CHAPTER – I
INTRODUCTION

1.1 General Background

Nepal is one of the richest countries in the world in terms of water resources possessing about 2.27% out the total world water resources. Every body now accepts that the key to development of Nepal lies in efficient exploitation of water resource. The theoretical hydro power potential of Nepal is 83,000 MW of which an estimated 43,000 MW are deemed commercially exploitable (Kafle, 2011).

Hydro power is a vital input needed to fuel the engine of economic growth and to fulfill the basic needs of the entire population of a country. Energy differentiates a least developed or developing economy from a developed economy. Empirical evidence suggests that lack of energy can whittle down the pace of economic development while its abundance can stimulate the development. Data shows that on an average an American consumes approximately 40% more energy than and Indian does. Electricity is the most critical input for agricultural, industrial production, information technology and telecommunications and raising the quality of life of people. Power development ought to be the top most economic priority of the state (Kafle, 2005).

Nepal is bestowed with snow clad Himalayas, lush green mountains, fascinating valleys and lakes as well as diversified eco-systems to attract both foreign and domestic tourists. Apart from basic infrastructure development works, sustainable energy supply is the key factor to boost of tourism industry. It has been acknowledged that tourism is a driving force for poverty alleviation and sustainable development.

The multiple use benefits of hydropower, particularly in relation to the availability, reliability and quality of fresh energy has been globally recognized for its valuable contribution to sustainable development providing access of energy especially for the poor and for maintaining natural ecosystem mitigating greenhouse gas emissions. At present, the source accounts only for 20% of world electricity supply (Karmacharya, 2002).

Electricity is one of the basic inputs for the acceleration of economic growth of the country but generation of hydropower for supplying electricity to fulfill event for the domestic

demand is delayed resulting to the adverse impact in the national economy. The annually increased population and increasing trend of electricity demand due to people's awareness of improving quality of life demands sustainable means of supplying source. About two third of population have no access of electricity, which blight their prospects for health, education and achievement. The enormous hydropower potential of Nepal is the main alternative sustainable source of energy that is environmentally friendly, socially responsible and economically viable. Development of hydropower contributes to the development of rural electrification meeting the domestic need, employment generation, stemming deforestation need, and expanding domestic agricultural production and development of industry as well as business, there by contributing to sustain poverty reduction (Karmacharya, 2002).

The availability of electricity in affordable cost can be utilized as a vehicle of industrial development and provide basis for competitive manufacturing industries, which in turn can lead to cheap manufactured export. Proper utilization of hydro energy in different industrial sector, transportation sector besides electrification, heating, cooking etc. can reduce the present investment of more than 25 billion Nepalese rupees to import of fossil fuel products, contributing the economic growth of the country.

The main outcomes of hydropower project development in the social aspects are providing improved living condition of affected people, improving public health condition, ensuring equitable distribution of benefit sharing particularly to the affected and vulnerable communities by the process of revenue sharing, training program and educational facility and supporting additional benefits of infrastructure development for drinking water supply and electrification services associated with project.

Rapid advanced in technology for the industrial development in the developed countries as well as in some developing countries of the world forced to the extensive use of fossil fuels and high rate of deforestation annually. The overuse of fossil fuel, chemical fertilizer etc. and deforestation increased the level of carbon dioxide in the atmosphere from 0.02% to 0.036% since last two centuries. Carbon dioxide is the most responsible factor for increasing greenhouse gas emission in the atmosphere is raising the temperature in the Earth continuously. Earth's average temperature reported to be increased from 0.3-0.6 degree Celsius since 1960 and will be continued. Change (IPCC), decade of nineties was found to be the warm decade and 1998 was the warmest year on record. Development of hydropower project and making proper utilization of energy may have direct impact to the reduction of

the negative consequences in the climate change. Besides, use of water for electricity generation is essentially a non-consumptive use of natural resource (Pandey, 2009).

