to their consumers. To

achieve this goal, the government, NEA and the IPP would have to work together on risk management in its diverse forms – project, country, political and regulatory. Also to be studied and minimised are risks factors such as market risk, currency depreciation, foreign exchange risk and production risk. Lower the risk, lower the return required by the investors and thus resulting in an affordable electricity tariff. This may the final factor in determining a sustainable solution to regional power in South Asia.

Nevertheless, there are three existing major challenges for the successful development of Nepal's hydropower. **The first** is related to the political environment and willingness to act. The parliamentary forces must sit together and develop a common roadmap that gives laws and principles regulating and guiding the development water resources.

The second is to protect environment and make hydropower sustainable and neighbour in the community. We must not forget that all development activities have certain negative environmental impact. However, the impact must be minimized and natural beauties protected.

The third is the technical challenge important for cost effective and optimum utilization of hydropower. There are mainly two sub-areas where there is uncertainty and risk of cost-effective investment in hydropower.

Hence, even if the contractual, political and environmental risks are handled in an acceptable manner, proper handling of tunnelling and sediment related risks are the major ones for the successful cost-effective hydropower development. For this, we must increase our local knowledge and expertise.

To analyze the Nepali hydropower projects the researcher taken a 10MW Upper Chardi Hydroelectric Project as reference. How a hydroelectric project will be cost effective and what is the financial indicator are

discussed here. Capital budgeting theory is used for analysis the financial part of the project.

Capital budgeting methods, including the average –rate of return and pay back methods, where examined under the assumption that the acceptance of any investment proposal does not change the business-risk complexion of the firm as perceived by supplier of capital. The two discounted cash flow methods – internal rate of return and net present value – are the only appropriate means by which to judge the economic contribution of an investment proposal. The important distinction between the internal rate of return and the present value method involved the implied compounding rate, the scale of investment, and the possibility of multiple internal rates of return. Depending on the situation, contrary answers can be given with respect to the acceptance of mutually exclusive investment proposals. Estimation of cash flow play vital role for analysing capital budgeting. Cash flow includes cash-outflow and cash inflow.

In estimating cash flows, it is important that the individual company take anticipated inflation in to account. Often there is tendency to assume that price levels will remain unchanged throughout life of the project. Frequently this assumption is imposed unknowingly; future cash flows are simply estimated on the basis of existing prices. A bias arises in the selection process, however, in that the required rate of return for the project is usually based on current capital costs, which in turn embody a premium for anticipated inflation. This is known as the normal required return, as distinguished from the real required return, which abstracts from inflation.

In general, an inflationary economy distorts capital budgeting decisions. For one thing, depreciation charges are based on original costs. As income grows with inflation, an increasing portion is taxed, with the result that real cash flows do not keep up with inflation. The presence of inflation therefore results in lower real rates of return and less Incentive for

companies to undertake capital investments. The cash flow situation is improved with accelerated depreciation, but the same unfavourable comparisons had. There simply is a disincentive for companies to undertake capital expenditures so they typically invest less, seek investment with faster payback (shorter economic Lives), and becomes less capital incentive during periods of inflation.

In view of fluctuation of market rates, the researcher analyzed here by increasing and decreasing on cost. Some of the important indicators on project and the results of the financial analysis of the project are summarized below:

Table 5.1: Summary of Financial Analysis on different cost

Summary of Key Indicators (Output)	10% Decrease on Cost	Base Cost	10% Increase on Cost	20% Increase on Cost
	NRs. '000	NRs. '000	NRs. '000	NRs. '000
Costruction Cost (NRs)	1,491,244.45	1,656,961.00	1,822,667.55	1,988,384.55
Interest during construction (NRs)	274,016.00	304,466.00	334,915.00	365,365.00
Financing and other fees (NRs)	6,524.00	7,249.00	7,974.00	8,699.00
Total cost with IDC and financing fees (NRs)	1,771,784.45	1,968,676.00	2,165,556.55	2,362,448.55
Cost/kW without IDC and Financig Cost	149,124	165,696	182,267	198,838
Cost/kW with IDC and Financig Cost	177,178	196,868	216,556	236,245
Project IRR	18.1%	16.7%	15.6%	14.5%
Equity IRR	24.6%	21.7%	19.3%	17.2%
Benefit to Cost Ratio	2.21	1.97	1.78	1.62
Debt Service Coverage Ratio:				
Minimum	1.3	1.2	1.1	1.0
Average	1.9	1.7	1.6	1.5
Net Present Value (NPV)	1,033,865	913,414	792,970	672,452
Simple Payback Period Year(s)	4.7	5.2	5.6	6.0
Average Rate of Return	19.9%	18.3%	17.0%	15.8%

The various parameters discussed above for the case with royalty rates as per the existing Electricity Act 2049 and in Table 4.3 and royalty rates as in the Hydropower Development Policy 2001. The financial analysis shown in the table, which indicates that the total construction cost is NRs.

1,491,244,450 and Total Project cost with IDC & Financial fee is NRs.IRR 1,771,784,450., where cost per kW in NRs. 177,178. IRR is 18.1 %, Net Present Value is NRs. 1,033,865,000.00, Average rate of return is 19.9% Benefit cost ratio is 2.21, debt service ratio is minimum 1.3 & Average 1.9 and for a simple payback period of 4.7 years at 10% decrease on cost. At the base cost the analysis showed that the total construction cost is NRs. 1,656,961,000 and Total Project cost with IDC & Financial fee is NRs. 1,968,676,000., where cost per kW in NRs. 196,868. IRR is 16.7 %, Net Present Value is NRs. 913,414,000.00, Average rate of return is 18.3% Benefit cost ratio is 1.97, debt service ratio is minimum 1.2 & Average 1.7 and for a simple payback period of 5.2 years. The analysis showed at 10% increase on base cost that the total construction cost is NRs. 1,822,667,550 and Total Project cost with IDC & Financial fee is NRs.IRR 2,165,556,550., where cost per kW in NRs. 182,282. IRR is 15.6 %, Net Present Value is NRs. 792,970,000.00, Average rate of return is 17.0% Benefit cost ratio is 1.78, debt service ratio is minimum 1.1 & Average 1.6 and for a simple payback period of 5.6 years. The analysis on 20% increase on base cost is the total construction cost is NRs. 1,988,384,550 and Total Project cost with IDC & Financial fee is NRs.IRR 2,362,448,550., where cost per kW in NRs. 236,245. IRR is 14.5 %, Net Present Value is NRs. 672,452,000.00, Average rate of return is 15.80% Benefit cost ratio is 1.62, debt service ratio is minimum 1.0 & Average 1.5 and for a simple payback period of 6.0 years.

By keeping all the parameters constraint, here performed a sensitivity analysis with increasing and decreasing project construction cost at the debt-equity ratio of 70:30. From the test we found the IRR is more than required rate of return. And the Net Present Value positive and the Benefit Cost Ratio more than one, the Upper Chardi Hydroelectric Project is therefore financially viable.

5.2 Conclusions

There is obviously an urgent need to review the whole process under which our hydro-electric projects are being constructed. Considering the low level of income of the average Nepali people, the cost of electricity in the country - said to be one of the richest in hydro-power potentials in the world - is easily the most expensive in the world.

There is, therefore, a need on the part of the government to rethink the manner in which contracts are awarded and strings-attached aid and loans are received. Clearly, in both the Kaligandaki and the Middle Marsyangdi, the contractors underbid in order to get the contracts and then escalated the costs one way or the other to make hefty profits. In such cases, the multilateral financing agencies or bilateral donors cannot be absolved of their faults. The net result is that the Nepalese people have to pay for the mistake of their own government and the avarice of the donor and lending agencies.

Since the prime duty of the government is the welfare of the Nepalese people, it must in future ensure that it does not fall prey to donors whose main purpose, under the guise of aid to underdeveloped countries, is to enrich their own kind. With the growing energy crisis, at least the hydropower sector should be buoyant. But that is not happening and the country is facing a severe power crunch with the load shedding period extended to fifteen hours each day and this period is expected to further increase during the coming years. Very little additional investment is flowing into this sector though there are many licenses issued for mini, micro and small hydroelectricity projects. Also the foreign investors who had come to Nepal during the last decade have not increased their investment. It is not that the power companies are not earning profit. Even the state-owned Nepal Electricity Authority (NEA) is making a cash profit though its accounting profit may be negative. But the companies are distributing this profit as hefty dividend instead of reinvesting it. The crux

of the matter is the provision to unbundle the NEA into separate entities for power generation, transmission, distribution and engineering services.

Nepali investors have received license for developing various small hydropower projects, but most are not developing them. While the general perception is that they are not developing these projects because they are not getting the capital, in reality they are just sitting on the licenses and waiting for some financier/developer to come to them prepared to pay a premium for the license. Not surprisingly, most of these license holders are politicians.

The IPPs say the unbundling is a must in order to create a market mechanism to govern the electricity sector. Vesting so much regulatory powers with the same agency that is also controlling generation and distribution of power is simply illogical, they say. But the idea of market mechanism in electricity is not well-marketed in Nepal and is probably the reason why the idea of unbundling is getting tough opposition. Though exactly what the proposed laws contain as the new provisions is still a secret, the IPPs say even the previous law wasn't that bad. That is why some foreign investors had come and invested in Nepal's hydropower sector. But the implementation of the law was not according to the spirit. It was spoiled by the bureaucracy, they claim.
To reach the ultimate goal of multiple buyers and sellers of electricity, certain things have to be done first. The major one is commercialisation of NEA's different entities. The second is to take out the transmission line of electricity from NEA's control and ensure that everyone has open and non-discriminatory access to it. But for this the NEA Act too has to be amended. However, that is being delayed.

Nepal's current situation has increased the risks level for foreign investors. Still when compared to the opportunities, these risks are less, say the IPPs. When foreign investors come to a country they look at a number of things. **First:** the availability of raw material, in this case water, which is

available in plenty due to the perennial rivers. And the topography offers opportunity to develop power projects in so many locations.

Second is the labour law. And the new labour law that is about to be promulgated soon is said to be much conducive for investment than the existing one.

Third is the market. Though the market for power within Nepal is considered small, the fast growing Indian economy offers the market opportunity. But there is a caveat. To tap the Indian market, there has to be robust power transmission line between the two countries and a power trading agreement has to be concluded.

Nepali banks are not allowed project financing under the existing guidelines of the central bank. Even collateral financing is a problem, they say, as the hydroelectricity is still not accorded the priority sector status. Though the list of the priority sector includes energy, it covers all the energy related industries including the production of bulbs and switches. Thus the list is not specific to hydroelectricity. And the other problem is with the single borrower limit. Even five or six banks forming a consortium cannot finance more than about Rs. 100 million for a project, which is peanut for even a medium sized hydropower project. Therefore, some IPPs are now planning to issue debentures targeting the remittances. However, as the sustainability of remittances is suspect, it may not be enough to develop power projects to meet the annual growth projection of the electricity demand.

That levels the international market as the only option to raise the finance. But due to the country risk perception about Nepal in the international market and the lack of independent country rating about Nepal, there needs to be either government guarantee or guarantee from the buyer to attract the investor. There is a single buyer right now (NEA) but no international lender would be ready to provide the finance against the guarantee of NEA when it looks at NEA's balance sheet.

These are solid points in favour of Nepal, he concludes. Nepal can market itself among the potential foreign investors by making use of these facts.
The market issue is one of the major points of debate in Nepal's hydroelectricity sector. While some people view that as power is a raw material and no country can hope to develop itself by exporting raw material only and thus the idea of exporting power is not in the long-run interest of the country, the others give example of Bhutan which has recorded a tremendous increase in its per capita income by exporting power.

Still more important is the logic that the power price will be lower if the project is developed with a view to export to India. The reason is the load factor. The peaking power demand in India is during the summer when the Nepali rivers have more water flow and power demand in Nepal is low. If the project is developed for the local market only, it has to be designed at lower capacity keeping in mind the lower flow of water in those rivers during the winter when the local market has peaking energy demand. Thus the turnover of the project will be higher if the target market is India. That reduces the average unit cost of electricity. Therefore, if this strategy is adopted the techno-economically feasible power generation capacity will be much higher than 44,000 MW that is presently estimated.