The huge hydropower potential of Nepal that can be developed in an economically, socially and environmentally sustainable manner represents the storage of energy in South Asian Region. It can provide easier access to financing in a new drive to encourage sustainable hydropower throughout the world.

Despite 50 years of planning in World's highest hydropower generation capacity has given only 40 percent of Nepalese population, access to electricity out of which the share of rural area is desperately low. The average per capita electricity consumption that is the indicator of living standard is 68 KWH per annum is one of the lowest in the world.

Government of Nepal has emphasized Rural Electrification (RE) to be the key and indispensable element for the overall economic development of the country. Rural electrification has remained a major challenge to GN/NEA in the past 30 years and Government's every endeavour has not been able to provide electrification up to the need and expectation of people. Tenth plans aims at achieving 55% of population coverage by electricity supply but so far only a small percentage of the rural population have been provided access to electricity. Most of the urban areas have been electrified and some of them are in saturation point (Rana, 2009).

Nepal's electricity generation is dominated by hydropower, though in the entire scenario of the country, the electricity is a tiny fraction, only 1% energy need is fulfilled by electricity, the energy need is dominated by fuel wood (68%), agricultural waste (15%), animal dung (8%) and imported fossil fuel (8%) (Dhungel, 2011).

Nepalese power sector structure comprises of three tiers-licensing authority, the utility and the tariff regulating authority. Department of Electricity Development (DOED) represents the licensing authority, Nepal Electricity Authority (NEA) is the generation, transmission and distribution utility and Electricity Tariff Fixation Commission (ETFC) is the tariff regulating authority. DOED is a gonvermental institution, NEA is a public Enterprise wholly owned by the government and ETFC is a quasi-government agency. Besides these three, there is also a research and consulting wing under ministry of water resource, called Water and Energy Commission Secretariat (WECS). According to the present structure, the ministry of water

resources is the apex ministry responsible for over all power sector policy. It has a water and energy commission secretariat as the policy advisory body that formulates short and long term water and energy policies. The department of Electricity Development aims to help develop hydro electricity and encourage private sector entrepreneurs through licensing, promotion and one-window mechanism (Karmacharya, 2002).

Nepal electricity authority in accordance with its own act is a public sector undertaking permitted to generate, transmit and distribute electricity throughout Nepal. NEA is the result of amalgamation of Nepal electricity corporation and electricity department in august 1985(Bhadra 1, 2042B.S.). Prior to the creation of Nepal electricity authority, then electricity department of HMG/N had the responsibility of development and construction of power projects whereas the then Nepal electricity corporation was involved in generation, transmission and distribution of electricity (Karmacharya, 2002).

1.2 Statement of the Problem

Nepal is known as a rich country in hydro resources. There are more than 6000 rivers having potential of 83000MW hydropower. These perennial river systems carry about 225 billion cubic meter of water every year and flow down to Indian Ocean via India. The government of Nepal has given high priority to the hydropower. On the other hand most of Nepalese can not have opportunity to use electricity and they are living with kerosene lamps.

In the sector of hydro electricity utilization only 40% of the total population has access to electricity, mainly in urban area and in some pockets of the rural at the end of ninth plan. Among 40% electricity benefited people 33% of people are from national electricity supply system and rest 7% are from alternative energy. The majority of population who has access can also not effort to use electricity for cooking, heating etc. Because of high tariff they are forced to depend on indigenous sources of energy as forest, agriculture residue, animal waste and imported petroleum products.

In present situation commercial banks are investing their huge cash in Treasury bill in very low return due to the lack of favorable opportunity. Local investors and financial institutions are not much willing to invest in the hydropower project.

Investments on hydropower projects require huge amount of money, skilled manpower, improved technology, machineries and long period of time etc. Most of the investment seeks foreign bilateral and multilateral grants, loans etc. By this we are seemed as parasites on hydropower development.