The wheeling problem is present not just for export. So far, each new power project has its own transmission line to connect it to the national power grid. As the transmission line cost adds to the total project cost, the cost of the power produced tends to be higher than what it should be. Moreover, the present 132 KV lines are not sufficient for the system and thus they are causing a lot of technical leakage of the power transmitted. The suggestion of the private sector is to have 250 KV lines connecting the potential power project sites or river basins up to the Indian border close to the Indian power centers. If this happens and the national transmission grid is made easily accessible to all as provided for in the proposed ordinances, potential projects would be picked up by interested

developers much faster. But the NEA is still stretching 132 KV lines. This is sheer waste of resources, say the IPPs.

5.3 Recommendation

The recommendations drawn on the basis of the financial analysis done are as following:

1. **Financial Analysis:** The results of the financial analysis, determined from the perspective of NEA / HMG indicate that over the 25 year period considered for the analysis, the net revenue is positive, thus indicating that the revenue expectations appear to be sufficient to cover the operating cost of the project.

2. **Rate of Electricity:** The project is financial attractive for tariff rate of electricity generated from the project has been fixed by NEA. The IPP are requesting NEA to amend / increase the rate and current Energy Minister of Government of Nepal also planning to increase the rate of electricity, the project would more attractive.

3. **Transmission line:** A detailed study should be carried out on the inter-connection of transmission lines with various options. Among all the available options, it was found that the 132 kV based power evacuation option more realistic than others. However, UCHEP alone make investment in the 132 KV transmission line but this would not justify, therefore cost sharing with other projects for construction of transmission line is considered. The power generated from the project shall be evacuated through a 38.0 km long 132 kV transmission line (proposed to be constructed by the project) to connect to the substation at Nepaltar. This connection is expected to improve supply of power in that region INPS. The study of EIA of transmission line should be immediately started as the process can take at least 1.5 years or mote to complete, which might delay the start date of construction of transmission line.

4. **Project cost:** The estimated project is cost of 1,968,676,000 Nepalese Rupees; where cost per kW in NRs. 196,868 after financing. The project is expected to be completed within 4 years

after construction begins. The project is technically viable and financially feasible; it is recommended there are other many more factors which my increase the total cost therefore the developer should be sensitive at the time of the implementation of the project.

5. **Access Road**: However, UCHEP alone make investment in the access road but this would not justify, therefore cost sharing with other projects at that region and local people will be participate for construction of access road.

6. **Acceptance of the Project:** The results of the financial analysis indicate that over the life of project, the net revenue is positive, thus indicating that the revenue expectations are sufficient to cover the operating cost of the project. Although all the financial indicators are positive, but there is an increasing trend of market rate for construction material and land also the interest rate imposed by bank is increasing. It is recommended that if cost of capital is remain at 10.5% and the market rate of construction material increase not more than 10% and tariff rate remain same them invest the project. If market rate of construction increase more than 10% and other parameters remains same, it is better to abandon the project.

Appendix A

Salient Features

Project Name	**Upper Chardi Hydroelectric Project**
Latitude	28°17'32" N to 29°19'59" N
Longitude	84°12'30" E to 84° 13' 11" E
District	Kaski
Drainage Area	
Total Area upstream of intake	370 km^2
Effective area below 3000 m	85 km^2
Highest point of the catchment	3835 m
Long-term annual average flow	24.80 m^3/s
Chardi Khola	
35% Exceedence flow	14.62 m^3/s
90% Exceedence	4.74 m^3/s
Design flow of Intake	14.62 m^3/s
Design Floods	
1:100 years flood	921.0 m^3/s
1:500 years flood	1454.0 m^3/s
Diversion during construction	
Type of structure	Diversion Channel
Design flow (1:20 Years Flood)	680.0 m^3/sec
Weir in Chardi Khola	
Type of structure	Free over flow type (Boulder riprap weir)
Deck level	1065.88 masl
Gravel Trap Spillway crest elevation for 20 Year Flood	1020.77 masl
Crest Length	38.0 m
Capacity (1 in 100 Yr Flood)	921.0 m^3/s
Intake	
Two Orifice Openings	3.3 m x 20.75 m for one opening
Bed Level of Orifice	1020.74 masl
Undersluice	
Opening Size	2 x 4.5m x 4.0m
Invert Level of Undersluice	1020.11 masl
Gravel Trap	
Width x Length x Height	8.2 m x 14 m x 6.8 m
Longitudinal Slope	1:30
Desanding Basin	
Number of Bays	2.0
Nominal size of trapped particle	> 0.20 mm
Length x Width x Depth	42.0 m x 6.0m x 5 m
Head pond	

Full Supply level	El 1009.43 masl	
Head pond size	42m x 24m	
Capacity	1021.0 m^3	
Approach Canal		
Design Discharge	10. 48 m^3/sec	
Length (including Desilting Basin, Box Culvert and Gravel Trap)	335.0 m	
Size	2.0 m x 1.60 m	
Freeboard	0.5m	
Headrace Tunnel		
Length	2448.46 m	
Internal diameter	3.0 m	
Height	3.5m	
Shape	Inverted D-shape	
Invert Level of Tunnel Inlet Portal	El. 1034.24 masl	
Lining thickness	250.0 mm	
Surge Tank		
Diameter (Circular)	6.50 m	
Height	27.0 m	
Invert Level of Surge Tank	El. 1029.34 m	
Maximum Up Surge	1049.36 m	
Maximum Down Surge	1034.67 m	
Steel-lined Penstocks (semi-surface) bifurcation	Main Unit	Unit after bifurcation
Diameter (m)	2.45	1.80
Length (m)	1023.98 m	29.0 m
Maximum Shell thickness (mm)	22.0 mm	16.0mm
Powerhouse		
Length x width	48.53 m x 22.6 m	
Elevation of access floor	El. 886.63 masl	
Number of generating units	2.0	
Turbine Type	Francis (vertical axis)	
Rated flow per unit	4.5 m^3/s	
Turbine Rated Capacity	5.5 MW	
Gross Head	190.00 m	
Rated Net Head	178.9 m	
Installed Capacity	5.0 x 2 = 10.0 MW	
Tailrace		
Length	15.0 m	
Size	6.5 m(Avg.) x 1.8 m	
Switchyard		
Length x breadth	55.0 x 31.0 m	
Transmission (132 kV)		
132kV Transmission line up to Nepal Thok	38.0 km	
Access		

New Permanent Road:	9.5 km
Branch to Powerhouse	2.24 km
Branch to Surge Tank	0.5 km
Financial Indicators	
Total cost with IDC and financing fees (NRs)	Rs. 1,968,676,000.00
Total Annual Energy	74.00 GWh
On Peak Annual Energy	16.00 GWh
Off Peak Annual Energy	58.00 GWh
Benefit / Cost at 10.5% discount rate	1.97
NPV at 10.5% discount rate	NRs. 913,414,000.00
Equity Internal Rate of Return	21.7%
Post Tax Internal Rate Return	16.7%

Appendix B: SUMMARY OF COST ESTIMATES

	Qty	Unit	Multi Factor 1 Total 1000xNRs	Total US$
1 **Civil Construction**				
Total Civil Construction			280,380.00	3,738,489.41
2 Tunnel Works				
Total Tunnel Works			209,700.00	2,796,000
Civil & Tunnel sub-total (1)			**490,080.00**	**6,534,489.41**
3 Electro-Mechanical				
Total electromichanical			300,000.00	4,000,000
4 Hydro-mechanical				
Total hydromechanical			244,740.00	3,263,311.51
E/M & H/M sub-total (2)			**544,740.00**	**7,263,311.5**
5 Transmission line/ substation				
Total Transmission line/ substation			124,570.00	1,661,016
6 Construction Power				
Total Construction Power			21,740.00	289,971
TL/SS & Const. Power Sub-total (3)			**146,310.00**	**1,950,987**
7 Access Road				
Total Access Road			41,250.00	550,000
8 Land Acquisition & Development				
Total Land Acquisition & Dev.			15,000.00	200,000
9 Infrastrecture & Development				
Total Infrastrecture & Dev.			18,530.00	247,145
10 Socio-Environment & Mitigation Costs				
Total Socio-Environment & Mitigation Costs			22,500.00	300,000
ss Road,Land,Housing& Mitigation Sub-total (4)			**97,280**	**1,297,145**
A. Base cost (1+2+3+4)			**1,278,410.00**	**17,045,933**
11 Contingencies				
Civil Construction	10%		28,030.00	373,848.94
Tunnel Works	20%		41,940.00	559,200.00
Electro-Mechanical	5%		15,000.00	200,000.00
Hydro-mechanical	10%		24,470.00	326,331.15
Transmission line/ substation	8%		9,960.00	132,881.28
Construction Power	5%		1,080.00	14,498.55
Access Road	10%		4,120.00	55,000.00
Land Acquisition & Development	5%		750.00	10,000.00
Infrastrecture & Development	5%		920.00	12,357.25
Socio-Environment & Mitigation Costs	5%		1,120.00	15,000.00
B. Contingencies sub-total			**127,390.00**	**1,699,117**
Total Contracts Costs (A+B)			**1,405,800.00**	**18,745,050.06**
12 Engineering & Construction Mgmt (4.5% of total cost)	4.50%		63,261.00	843,527.25
13 VAT and other taxes			153,440.00	2,045,922
14 Owners cost			34,460.00	459,520
TOTAL Construction Costs			**1,656,961.00**	**22,094,019.02**

	SUMMARY OF PROJECT COST		Total 1000xNRs	Total US$
1	Civil Construction		308,410.00	4,112,338.36
2	Tunnel Works		251,640.00	3,355,200.00
3	Electro-Mechanical		315,000.00	4,200,000.00
4	Hydro-mechanical		269,210.00	3,589,642.66
5	Transmission line/ substation		134,530.00	1,793,897.25
6	Construction Power		22,820.00	304,469.55
7	Access Road		45,370.00	605,000.00
8	Land Acquisition & Development		15,750.00	210,000.00
9	Infrastrecture & Development		19,450.00	259,502.25
10	Socio-Environment & Mitigation Costs		23,620.00	315,000.00
11	Engineering & Construction Mgmt		63,261.00	843,527.25
12	VAT and other taxes		153,440.00	2,045,921.70
13	Owners cost		34,460.00	459,520.00
	TOTAL CONSTRCTION COST	1000xNRs	**1,656,961.00**	**22,094,019.02**
		USD	22,092,813.00	
		NRs/kW	165,696.10	
	Cost/kW	USD/kW	2,209.00	
	Interest during construction	1000xNRs	304,466.00	
	Financing and other fees	1000xNRs	7,249.00	
	Total cost with IDC and financing fees	1000xNRs	1,968,676.00	
	Total cost with IDC and financing fees	USD	26,249,013.00	
	Cost/kW with IDC and Financig Cost	NRs/kW	196,867.60	
	Cost/kW with IDC and Financig Cost	USD/kW	2,624.00	

Appendix C

Upper Chardi Hydroelectric Project (UCHEP)

Summary of unit rates

S No	Item	Unit	Rate, USD	Rates , NRs.
	Earthwork Excavation			
1	Excavation on soft clay &silty soils including disposal (up to 10 m lead & 1.5 m lift).	m^3	2.60	192.11
2	Excavation on hard clay & soils mixed with soft moorum stones (up to 30 cm size) including disposal (up to 10 m lead & 1.5 m lift).	m^3	2.95	217.98
3	Excavation on medium rocks without blasting, disposal (up to 10 m lead & 1.5 m lift)	m^3	11.00	812.79
4	Excavation on medium rocks with blasting, disposal (up to 10 m lead & 1.5 m lift)	m^3	13.65	1008.60
6	Ditch cutting in hard soils, disposal (up to 10 m lead and 1.5 m lift).	m^3	4.60	339.89
7	Excavation for foundation work, drain etc including disposal (up to 10 m and lift 1.5 m), soft moorum rock	m^3	11.00	812.79
8	Excavation for foundation work, drain etc including disposal (up to 10 m and lift 1.5 m), medium hard rock (without blasting)	m^3	16.50	1219.19
	Filling work			
1	Filling with ordinary soils in 15 cm thick layers and manual compaction (haulage distance 10 m)	m^3	1.85	136.70
2	Filling with stones in 40 cm thick layers, sprinkling water and hand compaction (haulage distance 10 m)	m^3	3.70	273.39
3	Each additional haulage distance of 10 m (50% by basket & 50% by wheel barrow)	m^3	0.45	33.25
4	Each additional lift of 1.00 m using labour.	m^3	0.30	22.17
5	Compacting soils by roller in 20 cm thick layers.	m^3	1.94	143.24
6	Filling soils in pipe line trenches in 20 cm thick layers including hand and water sprinkling, soft soil.	m^3	1.85	136.70
7	Filling soils in pipe line trenches in 20 cm thick layers including hand and water sprinkling, medium soil.	m^3	2.05	151.47
8	Filling soils in pipe line trenches in 20 cm thick layers including hand and water sprinkling, hard soil.	m^3	2.35	173.64
9	Filling soils in pipe line trenches in 20 cm thick layers including hand and water sprinkling, gravel and boulder mixed soil.	m^3	2.20	162.56
	Site clearance			
1	Site clearance	m^2	2.00	147.78
	Stone Masonry			
1	Stone masonry wall in 1:3 C/S mortar	m^3	103.00	7610.67
2	Stone masonry wall in 1:4 C/S mortar	m^3	94.50	6982.61
3	Stone masonry wall in 1:6 C/S mortar	m^3	80.50	5948.15
4	Filling by stones in the foundation and levelling incl. Haulage dist. Up to 30 m	m^3	25.00	1847.25
5	Stone masonry, in ditch with 1: 3 C/S mortar	m^3	95.00	7019.55
6	Stone masonry, in ditch with 1: 6 C/S mortar	m^3	74.00	5467.86
7	Dry stone laying (sand infill)	m^2	5.50	406.40
	Brick Work			
1	Brick work in 1:3 cement sand mortar	m^3	178.00	13152.42
2	Brick work in 1:4 cement sand mortar	m^3	162.50	12007.13

Summary of unit rates

S No	Item	Unit	Rate, USD	Rates , NRs.
	Concrete Work			
1	Concrete grade C25	m^3	178.00	13152.42
2	Concrete grade C20	m^3	153.00	11305.17
3	Concrete grade C15	m^3	125.50	9273.20
4	Plum Concrete grade C15, 30% plum	m^3	114.00	8423.46
5	Plum Concrete grade C20, 30% plum	m^3	144.00	10640.16
	Steel Work			
1	Steel	t	1703.50	125871.62
	Formwork			
1	Formwork, Floor and slab	m^2	3.15	232.75
2	Formwork Vertical upto 4 m high, 0.5 m wide	m^2	3.05	225.36
3	Formwork Vertical 4-5 m high, 0.5 m wide	m^2	4.00	295.56
4	Formwork Vertical 5-10 m high, 0.5 m wide	m^2	8.80	650.23
5	Formwork Vertical upto 5 m high, 0.5-1 m wide	m^2	3.25	240.14
6	Formwork Vertical surface (5 m to 10 m high and 0.5 to 1.0 m wide)	m^2	8.15	602.20
	Gabion Work			
1	Gabion work, box size 2m x 1mx 1m	m^3	43.50	3214.22
2	Gabion work, box size 2m x 1mx 0.5m	m^3	52.50	3879.23
3	Gabion work, box size 3m x 1mx 1m	m^3	42.33	3128.01
4	Gabion work, box size 3m x 1mx .5m	m^3	51.83	3829.97
5	Dry boulder packing	m^3	32.50	2401.43
	Cement Plaster Work			
1	Plastering 12.5 mm thick 1:3 cement sand mortar	m^2	4.50	332.51
2	Plastering 12.5 mm thick 1:4 cement sand mortar	m^2	4.00	295.56
3	Plastering 12.5 mm thick 1:6cement sand mortar	m^2	3.50	258.62
4	Plastering 20 mm thick 1:3 cement sand mortar	m^2	5.00	369.45
5	Plastering 20 mm thick 1:4 cement sand mortar	m^2	5.00	369.45
6	Plastering 20 mm thick 1:6cement sand mortar	m^2	4.00	295.56
7	Cement Punning 3mm thick	m^2	2.50	184.73
	Roofing Works			
1	CGI Sheet roofing works with supply of materials complete	m^2	9.50	701.96
2	Making ridge of PGI sheets and fitting with supply of materials complete	m^2	9.00	665.01
3	Fixing and supply of steel tubular truss	kg	2.00	147.78
	Wood works			
1	Making salwood frame and fixing of door size 900 x 2100 mm	m^3	665.00	49136.85
2	Making Shutter in 38 mm thick salwood frame (shutter size 1.07m x 1.982 m)	m^2	45.00	3325.05
3	Making and fitting 3mm glazed shutter in 38 x 75 mm salwood frame	m^2	49.00	3620.61
	Painting Works			
1	Two coats of white washing	m^2	0.50	36.95
2	First and second coat of cement paint on plastered surface	m^2	3.00	221.67
3	Two coats of enamel painting on one coat lining	m^2	2.50	184.73

Summary of unit rates

S No	Item	Unit	Rate, USD	Rates , NRs.
	Fencing works			
1	Barbed wire fencing works with five rows and two diagonal barbed wires and column at 3m spacing	rm	8.50	628.07
	Filter material laying			
1	Laying of filter 300mm thick	m^2	10.36	765.53
	Laying of Geotextile			
1	Laying of Geotextile	m^2	7.00	517.23
	Miscelleneous			
1	Expansion joints in penstock pipe	no	4210.53	311115.79
2	Air release valve in penstock pipe	no.	3508.77	259263.16
3	Seleant	m	24.10	1780.45
4	Hydrocell	m	11.84	874.86
5	Water bars	m	10.44	771.57
6	1.5 m dia Boulder riprap	m^2	75.00	5541.75
7	1 m dia Boulder riprap	m^2	60.00	4433.40
8	Curtain Grouting	m^2	24.00	1773.36
9	Clay blanket	m^3	6.67	492.85
10	30 cm thick Hard stone lining	m^2	78.00	5763.42
11	Steel lining (20 mm thick)	m^2	334.00	24679.26
12	Rolling Shutters	m^2	28.07	2074.11
13	HDPE pipe of 75mm	rm	5.02	371.26

Appendix D

Upper Chardi Hydroelectric Project (UCHEP)

Bill of Quantities of Civil Works

US$ 1= 75

S.N.	Item Description	Unit	Rate (US$)	Quantity	Amount (US$)	Amount (NRs)	Remarks
A	**General items**						
	Contractual requirements						
A.1	Insurances	L.S.			30,000.00	2,250,000.00	
A.2	Mobilisation	L.S.			13,333.30	999,997.50	
A.3	Demobilisation	L.S.			6,666.70	500,002.50	
	Sub total				**50,000.00**	**3,750,000.00**	
1	**Headworks**						
	River Diversion:						
1	Excavation in Hardrock	m^3	16.50	6.00	99.00	7,425.00	
2	Stone masonry in 1:6 C/S mortar	m^3	80.50	62.00	4,991.00	374,325.00	
3	Dewatering	LS	10500.00	1.00	10,500.00	787,500.00	
	Sub total				**15,590.00**	**1,169,250.00**	
	Weir & Undersluice:					-	
1	Excavation in Hardrock	m^3	16.50	72.00	1,188.00	89,100.00	
2	Base Preparation	m^2	3.70	63.00	233.10	17,482.50	
3	C15 Blinding	m^3	125.50	6.50	815.75	61,181.25	
4	30% Plum	m^3	114.00	112.00	12,768.00	957,600.00	
5	C25 concrete	m^3	178.00	82.00	14,596.00	1,094,700.00	
6	Stone masonry(1:4)	m^3	94.50	25.00	2,362.50	177,187.50	
7	Rock bolt	no.	49.34	56.00	2,762.76	207,207.00	
8	Formwork	m^2	4.00	101.00	404.00	30,300.00	
9	Rebar	ton	1703.50	5.12	8,721.92	654,144.00	
10	16 mm Steel lining	m^2	334.00	120.00	40,080.00	3,006,000.00	
11	Dewatering	LS				-	
	Sub total				**83,932.03**	**6,294,902.25**	
	Intake & Gravel Trap					-	
1	Excavation in Hardrock	m^3	16.50	316.00	5,214.00	391,050.00	
2	Base Preparation	m^2	3.70	108.00	399.60	29,970.00	
3	C15 Blinding	m^3	125.50	12.80	1,606.40	120,480.00	
5	C25 concrete	m^3	178.00	112.68	20,057.04	1,504,278.00	
6	0.3 m thick Dressed Stone armouring	m^2	78.00	44.00	3,432.00	257,400.00	
8	Formwork	m^2	4.00	455.00	1,820.00	136,500.00	
9	Rebar	ton	1703.50	16.65	28,363.28	2,127,245.63	
10	16 mm Steel lining	m^2	334.00	74.00	24,716.00	1,853,700.00	
11	E/W in backfilling	m^3	1.85	120.00	222.00	16,650.00	
12	Dewatering	LS				-	
	Sub total				**85,830.32**	**6,437,273.63**	
	Intake culvert / Approach canal						
1	Site Clearance	m^2	2.00	1500.00	3,000.00	225,000.00	
2	Excavation in Boulder mix soil	m^3	2.95	2242.60	6,615.67	496,175.25	
3	Excavation in Hardrock	m^3	16.50	465.60	7,682.40	576,180.00	
4	Base Preparation	m^2	3.70	263.48	974.88	73,115.70	
5	C15 Blinding	m^3	125.50	22.50	2,823.75	211,781.25	
6	C25 concrete	m^3	178.00	112.24	19,978.72	1,498,404.00	
7	Formwork	m^2	4.00	742.85	2,971.40	222,855.00	
8	Rebar	ton	1703.50	17.03	29,010.61	2,175,795.38	
9	Backfilling	m^3	1.85	435.56	805.79	60,433.95	
10	Waterbar	m	10.44	45.50	475.12	35,633.68	
11	Filler	m^2	11.84	14.30	169.31	12,698.40	
12	Sealant	m	24.10	70.00	1,686.72	126,504.00	
13	Gabion	m^3	43.50	70.00	3,045.00	228,375.00	
14	Plum concrete	m^3	114.00	25.00	2,850.00	213,750.00	

S.N.	Item Description	Unit	Rate (US$)	Quantity	Amount (US$)	Amount (NRs)	Remarks
15	Stone masonry	m^3	94.50	60.00	5,670.00	425,250.00	
	Sub total				**87,759.35**	**6,581,951.61**	
	Settling Basin & Forebay						
1	Site Clearance	m^2	2.00	1200.00	2,400.00	180,000.00	
2	Excavation in Boulder mix soil	m^3	2.95	6400.00	18,880.00	1,416,000.00	
3	Excavation in Hardrock	m^3	16.50	925.00	15,262.50	1,144,687.50	
4	Base Preparation	m^2	3.70	961.50	3,557.55	266,816.25	
5	C15 Blinding	m^3	125.50	70.13	8,801.32	660,098.63	
6	C25 concrete	m^3	178.00	712.30	126,789.40	9,509,205.00	
7	Formwork	m^2	4.00	2460.00	9,840.00	738,000.00	
8	Rebar	ton	1703.50	104.68	178,322.38	13,374,178.50	
9	Backfilling	m^3	1.85	845.60	1,564.36	117,327.00	
10	Waterbar	m	10.44	205.60	2,146.90	161,017.26	
11	Filler	m^2	11.84	70.80	838.27	62,870.40	
12	Sealant	m	24.10	307.80	7,416.75	556,256.16	
13	Dewatering	LS				-	
	Sub total				**375,819.42**	**28,186,456.70**	
	Gravel Flushing						
1	Excavation in Hardrock	m^3	16.50	25.00	412.50	30,937.50	
2	Base Preparation	m^2	3.70	6.50	24.05	1,803.75	
3	C15 Blinding	m^3	125.50	1.50	188.25	14,118.75	
4	C25 concrete	m^3	178.00	4.00	712.00	53,400.00	
5	Formwork	m^2	4.00	12.00	48.00	3,600.00	
6	Rebar	ton	1703.50	1.50	2,555.25	191,643.75	
7	Steel lining	m^2	334.00	12.00	4,008.00	300,600.00	
8	Backfilling	m^3	1.85	42.50	78.63	5,896.88	
	Sub total				**8,026.68**	**602,000.63**	
	Diversion Canal						
1	E/W excavation in boulder mixed soil	m^3	2.95	285.00	840.75	63,056.25	
2	Excavation in Hardrock	m^3	16.50	150.00	2,475.00	185,625.00	
3	Base Preparation	m^2	3.70	77.81	287.90	21,592.28	
4	C15 Blinding	m^3	125.50	9.30	1,167.15	87,536.25	
5	C25 concrete	m^3	178.00	43.00	7,654.00	574,050.00	
6	Formwork	m^2	4.00	218.87	875.48	65,661.00	
7	100mm thick precast slab	m^3	178.00	8.82	1,569.96	117,747.00	
8	Rebar	ton	1703.50	7.85	13,372.48	1,002,935.63	
9	E/W in backfilling	m^3	1.85	33.70	62.35	4,675.88	
10	Waterbar	m	10.44	16.80	175.43	13,157.05	
11	Filler	m^2	11.84	3.20	37.89	2,841.60	
12	Sealant	m	24.10	53.80	1,296.36	97,227.36	
13	Gabion	m^3	52.50	35.00	1,837.50	137,812.50	
14	Plum concrete	m^3	114.00	9.00	1,026.00	76,950.00	
15	Stone masonry	m^3	94.50	18.00	1,701.00	127,575.00	
16	Rockbolt	no.	49.34	60.00	2,960.10	222,007.50	
	Sub total				**37,339.34**	**2,800,450.29**	
	Spillway Culvert from Gravel Trap						
1	Excavation in Hardrock	m^3	16.50	45.00	742.50	55,687.50	
2	Base Preparation	m^2	3.70	8.60	31.82	2,386.50	
3	C15 Blinding	m^3	125.50	7.35	922.43	69,181.88	
4	C25 concrete	m^3	178.00	5.50	979.00	73,425.00	
5	Formwork	m^2	4.00	25.20	100.80	7,560.00	
6	Rebar	ton	1703.50	1.00	1,703.50	127,762.50	
7	Backfilling	m^3	1.85	20.00	37.00	2,775.00	
	Sub total				**4,517.05**	**338,778.38**	
	Sub-Total cost for Headworks				**698,814.18**	**52,411,063.47**	
2	**Headrace Pipe**						