What types of problems are being faced by the hydropower developers, financial institutions, government agencies and Nepal Electricity Authority in the context of hydropower development? What is the main reason behind the high electricity rate in Nepal? There is a stark imbalance between energy endowment and its utilization in Nepal. There is also imbalance between power demand and supply situation. This study is directed to resolve the following issues:

i. What is the investment pattern on power development in Nepal during sample period?
ii. What is the financial strength of NEA?
iii. What is the exiting investment policy of NEA?

1.3 Objectives of the Study

The main objective of the study is to analyze the power sector investment in Nepal with the following specific objectives:

- To study the investment pattern on power development.
- To identify problems of financing on power development.
- To provide suggestions based on findings.

1.4 Significance of the Study

Hydropower is economic, non-polluting and environmentally benign source of energy. Out of 83000MW potential, only 50% is technically feasible. But till the date the installed capacity in Nepal Electricity Authority (including private and others) is only 613.557MW and about 80MW is under construction. That means less than 1% has been developed out of which 99% yet to be developed. In the line of the fact, research analysis and development of hydropower is very essential from the view of economic development of the nation and uplift the overall economic condition of the people of Nepal.

The industrialization process in Nepal is being developed very slowly. In spite of various attractive policies of government in respect of industrialization, new investment made on industrial sector is not satisfactory. On the other hand in developing country like Nepal, development of hydropower industries and projects is very essential for supply of electricity required for establishment of industries in Nepal. Financing and banking sector of Nepal is increasing rapidly. Hydropower financing for them can be more reliable and viable source as there is huge potential in Nepal. Government has accorded to national priority to hydropower projects development but being highly capital intensive could not be effective. A partnership between government and private sectors is essential to harness abundant hydropower potential. For that the policies, acts, rules and regulations should be reformed based on project size as small, medium and large creating favorable environment to attract investment for co-financing from private investors to the sustainable hydropower development.

Private participation, power purchase agreement with private investors and their financial implication on NEA are important matters which need to be studied.

This study will point out the problems in the field of power development which will enable the developer, financing institutions and the government for planning in the future.

This study will also focus on investment policy, capital investment on power projects, financial health of NEA, its present status and future strategies. This will certainly be benefited to the researcher, planners, developer, financial institution, employees knowing. to know about power development in Nepal and NEA. Unfortunately, not much of worthwhile studies have been carried out in this area which even more increases the importance of such study.

1.5 Limitations of the Study

The study has following limitations:

i. The coverage of this study is limited to analyze the financing trend of the government for power development in different plans period covering 1956 to 2012 and of Nepal Electricity Authority (NEA) and the policy related with it.

ii. 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.

iii. Some quantitative tools such as percentage, trend analysis, mean, standard deviation, coefficient of variation and ratio analysis have been used to make the study more analytical.

iv. The study regarding the financial health of NEA covers the period starting from 2000/2001 to 2010/11.

1.6 Organization of the Study

The study has been divided into five chapters. Which are as follows:-

Chapter – I

Chapter one concentrates on introductory part of the study. It includes general background, statement of the problem, significance of the study, limitation of the study and organization of the study.

Chapter – II

Chapter two is review of literature under conceptual framework and reviews of previous studies have been covered.

Chapter – III

Research methodology is discussed in chapter three and deals with research design, period covered, types and sources of data, data collection procedure, method of analysis and analytical tools used.

Chapter – IV

Chapter four is presentation, analysis, interpretation of data and major findings of the study.

Chapter – V

Chapter five discusses the summary, conclusions and recommendations.

Besides these, bibliography and Annexes are added.

CHAPTER - II

REVIEW OF LITERATURE

2.1 Theoretical Framework

The main objective of this part is to develop theoretical foundation of the researcher on the study area. This part shall include the conceptual review on the area that needs to be based on a review of text books and other reference materials such as journals and magazines.