S.N.	Item Description	Unit	Rate (US$)	Quantity	Amount (US$)	Amount (NRs)	Remarks
2.1	Site Clearance	m^2	2.00	10000.00	20000.00	1,500,000.00	
2.2	E/w in Excavation					-	
2.2.1	Excavation on soft clay	m^3	2.60	6273.37	16310.75	1,223,306.62	
2.2.2	Excavation on hard clay and soil mixed with soft moorum stones	m^3	2.95	4190.73	12362.66	927,199.47	
2.2.3	Excavation medium rocks without blasting	m^3	11.00	4293.95	47233.49	3,542,511.64	
2.3	E/w in backfilling					-	
2.3.1	Filling with ordinary soil in 15cm thick layer and manual compaction	m^3	1.85	7215.20	13348.11	1,001,108.62	
2.3.2	Filling with filter material	m^3	34.53	1682.43	58102.07	4,357,655.11	
2.4	C15 Blinding Concrete	m^3	125.50	92.97	11667.90	875,092.36	
2.5	C20 Concrete	m^3	153.00	702.31	107452.76	8,058,956.76	
2.6	C20 Plum Concrete (30%)					-	
2.6.1	Thrust Blocks	m^3	144.00	210.98	30381.02	2,278,576.48	
2.7	C25 Concrete					-	
2.7.1	Retaining wall	m^3	178.00	0.00	0.00	-	
2.7.2	Support Piers	m^3	178.00	0.00	0.00	-	
2.9	Reinforcement Bars	Ton	1703.50	80.21	136643.57	10,248,267.63	
2.13	Formworks	m^2	4.00	2287.22	9148.89	686,166.60	
2.14	Stone Masonry in C/s 1:4	m^3	94.50	364.71	34465.02	2,584,876.46	
2.15	Rock Anchor (1.5 m long)	No.	24.15	24.00	579.60	43,470.00	
2.16	Hydrocell	m	11.84	136.60	1617.39	121,304.35	
2.17	Seleant	m	24.10	303.21	7306.10	547,957.50	
2.18	75mm HDPE pipe for weep holes	m	5.02	92.34	463.99	34,799.11	
2.19	Bhirpakha Kholsi Training	LS	10000.00	1.00	10000.00	750,000.00	
	Sub total				**517083.32**	**38781248.72**	
3	**Tunnel**						
3.1	***Spoil tip - Tunnel***						
3.1.1	Collection and back filling	m^3	1.85	17,411.7	32211.70	2,415,877.49	
3.1.2	Gabion Work, 3x1x1 size	m^3	42.33	300.0	12700.00	952,500.00	
3.1.3	Gabion Work, 2x1x1 size	m^3	43.50	200.0	8700.00	652,500.00	
	Sub total				**53611.70**	**4020877.49**	
4.00	***Penstock***						
4.1	Excavation						
4.1.1	Excavation in boulder mixed soil	m^3	11.00	2230.86	24539.48	1,840,460.82	
4.1.2	Excavation on soft clay with soft morum stones	m^3	2.95	2230.86	6581.04	493,578.13	
4.1.3	Excavation on soft clay	m^3	2.60	16269.16	42299.82	3,172,486.36	
4.2	Backfilling					-	
4.2.1	Filling with ordinary soil in 15cm thick layer and manual compaction	m^3	1.85	6214.23	11496.32	862,223.86	
4.2.2	Gravel mixed soil filling	m^3	2.20	223.20	491.04	36,828.00	
4.3	Concrete Works					-	
4.3.1	C25 Concrete	m^3	178.00	22.78	4054.84	304,113.00	
4.3.2	C20 Concrete	m^3	153.00	713.79	109209.87	8,190,740.25	
4.4	Plum Concrete					-	
4.4.1	C20 Plum Concrete (30%)	m^3	144.00	2286.22	329215.44	24,691,158.21	
4.5	Reinforcement Bars					-	
4.5.1	Anchor Block	ton	1703.50	72.85	124107.53	9,308,064.52	
4.5.2	Support Pier	ton	1703.50	70.16	119511.70	8,963,377.56	
4.6	C15 Blinding Concrete	m^3	125.50	432.32	54256.10	4,069,207.29	
4.7	Formwork	m^2	4.00	4242.09	16968.38	1,272,628.35	
4.8.2	Stone Masonry in C/S 1:6	m^3	80.50	0.00	0.00	-	
4.8.3	Stone Masonry in C/S 1:4	m^3	94.50	1339.56	126588.55	9,494,141.50	
4.9	stone filling	m^3	3.70	1111.85	4113.85	308,538.38	
4.10	Dry boulder packing	m^2	32.50	110.00	3575.00	268,125.00	
4.11	Gabion Box	m^3	43.50	110.00	4785.00	358,875.00	
4.12	Kholsi crossing filter layer	m^2	10.36	77.00	797.75	59,831.08	
4.13	Filling with filter material in buried penstock sections	m^3	34.53	2555.49	88252.62	6,618,946.24	
4.14	Fencing	m	8.50	3670.20	31196.70	2,339,752.50	
4.15	Site Clearance	m^2	2.00	18351.00	36702.00	2,752,650.00	

S.N.	Item Description	Unit	Rate (US$)	Quantity	Amount (US$)	Amount (NRs)	Remarks
4.16	Kholsi Training (Surge shaft)	LS	20000.00	1.00	20000.00	1,500,000.00	
	Sub total				**1158743.01**	**86905726.04**	
5.0	***Powerhouse***						
5.1	Site Clearence	m^2	2.00	6,000.0	12000.00	900,000.00	
5.2	Earthwork excavation in boulder mixed soil	m^3	11.00	11,120.0	122320.00	9,174,000.00	
5.3	Backfill work	m^3	1.85	821.0	1518.85	113,913.75	
5.4	Brick work in 1:4 Cement sand mortar (Superstructure)	m^3	162.50	252.5	41036.77	3,077,757.52	
5.5	Concrete C30	m^3	165.00	522.4	86202.60	6,465,195.00	
5.6	Cement concrete C25	m^3	178.00	395.3	70358.79	5,276,909.57	
5.7	75 mm thick blinding concrete C15	m^3	125.50	0.0	0.00	-	
5.8	Stone masonary in 1:4 cement sand mortar(Substructure)	m^3	94.50	0.0	0.00	-	
5.9	12.5mm thick cement plaster in 1:4 c/s mortar	m^2	4.00	2,912.2	11648.70	873,652.50	
5.10	Punning	m^2	2.50	454.4	1135.98	85,198.13	
5.11	Wood works	m^3	665.00	1.5	1028.89	77,166.60	
5.12	Door Shutters	m^2	45.00	20.2	910.58	68,293.13	
5.13	Window Shutters	m^2	49.00	44.7	2191.77	164,382.75	
5.14	Reinforcement bars	ton	1703.50	108.1	184081.64	13,806,122.84	
5.15	Formwork	m^2	4.00	1,527.8	6111.06	458,329.50	
5.16	Roof truss	kg	2.00	2,660.0	5320.00	399,000.00	
5.17	C.G.I. Sheets in roof	m^2	9.50	558.2	5302.57	397,692.56	
5.18	G.I. Ridging	m^2	9.00	32.9	295.65	22,173.75	
5.19	White washing 2 coats on wall	m^2	0.50	2,358.4	1179.18	88,438.13	
5.20	Barbed wire fencing work	Rm	8.50	252.0	2142.00	160,650.00	
5.21	Guard House	LS	4200.00	1.0	4200.00	315,000.00	
5.22	Road to PH and Switchyard	LS	13333.33	1.0	13333.33	1,000,000.00	
5.23	Steel Main Gate	LS	3733.33	1.0	3733.33	280,000.00	
	Sub total				**572318.34**	42,923,875.71	
	Sanitary fittings @20%				**114463.67**	8,584,775.14	
	Sub total				**686782.01**	**51508650.86**	
6.0	***Switchyard***						
6.1	Site clearance	m2	2.00	4,000.0	8000.00	600,000.00	
6.2	Gravel filling	m3	3.70	788.5	2917.38	218,803.20	
6.3	E/W excavation in boulder mixed soil	m3	2.95	11,174.9	32965.86	2,472,439.43	
6.4	Backfilling with ordinary soil	m3	1.85	320.0	592.00	44,400.00	
6.5	1:4 C/S stone masonry	m3	94.50	1,123.1	106129.17	7,959,687.75	
6.6	C15 Concrete blinding	m3	125.50	13.3	1667.26	125,044.47	
6.7	C20 Concrete slab	m3	153.00	6.1	936.36	70,227.00	
6.8	C25 concrete for machine foundation	m3	178.00	85.0	15126.68	1,134,501.36	
6.9	Formworks	m2	3.05	285.3	870.18	65,263.52	
6.10	Reinforcement	Ton	1703.50	13.8	23546.62	1,765,996.63	
	Sub total				**192751.51**	**14456363.36**	
7.0	**River Protection**						
7.1	E/W for excavations on Boulder Mix soil	m^3	11.00	4,422.8	48650.80	3,648,810.00	
7.2	gabion protection	m^3	43.50	313.5	13637.25	1,022,793.75	
7.3	C20 Concrete works	m^3	178.00	353.7	62966.61	4,722,495.75	
7.4	Stone masonary in 1:4 C/S mortar	m^3	94.50	842.1	79573.73	5,968,029.38	
7.5	C25 Concrete works	m^3	178.00	156.4	27839.20	2,087,940.00	
7.6	Formworks	m^2	4.00	1,912.9	7651.60	573,870.00	
7.7	1m Dia Boulder Rip-rap for river protection	m^2	60.00	1,210.0	72600.00	5,445,000.00	
7.8	Reinforcement for concrete works(@1.0%)	Ton	1703.50	39.8	67784.50	5,083,837.24	
	Sub total				**380703.68**	**28552776.12**	
	Total Civil Cost				**3,738,489**	**280,386,706**	

Appendix E

Upper Chardi Hydroelectric Project (UCHEP)

Bill of Quantities of Tunnel Works

Summary of Tunnel Works (rock support)

		US$	NRs.
	Exchange rate	1	75
Length of tunnel, m	2,425	US$	NRs.
Tunnel cost per meter		1,153	86,474

Total cost (Headrace tunnel, Surge shaft and portals stabiliation)

S.N.	Items		US$	NRs.
1	Chardi Khola Headrace Tunnel		1,920,257	144,019,300
2	Surge shaft		600,165	45,012,383
3	Inlet and Outlet portals' support		80,907	6,068,033
4	Small tunnel near Inlet Portal		2,642	198,171
5	Uncertainties cost, 10%		192,026	14,401,930
Total cost			**2796000**	**209700000**

1. Headrace tunnel

S.N.	Items	Quantity	Rate US$	Total cost
1	**I**(2 bolts + 5cm sfr+15cm conc. Slab)	693	225	155,935
3	**II** (3 bolts+ 5-7cm sfr+20cm conc. slab)	682	1,037	707,336
4	**III** (5 bolts +10cm sfr+20 cm conc. slab)	636	454	288,752
6	**IV** (6 bolts +15cm sfr+4 spiling+20 cm conc.slab)	1,028	195	200,460
7	**V** (6 bolts +20cm sfr+4 spiling+25 cm conc.slab)	1,382	164	226,648
8	**IV**(13 bolts + 10cm sfr+20cm conc. Slab), large sized tunnel	3,295	25	82,371
9	Injection Grouting(Tunnels+surge shaft), kg	30,467	0.5	15,233
10	Gravel grading cost	35	2075	26,738
11	25 cm thick concrete lining, m3	691	314	216,785
				1,920,257

2. Surge Shaft

S.N.	Items	Quantity	Rate US$	Total cost
1	**III** (14 bolts, 2 m long +10cm sfr)	21	13,070	267,933
2	**III** (11 bolts, 2 m long +10cm sfr)	31	6789	210,448
3	50 cm thick concrete lining on 3.5m	198	314	62,296
4	40 cm thick concrete lining on 3.5m	189	314	59,488
				600,165

3. Inlet and Outlet Portals' support

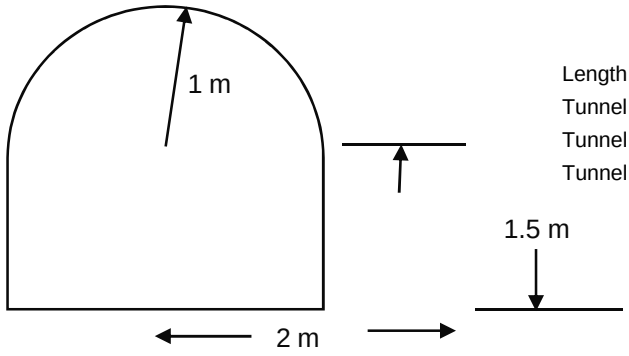
S.N.	Items	Quantity	Rate US$	Total cost
1	5 m long rock bolts, number	364	93	33,725
2	10 cm sfr, m2	420	51	21,349
3	Inlet Excavation, m3	980	18	17,581
4	Outlet Excavation, m3	460	18	8,252
				80,907

4.Small tunnel near Inlet Portal

S.N.	Items	Quantity	Rate US$	Total cost
1	**I** (4 bolts, 1 m long)	13	20	260
2	Rock excavation	45	18	807
3	Tunnel excavation	25	64	1,575
				2,642

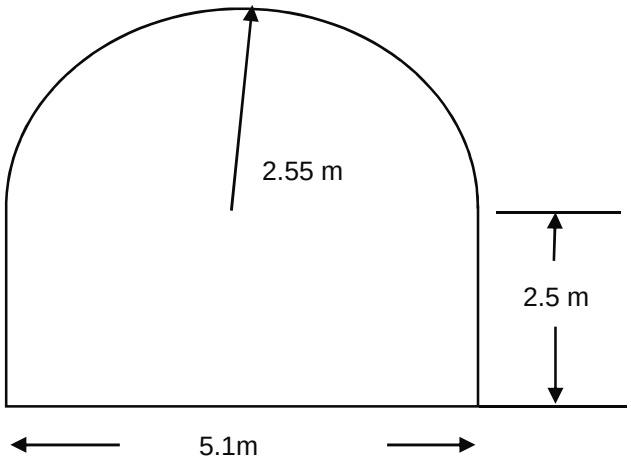
6. Spoil

S.N.	Items	Quantity	Rate US$	Total cost
1	Inlet	7094.25		
2	Outlet	10317.48		



Length of tunnel	1948
Tunnel area	4.57
Tunnel perimeter	6.14
Tunnel perimeter inclu. invert	8.14

Length of tunnel	10
Tunnel area	6.97
Tunnel perimeter	8.54
Tunnel perimeter inclu. invert	10.54



Length of tunnel	20
Tunnel area	6.57
Tunnel perimeter	8.14
Tunnel perimeter inclu. invert	13.24

2.55

Appendix F

Upper Chardi Hydroelectric Project (UCHEP)

Summary of Electro-Mechanical Works

	US$		NRs
Exchange Rate	1		75
Power (KW)		10000.00	
Cost per Kw		400.00	US$
Total cost		**4,000,000.00**	US$
		300,000,000.00	NRs

Appendix G

Upper Chardi Hydroelectric Project (UCHEP)

Cost Estimate of Hydro-Mechanical Works

Rates for gates and accessoried have been increased by 15%
For steel pipe rate taken in NRs. 170/kg

1 USD= 75.00 NRs

S.N.	Item Description	Unit	Rate (US$)	Quantity	Amount (US$)	Amount (NRs)
1	**Headworks**					
	Mai headworks					
1	Undersluice Flushings gates	Nos.	12161.25	2.00	24,322.50	
2	Intake Gate	Nos.	10580.00	3.00	31,740.00	
3	Intake Trash Rack	Nos.	4899.00	3.00	14,697.00	
4	Gravel Flushing Gate	Nos.	2415.00	2.00	4,830.00	
5	Gravel Trap Trash Rack	Nos.	10447.75	1.00	10,447.75	
6	Settling Basin Inlet Gates	Nos.	5773.00	4.00	23,092.00	
7	Settling Basin outlet Gates	Nos.	1449.00	8.00	11,592.00	
8	Settling Basin Flushing Gates	Nos.	2346.00	8.00	18,768.00	
9	Fine Trash Rack for Bell mouth	Nos.	9487.50	1.00	9,487.50	
	Sub total				**148,976.75**	11,173,256.25
2	**Headrace Pipe**					
2.10	Steel Pipe	Ton	2266.67	201.62	457013.54	
2.11	Expansion Joints	No.	4210.53	4.00	16842.11	
2.12	Air Release Valves	No.	3508.77	0.00	0.00	
	Sub total				**473855.64**	35,539,173.13
3	**Tunnel**					
3.3	Bulk Head Door	No	6666.67	2.0	13333.33	
	Sub total				**13333.33**	1,000,000.00
4.00	***Penstock and powerhouse***					
4.1	Steel Works					
4.1.2	Penstock Pipe	ton	2266.67	1009.66	2288573.22	
4.1.3	Wear plate	ton	2266.67	60.33	136748.00	
4.1.4	Ball valve	No.	42000.00	1.00	42000.00	
4.2	Expansion Joints	No.	4210.53	30.00	126315.79	
4.21	Air release valve	No.	3508.77	1.00	3508.77	
4.3	Gates and trash racks				30000.00	
	Sub total				**2627145.78**	197,035,933.67
	Total Penstock and Hydromechanical Cost				**3,263,312**	**244,748,363.05**

Appendix H

Upper Chardi Hydroelectric Project (UCHEP)

Summary of Transmission Line Works

Exchange rate for US$	75.00	
132 KV Line		
Transmission Line length	38.00	Km
Cost per Km	3278321	NRs.
	43,710.95	US$
Total Cost	1,661,015.97	US$
	124,576,198.00	NRs.

Appendix I

Upper Chardi Hydroelectric Project (UCHEP)

Summary of Access Road Works

Exchange rate US$	75.00	
Cost for 9.5 KM	41,250,000.00	NRs.
	550,000.00	US$

Appendix J

Upper Chardi Hydroelectric Project (UCHEP)
Estimation Sheet

Contruction Power

2 Generators running for 2 shifts for tunnel

Generator (125 kVA) rent	NRs.	85,000.00	per month
Diesel consumption	Ltr.	7.00	per hr.
Deisel rate	NRs.	58.00	per ltr.
Mobil change	Time	1.00	every 200 hrs.
Mobil charge	NRs.	650.00	
No. of generators	No.	3.00	
Operator & Maintenance cost		0.02	of the rent
Time of operation		29.00	months
No. of working shifts		2.00	
Total working hours		13920.00	hrs.
Total diesel consumtion		97440.00	Ltr.
No. of mobil change		69.60	times
US$ conversion rate		75.00	

Cost for running One Generator

Rent	NRs.	2,465,000.00	
Operator & Maintenance	NRs.	36,975.00	
Deisel	NRs.	5,651,520.00	
Mobil	NRs.	45,240.00	
Total for 1 Generator	**NRs.**	**8,198,735.00**	
Total for 2 Generators	**NRs.**	**16,397,470.00**	
	US$	**218,632.93**	

1 Generator running for penstock and powerhouse

Time of operation		29.00	months
No. of working shifts		1.00	
Total working hours		6960.00	hrs.
Total diesel consumtion		48720.00	Ltr.
No. of mobil change		34.80	times
US$ conversion rate		75.00	

Cost for running One Generator

Rent	NRs.	2,465,000.00	
Operator & Maintenance	NRs.	36,975.00	
Deisel	NRs.	2,825,760.00	
Mobil	NRs.	22,620.00	
Total for 1 Generator	**NRs.**	**5,350,355.00**	
	US$	**71,338.07**	
Grand Total Cost	**NRs.**	**21,747,825.00**	
	US$	**289,971.00**	

Appendix K

Upper Chardi Hydroelectric Project (UCHEP)

Summary of Infrastrecture & Housing Works

Exchange rate	75	NRs
Camp Housing	247,145.00	US$
	18,535,875.00	NRs

Appendix L

Upper Chardi Hydroelectric Project (UCHEP)

Owner's Direct cost

Rate for US$/NRs 75

S.N.	Description of Items	Units	Nos.	Quantity	Rate	Amount	Amount
					US$	US$	NRs
1	Feasibility Study		1	L.S.	24,000.00	24,000.00	1,800,000.00
2	Detail design including tender doc preparation		1	L.S.	80,000.00	80,000.00	6,000,000.00
3	Office Setup						
3.1	Office building rent	months	1	40	385.00	15,400.00	1,155,000.00
3.2	Salary for personnel						
3.2.1	Managing Director	months	1	40	900.00	36,000.00	2,700,000.00
3.2.2	Engineers	months	3	40	600.00	72,000.00	5,400,000.00
3.2.3	Peons	months	1	40	100.00	4,000.00	300,000.00
3.2.4	Guard	months	1	40	100.00	4,000.00	300,000.00
3.2.5	Administration	months	3	40	200.00	24,000.00	1,800,000.00
4	Vehicle	Nos.	2	1	20,720.00	41,440.00	3,108,000.00
5	Office furniture			L.S.	2,670.00	2,670.00	200,250.00
6	Owner's Overhead			L.S.	13,340.00	13,340.00	1,000,500.00
7	Site Security						
7.1	Officers	months	2	40	200.00	16,000.00	1,200,000.00
7.2	Assistants	months	15	40	100.00	60,000.00	4,500,000.00
8	Housing and facilities			L.S.	66,670.00	66,670.00	5,000,250.00
	Total Cost					**459,520.00**	**34,464,000.00**

Appendix M

नेपाल सरकार
स्थानीय विकास मन्त्रालय
जिल्ला विकास समितिको कार्यालय
जिल्ला प्राविधिक कार्यालय
कास्की

जिल्ला दररेट (२०६६/०६७)

सि.नं.	तह/किसिम	एकाई	दर प्रति एकाई	३.५% ढुवानी थप
१	ज्यामी	जवान	१७०।००	१७०।००
२	ज्यामी	जवान	१७०।००	१७०।००
३	सिपालू	जवान	३००।००	३००।००
४	पम्प भांडा	घन्टा	३००।००	३०९।००
५	खानी वालूवा	घ.मि	६४०।००	६६२।४०
६	सफेद पखालेको वालूवा	घ.मि	१,२००।००	१२४२।००
७	खोलाको वालूवा(नचालेको)	घ.मि	१,०५०।००	१०८६।७५
८	खस्रो बालूवा	घ.मि	१२००।००	१२४२।००
९	१ नं. को ईटा चिम्नी भट्टा)	एक	७।५०	७।७६
१०	ईटा (मेसिन मेड)	एक	१०।००	१०।३५
११	सिमेन्ट	मे.ट	१२५००।००	१२९३७।५०
१२	सेतो सिमेन्ट	मे.ट	२१६००।००	२२३५६।००
१३	माटो	घ.मि	४५०।५०	४६६।२६
१४	ब्लक स्टोन (खोलाको)	घ.मि	१,२००।००	१२४२।००
१५	वण्ड स्टोन (खोलाको)	घ.मि	१,२००।००	१२४२।००
१६	कूंदेको ढूंगा	घ.मि	१३५०।००	१३९७।२५
१७	फोरुवा ढूंगा(खानीको)	घ.मि	७००।००	७२४।५०
१८	३८-४० मी.मी. रोडा	घ.मि	१९००।००	१९६६।५०
१९	१२-२५ मी.मी. रोडा	घ.मि	१९००।००	१९६६।५०
२०	१२.५ मी.मी. रोडा	घ.मि	१९००।००	१९६६।५०
२१	१० मी.मी. रोडा	घ.मि	१९००।००	१९६६।५०
२२	विभिन्न साइजको फलामे डण्डी (Tor Steel)	मे.ट.	६५०००।००	६७२७५।००
२३	विभिन्न साइजको फलामे डण्डी (TMT Fe - 500)	मे.ट.	६७०००।००	६९३४५।००
२४	जि.आई बाध्ने तार	केजी	१०५।००	१०८।६७
२५	काठ सालको (८फीट सम्मको)	घ.मि	४२३६०।००	४३८४२।६०
२६	सल्लो कू काठ	घ.मि	१४०००।००	१४४९०।००
२७	किला कांटी	केजी	१००।००	१०३।५०
२८	पेच किला	एक	७।५०	७।७६
२९	होल फास्ट	एक	९०।००	९३।१५
३०	कब्जा १०० मी.मी.	एक	२०।००	२०।७०
३१	कब्जा ७५ मी.मी.	एक	१०।००	१०।३५
३२	छेस्किनी १०० मी.मी.	एक	२८।००	२८।९८
३३	छेस्किनी १५० मी.मी.	एक	४२।००	४३।४७
३४	छेस्किनी ३०० मी.मी.	एक	७०।००	७२।४५
३५	लकिङ सेट ३०० मी.मी.	एक	१५०।००	१५५।२५

जिल्ला दररेट (२०६६/०६७)

सि.नं.	तह/किसिम	एकाई	दर प्रति एकाई	३.५% ढुवानी थप
३६	मोर्टिस लक साधारण	एक	६२५।००	६४६।८७
३७	कर्मसियल प्लाइउड ४ मी.मी.	वर्ग मि	१७०।००	१७५।९५
३८	कर्मसियल प्लाइउड ६ मी.मी.	वर्ग मि	२३५।००	२४३।२२
३९	कर्मसियल प्लाइउड १२ मी.मी.	वर्ग मि	३७५।००	३८८।१२
४०	कर्मसियल प्लाइउड १९ मी.मी.	वर्ग मि	५२९।००	५४७।५१
४१	वाटर प्रूफ प्लाइउड ६ मी.मी.	वर्ग मि	८३२।००	८६१।१२
४२	वाटर प्रूफ प्लाइउड १९ मी.मी.	वर्ग मि	११५५।००	११९५।४२
४३	टिक प्लाइउड ४ मी.मी.	वर्ग मि	५३५।००	५५३।७२
४४	हार्ड बोर्ड	वर्ग मि	२९०।५२	३००।६८
४५	ऐना ३ मी.मी.	वर्ग मि	४२०।००	४३४।७०
४६	ऐना ४ मी.मी.	वर्ग मि	४७५।००	४९१।६२
४७	ऐना ५ मी.मी.	वर्ग मि	६५०।००	६७२।७५
४८	ऐना ६ मी.मी.	वर्ग मि	८१५।००	८४३।५२
४९	हाण्डिल (स्पेशल)	एक	९०।००	९३।१५
५०	हाण्डिल साधारण	एक	४०।००	४१।४०
५१	ट्रस (आइरन ब्लाकपाइप)	केजी	१००।००	१०३।५०
५२	पर्लिन (आइरन ब्लाकपाइप)	केजी	१००।००	१०३।५०
५३	जि.आई.पाता प्लेन सिट (२८ गेज)	वर्ग मि	२३५।००	२४३।२२
५४	सि.जि.आई.पाता २६ गेज	वर्ग मि	४७१।६५	४८८।१५
५५	२८ गेज प्लेनसिट	र.मी.	२३५।००	२४३।२२
५६	०.४१ मी.मी रंगिन जस्ता पाता	व.मी.	६३२।९०	६५५।०५
५७	नट बोल्ट	गोटा	१३।००	१३।४५
५८	जे हूक (१ के.जी.मा १० वटा मानेको)	गोटा	१३।००	१३।४५
५९	यु हूक (१ के.जी.मा १० वटा मानेको)	गोटा	१३।००	१३।४५
६०	विटूमिन वासर	गोटा	१।७५	१।८१
६१	पोरसिलिन ग्लेज टायल	वर्ग मि	५६०।००	५७९।६०
६२	खापा अड्याउने हूक	गोटा	२०।००	२०।७०
६३	काठको लिष्टी	रमि	४।००	४।१४
६४	४० मी.मी. स्क्रयु	गोटा	२।५०	२।५८
६५	डोर स्प्रीडग साधारण	गोटा	३२०।००	३३१।२०
६६	मैन पालिस	केजी	३२०।००	३३१।२०
६७	तारपेन्टाईन	लिटर	८५।००	८७।९७
६८	सेता चूना	केजी	२०।००	२०।७०
६९	सूर्की	टन	१७००।००	१७५९।५०
७०	गम (मोविकल/फेविकल)	केजी	१५१।२०	१५६।४९
७१	अस्तर (सिमेन्ट प्राइमर सेतो)	लिटर	२५०।००	२५८।७५
७२	तयारी डिस्टेम्पर (वासेवल)	लिटर	३००।००	३१०।५०
७३	सिमेन्ट पेन्ट	केजी	९०।००	९३।१५
७४	इनामेल पेन्ट	लिटर	२४०।००	२४८।४०
७५	प्राइमर पेन्ट (उड प्राइमर)	लिटर	२८५।००	२९४।९७
७६	इमल्सन पेन्ट	लिटर	४००।००	४१४।००
७७	एल्मूनियम पेन्ट	लिटर	३३०।००	३४१।५५
७८	गेरु	केजी	१७।००	१७।५९

जिल्ला दररेट (२०६६/०६७)

सि.नं.	तह/किसिम	एकाई	दर प्रति एकाई	३.५% ढुवानी थप
७९	रेड अक्साइड पेन्ट	लिटर	३३५।००	३४६।७२
८०	टाटा रेड अक्साइड पेन्ट	लिटर	९०।००	९३।१५
८१	खाक्सी	केजी	३।००	३।१०
८२	बार्नेस (तयारी बार्नेस कर्मसियल)	लिटर	३२०।००	३३१।२०
८३	अलकत्रा पेन्ट	लिटर	६५।००	६७।२७
८४	चप्रा	केजी	५००।००	५१७।५०
८५	स्पिरिट	लिटर	९०।००	९३।१५
८६	स्नोसिम	केजी	९०।००	९३।१५
८७	वाटरप्रूफ कम्पाउण्ड	केजी	१८०।००	१८६।३०
८८	विटूमिन वासर	एक गोटा	१।७५	१।८१
८९	पोलिथिन शिट ५०० गेज	वमि	१५६।००	१६१।४६
९०	तयारी ईनामेल पेन्ट	लिटर	२४०।००	२४८।४०
९१	फलामे ग्रिल ३x२० मी.मी. (प्रति वफि १.५ केजी)	वमि	१५३४।००	१५८७।६९
९२	फलामे ग्रिल ४.५x२० मी.मी.(प्रति वफि २ केजी)	वमि	२२४०।००	२३१८।४०
९३	विभिन्न प्रकारको च्यानलहरु	केजी	९५।००	९८।३२
९४	फलामे कोलाप्सीबल गेट (जडान समेत)	वमि	३५१०।००	३६३२।८५
९५	जि.आई. कांढेतार (वार वेड वायर ७ मी. वरावर १	रमि	१५।००	१५।५२
९६	डायगोनल कांढेतार (वार वेड वायर ७ मी. वरावर १	रमि	१५।००	१५।५२
९७	बास १८ देखि २० फिट लामो	गोटा	१००।००	१०३।५०
९८	4"- 6" पाइप,फूट रेस्ट, रेलिङ समेत जडान गरी फलामे	र.मि	४३७८।८०	४५३२।०५
९९	विभिन्न प्रकारको एंगलहरु	केजी	६०।००	६२।१०
१००	प्लास्टर अफ पेरिस	केजी	१५।००	१५।५२

नेपाल सरकार

स्थानीय विकास मन्त्रालय

जिल्ला विकास समितिको कार्यालय

जिल्ला प्राविधिक कार्यालय

कास्की

दर विष्लेशण (Summary)

आ.व. २०६६-०६७

क्र.सं.	विवरण	दर(रुपैयां)		इकाई
		ओभरहेड बाहेक	ओभरहेड सहित	
कार्य समूह 'क' :- साईट सफा गर्ने काम				
१.	१२-३० से.मी. गोलाई रुख ढाल्ने कार्य	२२।१०	२५।४१	एक
२.	१३७ से.मीं गोलाई रुख ढाल्ने कार्य	६८०।००	७८२।००	एक
३.	रुखको जरा झिक्ने कार्य	६८।००	७८।२०	एक
४.	बाक्लो झारपाट काट्ने कार्य	६।८०	७।८२	व.मी.
५.	सर्फेस ड्रेसिङ्ग गर्ने कार्य	१।७०	१।९५	व.मी.
६.	माथिल्लो माटो खन्ने काम	२७।२०	३१।२८	व.मी.
७.	साईट सफा गर्ने काम	१०।२०	११।७३	व.मी.
कार्य समूह 'ख' :- माटो काट्ने र पुर्ने काम				
८.	नरम प्रकारको माटो खन्ने काम	१२२।५७	१४०।९५	घ.मी.
९.	साह्रो प्रकारको माटो खन्ने काम	१४०।०८	१६१।०९	घ.मी.
१०.	सामान्य माटोले पुर्ने काम (पानी छरिकन)	८५।००	९७।७५	घ.मी.
१०. क	सामान्य माटोले पुर्ने काम (पानी छरिकन) माटोको ढुवानी समेत	५५१।२५	६३३।९४	घ.मी.
११.	सामान्य माटोले पुर्ने काम (पानी नछरिकन)	४२।५०	४८।८७	घ.मी.
१२.	जग वा खाडलबाट पानी पम्प गर्ने काम	१५४।५०	१७७।६७	घ.मी.
१३.	बालुवा भर्ने काम	८४७।६३	९७४।७८	घ.मी.
कार्य समूह 'ग' :- ईंटाको काम				
१६.	भुईंतल्लामा ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:४) मा	७,९७३।६१	९,१६९।६५	घ.मी.
१७.	भुईंतल्लाभन्दा माथि ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:४) मा	८,०६१।१६	९,२७०।३३	घ.मी.
१८.	भुईंतल्लामा ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:५) मा	७,८९३।९०	९,०७७।९९	घ.मी.
१९.	भुईंतल्लाभन्दा माथि ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:५) मा	७,९८१।४५	९,१७८।६७	घ.मी.
२०.	भुईंतल्लामा ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:६) मा	७,६२२।७४	८,७६६।१५	घ.मी.
२१.	भुईंतल्लाभन्दा माथि ईंटाको गारो लगाउने काम सिमेन्ट मसला (१:६) मा	७,७१०।२९	८,८६६।८३	घ.मी.
२४.	भुईंतल्लामा चिम्नी भट्टाको ईंटाको गारो सिमेन्ट मसला (१:४) मा	६,८४६।१२	७,८७३।०४	घ.मी.
२५.	भुईंतल्लाभन्दा माथि चिम्नी भट्टाको ईंटाको गारो सिमेन्ट मसला (१:४) मा	६,९३३।६८	७,९७३।७३	घ.मी.
२६.	भुईंतल्लामा चिम्नी भट्टाको ईंटाको गारो सिमेन्ट मसला (१:६) मा	६,४८२।८३	७,४५५।२६	घ.मी.
२७.	भुईंतल्लाभन्दा माथि चिम्नी भट्टाको ईंटाको गारो सिमेन्ट मसला (१:६) मा	६,५७०।३८	७,५५५।९४	घ.मी.
२८.	भुईंतल्लामा चिम्नी भट्टाको ईंटाको गारो माटोमा लगाउने काम	५,१६५।४३	५,९४०।२५	घ.मी.
२९.	भुईंतल्लाभन्दा माथि चिम्नी भट्टाको ईंटाको गारो माटोमा लगाउने काम	५,२५२।९८	६,०४०।९३	घ.मी.
कार्य समूह 'घ' :- ढुङ्गाको काम				
३१.	ढुङ्गाको गारो सिमेन्ट मसला (१:४) मा	५,२६९।७४	६,०६०।२०	घ.मी.
३२.	ढुङ्गाको गारो सिमेन्ट मसला (१:६) मा	४,६००।०१	५,२९०।०१	घ.मी.
३३.	सुख्खा ढुङ्गाको गारो लगाउने काम	२,००६।२०	२,३०७।१३	घ.मी.
३४.	ढुङ्गाको गारो माटो लगाउने काम	२,२४४।५१	२,५८१।१९	घ.मी.
३५.	ढुङ्गाको गारो तेर्सो सतहमा सि.बा. (१:३) मा	५,९१५।७०	६,८०३।०६	घ.मी.
३६.	ढुङ्गाको गारो तेर्सो सतहमा सि.बा. (१:४) मा	५,५००।१६	६,३२५।१८	घ.मी.
३७.	ढुङ्गाको गारो तेर्सो सतहमा सि.बा. (१:६) मा	४,८३९।३०	५,५६५।२०	घ.मी.
३८.	कुंदेको ढुङ्गाको काम सि.बा. (१:६) मा	३,५३६।११	४,०६६।५३	घ.मी.
३९.	जगको खाडलमा ढुङ्गा भर्ने काम	१,७४५।४०	२,००७।२१	घ.मी.

दर विष्लेशण (Summary)

आ.व. २०६६-०६७

क्र.सं.	विवरण	दर(रुपैयां)		इकाई
		ओभरहेड बाहेक	ओभरहेड सहित	
कार्य समूह 'ङ' :- सिमेन्ट कंक्रीटको काम				
४२.	जग भित्ता पर्खालमा पी.सी.सी. (१:३:६)	६,१६०।१७	७,०८४।१९	घ.मी.
४३.	जग भित्ता पर्खालमा पी.सी.सी. (१:२:४)	७,३४४।२१	८,४४५।८४	घ.मी.
४४.	सूपर स्ट्रक्चरमा पी.सी.सी. (१:२:४)	७,७२४।२१	८,८८२।८४	घ.मी.
४५.	सूपर स्ट्रक्चरमा पी.सी.सी. (१:१$^{१}/_{२}$:३)	८,७५४।०३	१०,०६७।१३	घ.मी.
४६.	सूपर स्ट्रक्चरमा पी.सी.सी. (१:१:२:)	११,४५१।२३	१३,१६८।९२	घ.मी.
४७.	आर.सी.सी.को लागि फलामे डण्डीको काम	७७,३६५।४४	८८,९७०।२६	मे.टन.
कार्य समूह 'च' :- फर्माको काम				
४८.	काठमा फर्मा बनाउने काम	२२२।५९	२५५।९८	व.मी.
४९.	कोलममा फर्मा लगााउने काम	३३५।३१	३८५।६१	व.मी.
५०.क	वीममा फर्मा बनाउने काम (वीमको उचाई ०.३ मी. सम्म)	३४९।३०	४०१।७०	व.मी.
५१.	वीममा फर्मा बनाउने काम (वीमको उचाई ०.३ मी. देखि ०.८ मी. सम्म)	२७५।४०	३१६।७१	व.मी.
५१.ख	१९ मी.मी. प्लाईको कोलममा फर्मा लगाउने काम	४२७।२१	४९१।२९	व.मी.
कार्य समूह 'छ' :- छानाको काम				
५५क.	०.३५ मी.मी. बाक्लो सी.जी.आई. छाना छाउने काम	७२३।९६	८३२।५५	व.मी.
५८.	२८ गेज रंगिन प्लेन शिटको धुरी जडान गर्ने काम	४०९।८६	४७१।३४	र.मी.
"	२८ गेज रंगिन प्लेन शिटको धुरी जडान गर्ने काम	४५०।३९	५१७।९५	व.मी.
कार्य समूह 'ज' :- काठको काम				
६२.	काठको सिलिङ्ग लगाउने काम	३,३२०।६२	३,८१८।७१	व.मी.
६३.	अग्राख काठको चौकोस बनाई जोड्ने काम	६९,००२।५०	७९,३५२।८७	घ.मी.
६४.	अग्राख काठको डिला खापा बनाउने काम	३,५४०।४१	४,०७१।४७	व.मी.
६५.	३ मी.मी. ऐना खापा बनाई जडान गर्ने काम	२,५३३।१९	२,९१३।१७	व.मी.
६६.	४ मी.मी. ऐना खापा बनाई जडान गर्ने काम	२,६२६।१०	३,०२०।०१	व.मी.
६७.	५ मी.मी. ऐना खापा बनाई जडान गर्ने काम	२,७११।९८	३,११८।७८	व.मी.
६८.	६ मी.मी. ऐना खापा बनाई जडान गर्ने काम	२,७९७।३१	३,२१६।९१	व.मी.
६९.	४ मी.मी. कमर्सियल प्लाईउडको खापा बनाई जडान गर्ने काम	२,४०७।५७	२,७६८।७१	व.मी.
७०.	६ मी.मी. वाटरप्रुफ प्लाईउडको खापा बनाई जडान गर्ने काम	३,११२।७०	३,५७९।६१	व.मी.
७१.	४ मी.मी. टीक प्लाईउडको खापा बनाई जडान गर्ने काम	३,१८७।८१	३,६६५।९८	व.मी.
७२.	जी.आई.प्लेन शीट खापा बनाई जडान गर्ने काम	२,५७४।६०	२,९६०।७९	व.मी.
७४.	३ मी.मी. ऐना लिष्टी लगाई जोड्ने काम	४८५।४८	५५८।३०	व.मी.
७५.	४ मी.मी. ऐना लिष्टी लगाई जोड्ने काम	५४२।४०	६२३।७६	व.मी.
७६.	५ मी.मी. ऐना लिष्टी लगाई जोड्ने काम	७२३।५२	८३२।०५	व.मी.
७७.	६ मी.मी. ऐना लिष्टी लगाई जोड्ने काम	८९४।३०	१,०२८।४४	व.मी.
७८.	४ मी.मी. कमर्सियल प्लाईउड लिष्टी लगाई जोड्ने काम	२३५।५१	२७०।८४	व.मी.
७९.	४ मी.मी. कमर्सियल प्लाईउडको कठवार लगाउने काम	१,०३६।१७	१,१९१।६०	व.मी.
८०.	१२ मी.मी. कमर्सियल प्लाईउड लिष्टी लगाई कठवार लगाउनृ काम	१,४८३।४१	१,७०५।९३	व.मी.
८२.	४ मी.मी. कमर्सियल प्लाइउडको फल्स सिलिङ्ग काम (अग्राख)	९५७।९५	१,१०१।६४	घ.मी.
८२क.	६ मी.मी. कमर्सियल प्लाइउडको फल्स सिलिङ्ग काम (अग्राख)	१,०२८।८५	१,१८३।१८	व.मी.
८३.	४ मी.मी. कमर्सियल प्लाइउडको फल्स सिलिङ्ग काम (सल्लो)	५८६।७१	६७४।७२	व.मी.
८४.	अग्राख काठको वीम लिन्टल बनाई जोड्ने काम	५१,६८०।६८	५९,४३२।७८	घ.मी.
८५.	२५ मी.मी. ईम्स वोर्ड (मुठल) बनाई जोड्ने काम	१,२५७।००	१,४४५।५५	व.मी.
८६.	चौकसमा डण्डी जडान गर्ने काम	८०,०३८।७५	९२,०४४।५६	मे.ट.

दर विष्लेशण (Summary)

आ.व. २०६६-०६७

क्र.सं.	विवरण	दर(रुपैयां)		इकाई
		ओभरहेड बाहेक	ओभरहेड सहित	
कार्य समूह 'झ' :- फ्लोरिङ्गको काम				
८७.	सिमेन्ट कंक्रीट फ्लोरिङ्ग (१:२:४) (३८ मी.मी.)	३३२।८३	३८२।७६	व.मी.
८८.	सिमेन्ट कंक्रीट फ्लोरिङ्ग (१:२:४) (५० मी.मी.)	४१५।३८	४७७।६९	व.मी.
८९.	सिमेन्ट कंक्रीट फ्लोरिङ्ग (१:२:४) (७५ मी.मी.)	६००।८२	६९०।९४	व.मी.
९५.	पोरसिलीन ग्लेज्ड टाईल (१:४) सिमेन्ट बा.मा	१,२००।२४	१,३८०।२८	व.मी.
१०१.	ठाडो ईंटा (१:६) सि.बा.मा छाप्ने काम	८४८।९७	९७६।३२	व.मी.
१०२.	सुख्खा ईटा च्याप्टो छाप्ने काम	४३५।०८	५००।३४	व.मी.
१०३.	सुख्खा ईटा ठाडो छाप्ने काम	७४४।४१	८५६।०७	व.मी.
१०४.	सुख्खा ढुङ्गा छाप्ने काम	१,६६२।६४	१,९१२।०४	व.मी.
१०५.	ईटा सोलिङ्ग गरी जोर्नीमा बालुवा भर्ने काम	७४६।७४	८५८।७५	व.मी.
१०६.	ढुङ्गा छापेकोमा टिप्कार गर्ने काम	५,४५७।५७	६,२७६।२१	घ.मी.
१०७.	फ्लोरिङ्गमा बालुवा भर्ने काम	९२३।६३	१,०६२।१८	व.मी.
१०९.	मसीनो सिमेन्ट घोट्ने काम	११५।८३	१३३।२०	व.मी.
११०.	प्लेन प्लास्टर अफ पेरिस गर्ने काम	१२९।५७	१४९।००	व.मी.
कार्य समूह 'ञ' :- प्लाष्टरको काम				
११२.	१२.५ मी.मी. सिमेन्ट बालुवा (१:३) प्लाष्टर सिलिंगमा	१७५।७६	२०२।१२	व.मी.
११३.	१२.५ मी.मी. सिमेन्ट बालुवा (१:४) प्लाष्टर सिलिंगमा	१६६।७३	१९१।७४	व.मी.
११४.	१२.५ मी.मी. सिमेन्ट बालुवा (१:४) प्लाष्टर	१५०।९३	१७३।५७	व.मी.
११५.	१२.५ मी.मी. सिमेन्ट बालुवा (१:६) प्लाष्टर	११४।६९	१३१।८९	व.मी.
११७.	२० मी.मी. सिमेन्ट बालुवा (१:३) प्लाष्टर	२२२।७१	२५६।१२	व.मी.
११८.	२० मी.मी. सिमेन्ट बालुवा (१:४) प्लाष्टर	२०६।४२	२३७।३८	व.मी.
११९.	२० मी.मी. सिमेन्ट बालुवा (१:६) प्लाष्टर	१७७।२३	२०३।८१	व.मी.
कार्य समूह 'ट' :- रंग रोगनको काम				
१२२.	नयाँ सर्फेसमा ह्वाईटवाश गर्ने काम (सिलिंगमा) दुई कोट	१३।८९	१५।९७	व.मी.
१२३.	नयाँ सर्फेसमा ह्वाईटवाश दुई कोट गर्ने काम	१२।३०	१४।१४	व.मी.
१२४.	नयाँ सर्फेसमा ह्वाईटवाश तीन कोट गर्ने काम (सिलिंगमा)	२५।६०	२९।४४	व.मी.
१२५.	नयाँ सर्फेसमा ह्वाईटवाश तीन कोट गर्ने काम	२२।२१	२५।५४	व.मी.
१२६.	पुरानो सर्फेसमा ह्वाईटवाश गर्ने काम	६।२८	७।२२	व.मी.
१२७.	एक कोट डिस्टेम्पर रंग लगाउने काम	५९।६८	६८।६३	व.मी.
१२८.	दुई कोट डिस्टेम्पर रंग लगाउने काम	८३।६६	९६।२१	व.मी.
१२९.	एक कोट वाटर प्रुफ सिमेन्ट कोट लगाउने काम	३५।९३	४१।३२	व.मी.
१३०.	दुई कोट वाटर प्रुफ सिमेन्ट कोट लगाउने काम	६८।६७	७८।९७	व.मी.
१३१.	एक कोट इनामेल पेन्ट लगाउने काम	७५।८१	८७।१८	व.मी.
१३२.	दुई कोट इनामेल पेन्ट लगाउने काम	११०।३०	१२६।८४	व.मी.
१३३.	एक कोट प्लाष्टिक इमल्शन पेन्ट लगाउने काम	९०।७१	१०४।३२	व.मी.
१३४.	दुई कोट प्लाष्टिक इमल्शन पेन्ट लगाउने काम	१३६।७९	१५७।३१	व.मी.
१३५.	दुई कोट एल्युमिनियम पेन्ट लगाउने काम	१०८।३६	१२४।६१	व.मी.
१३६.	दुई कोट गेरु रंग लगाउने काम	८०।१५	९२।१७	व.मी.
१३९.	एक कोट बार्नेस लगाउने काम	३२।२७	३७।११	व.मी.
१४०.	दुई कोट बार्नेस लगाउने काम	६१।२३	७०।४१	व.मी.
१४१.	एक कोट अलकत्रा पेन्ट लगाउने काम	११।०३	१२।६८	व.मी.
१४२.	दुई कोट अलकत्रा पेन्ट लगाउने काम	१९।१०	२१।९६	व.मी.
१४३.	तीन कोट चप्रा पालिश लगाउने काम	५५।१६	६३।४३	व.मी.
१४४.	एक कोट टाटा रेड अक्साइड लगाउने काम	११२।००	१२८।८०	व.मी.
१४५.	दुई कोट टाटा रेड अक्साइड लगाउने काम	१९१।६५	२२०।४०	व.मी.

दर विष्लेशण (Summary)

आ.व. २०६६-०६७

क्र.सं.	विवरण	दर(रुपैयां)		इकाई
		ओभरहेड बाहेक	ओभरहेड सहित	
कार्य समूह 'ठ' :- टिप्कार गर्ने काम				
१४६.	ईटाको गारोमा सिमेन्ट बालुवा (१:१) फ्लस टिप्कार गर्ने काम	९५।५१	१०९।८४	व.मी.
१४७.	ईटाको गारोमा सिमेन्ट बालुवा (१:१) रुल्ड टिप्कार गर्ने काम	१२१।४६	१३९।६८	व.मी.
१४८.	ईटाको गारोमा सिमेन्ट बालुवा (१:२) फ्लस टिप्कार गर्ने काम	८२।६७	९५।०७	व.मी.
१४९.	ईटाको गारोमा सिमेन्ट बालुवा (१:२) रुल्ड टिप्कार गर्ने काम	१०८।६२	१२४।९१	व.मी.
१५०.	ईटाको गारोमा सिमेन्ट बालुवा (१:३) फ्लस टिप्कार गर्ने काम	७५।९२	८७।३१	व.मी.
१५१.	ईटाको गारोमा सिमेन्ट बालुवा (१:३) रुल्ड टिप्कार गर्ने काम	१०१।८७	११७।१५	व.मी.
१५२.	बोल्डर ढुङ्गाको गारोमा सिमेन्ट बालुवा (१:१) रुल्ड टिप्कार गर्ने काम	१३८।३१	१५९।०६	व.मी.
१५३.	बोल्डर ढुङ्गाको गारोमा सिमेन्ट बालुवा (१:२) फ्लस रुल्ड टिप्कार गर्ने काम	११३।६६	१३०।७१	व.मी.
१५८.	फ्लसिंग प्लाष्टर सिमेन्ट बालुवा (१:१) मा लगाउने काम	९३।३२	१०७।३२	व.मी.
१५९.	चुनामा फ्लसिंग प्लाष्टर लगाउने काम	९५।०२	१०९।२७	व.मी.
१६०.	सिमेन्टमा फ्लसिंग प्लाष्टर लगाउने काम	११४।०१	१३१।११	व.मी.
कार्य समूह 'ड' :- वाटर प्रुफिंग गर्ने काम				
१६१.	२ से.मी.मोटाईको सिमेन्ट बालुवा (१:२) मा डेम्प प्रुफिङ्ग गर्ने काम	२८३।४१	३२५।९२	व.मी.
१६२.	२.५ से.मी.मोटाईको सिमेन्ट कंक्रीट (१:१$^{१}/_{२}$:३) मा डेम्प प्रुफिङ्ग गर्ने काम	१५७।५७	१८१।२१	व.मी.
१६३.	३.८ से.मी.मोटाईको सिमेन्ट कंक्रीट (१:२:४) मा डेम्प प्रुफिङ्ग गर्ने काम	२०८।५४	२३९।८२	व.मी.
१६५.	५०० गेजको पोलिथिन शीट एक तह विछ्याउने काम	२०५।८०	२३६।६७	व.मी.
कार्य समूह 'ढ' :- मर्मत सम्बन्धी काम				
१६९.	गारोको मोहडामा विग्रेको ईटा निकाली सि.बा. (१:६) मा मर्मत गर्ने काम	८,१३८।६७	९,३५९।४७	घ.मी.
१७३.	माटोमा जोडेको गारो भत्काउने काम	१८०।२०	२०७।२३	घ.मी.
१७४.	सिमेन्ट वा वज्र जोडेको गारो भत्काउने काम	३६०।४०	४१४।४६	घ.मी.
१७५.	आर.सी.सी. वा आर. वि.सी. भत्काउने काम	१,८७०।००	२,१५०।५०	घ.मी.
१७६.	पी.सी.सी. वा एल.सी.सी. भत्काउने काम	६८०।००	७८२।००	घ.मी.
कार्य समूह 'ण' :- फलामको काम				
१७७.	३ X २० मी.मी.ग्रील वनाई जोड्ने काम (पेन्ट समेत)	४८४।२३	५५६।८६	व.मी.
१७८.	४.५ X २० मी.मी.ग्रील वनाई जोड्ने काम (पेन्ट समेत)	७०६।४३	८१२।३९	व.मी.
१७९.	फलामे कोलप्सीवल गेट वनाई जोड्ने काम (पेन्ट समेत)	३,७६३।८४	४,३२८।४२	व.मी.
१८२.	जी.आई.कांडेतार लगाउने काम	३१।३०	३५।९९	र.मी.
१८३	३ मी. दूरीमा खम्वा गाडी कांडेतार लगाउने काम	४६२।८५	५३२।२८	र.मी.
	(५लाइन सिधा,२ लाइन तेर्सो र साल काठको पोल सहित)			
कार्य समूह 'त' :- नयाँ काम				
१९३.	Black Pipe Tubular Purlin बनाई जडान गर्ने काम (प्राइमर पेन्ट सहित)	१२७।१९	१४६।२७	के.जी.
१९८.	अस्तर वाहेक एककोट तयारी इनामेल पेन्ट गर्ने काम	४०।७५	४६।८६	व.मी.
१९९.	अस्तर वाहेक दुईकोट तयारी इनामेल पेन्ट गर्ने काम	७५।२४	८६।५३	व.मी.
२००.	अस्तर वाहेक एककोट प्लाष्टिक इमल्सन पेन्ट गर्ने काम	५५।६५	६४।००	व.मी.
२०१.	अस्तर वाहेक दुई कोट प्लाष्टिक इमल्सन पेन्ट गर्ने काम	१०१।७४	११७।००	व.मी.
२०४.	अस्तर वाहेक एक कोट रेट अक्साइड पेन्ट गर्ने काम	२१।६१	२४।८५	व.मी.
२०५.	अस्तर वाहेक दुई कोट रेट अक्साइड पेन्ट गर्ने काम	५३।५५	६१।५८	व.मी.
२१५.	जस्तापाताको छाना भत्काउने काम	१४।९०	१७।१३	व.मी.

Appendix - N

Questionnaire

Nammaste! I am Deva Raj Subedi. I am studying MBS at Shanker Dev Campus. Currently, I am conducting a research on ***"Financing in Hydropower Project of Nepal – A study of Upper Chardi Hydroelectric project"*** to prepare my thesis. In this connection, I am going to ask you some questions about your Project's cost and other details. Information provided by you will be kept confidential and will be used solely for the purpose of thesis writing. This interview will take about 30 minutes. I hope, you will cooperate me for providing accurate information that I need.

Researcher	**respondent**
Name:- Deva Raj Subedi	
Roll No – 904/059	Education:
Level M B S	Organization:
Sankar Dev College	Position:
	Date:

Questions: Please tick the (□) following Questions:-

Q.N. 1 Is your project Capital budgeting tools practice or not?

□ **YES** □ **NO**

Q.N. 2 Capital Budgeting tools should practice for investment decision?

□ **YES** □ **NO**

Q.N.3 your project which tools are used among the following?

□ Payback period □ **NPB**

□ **IRR** □ **ARR**

□ **ALL** □ **NON OF ALL**

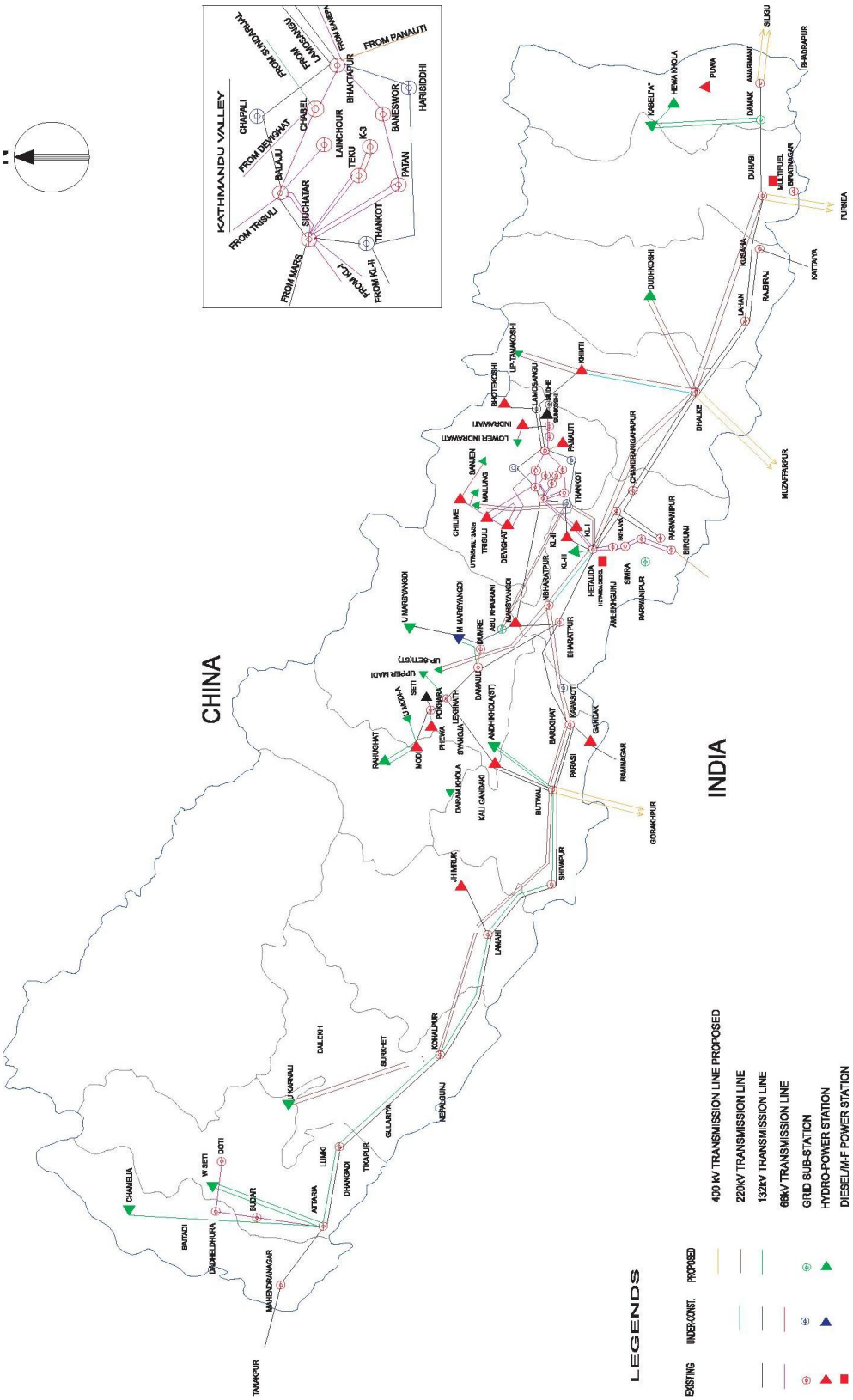
Thank you very much for your kind cooperation!

POWER DEVELOPMENT MAP OF NEPAL

SMALL HYDRO POWER STATIONS, ISOLATED SOLAR & DIESEL POWER STATIONS

(NOT TO SCALE)

Appendix P: Power Development Map of Nepal (Major Plants & Transmission Line)



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