Hydropower:

Hydropower may be induced using various technologies. Among them the power generated by the water is hydropower. Water is used to drive the mechanical equipment. The mechanical equipment is connected with generator, which produces electricity and controlled. The hydropower is only one power, which uses cheapest water energy. In Nepal, more than 90% of electrical power has been produced by hydropower that we use for our household and commercial purpose. Hydropower is the only renewable energy technology which is presently commercially viable on a larger scale. It has four major advantages: it is renewable, it is produces negligible amounts of greenhouse gases, it is the least costly way of storing large amounts of electricity, and it can easily adjust the amount of electricity produced to the amount demanded by consumers. Hydropower accounts for about 17% of global generating capacity, and about 20% of the energy produced each year (Shrestha, 2010).

Financing:

Financing is the process of rising of money and utilizes it for the betterment of projects. Collection of funds for the investment project is cost intensive. Hence least cost of capital is the great concern of the financing. Now a days financing is regarded as the debt management that is most for the investment project to earn high rate of return on capital. Under the financing, generally there are three functions: Investment decision, financing decision and Dividend decision. Hence, the financing decision can not be successful until investing in profitable project (Shrestha, 1996).

Investment:

Investment in its broadest sense means the sacrifice of current dollars for future dollars. Two

different attributes are generally involved: time and risk. The sacrifice takes place in the present and is certain. The reward comes later, if at all, and the magnitude is generally uncertain. In some cases the element of time predominates. In other cases risk is the dominant attribute. In yet others, both time and risk are important. Investment generally classified as, real investment and financial investment.

Real investment generally involves some kind of tangible asset such as land, machinery or factories. Financial investment involves contracts written on pieces of paper, such as common stocks and bonds (Khan and Jain, 1999).

Key Players on Hydropower Projects:

In most cases, the project will involve several parties, developer, lender, shareholders, and contractors. This section provides a general discussion of the parties involved and their interests in the power project.

Sponsor

The sponsor is the government agency or utility that is promoting a project. A private company that requires power may be the sponsor, but it may not want to build or own the plant. For large hydropower projects, the sponsor will normally be the national government or a government agency that wishes to improve the power- supply situation and to control the development of the power is often less important. The project may be a part of a national or regional electrification program with a government sponsor. However, in many cases the owners of the water rights develop hydro projects (Hugus, 1980).

Developer:

The developer is the most important participant in the development project. They must secure the necessary permission for the development, sign contracts with consultants, contractors and equipment suppliers, arrange a power purchase contract and secure the necessary financial resources for the development (Hugus, 1980).

Lenders:

Normally a bank or other investment institution will provide the majority of the financial resources needed often in the order of 60-80%.The lender may be agencies established for the specific purpose of facilitating investment in the national infrastructure e.g. the World Bank. They will provide financing at more favorable term than can be obtained on the private market. Private agencies such as commercial banks and insurance companies can also provide funding for hydro projects. However, as their main concern is the payback time shorter. To obtain a loan the developer must study feasibility and provide security for the lender's involvement.

Investors:

In most projects, bank loans will provide the largest proportion of the financial resources required. However, the last 20 – 30% of the financing, the equity capital, must be provided form others sources. This capital is poorly secured and has the lowest claim on the project's assets and cash flow. In return for talking this risk, the investors will expects to have strong influence on the projects, high anticipated profits or other special benefits. The project may be organized as a shareholder's company with the investor's receiving shares in return for the equity they provide. Possible investors include:

1. Power utilities that wish to influence or control the electricity supply in an area.
2. Industrial companies that wish to have access to power production utilities.
3. Local industry or local government agencies that provide venture capital to promote electrification in their area.
4. Financial institution that are interested in long term investment.

Power purchaser:

The power purchaser will normally be a nation or regional power utility or distribution company. It is also possible that the power will be sole directly to an end user, or to a power broker. The agreement between the development and the user is spelled out in detail in the power purchase agreement (PPA). It describe the amount of power to be supplied, prices and the price regulation agreement and penalty clauses that come into effect if the conditions are not fulfilled. The PPA is extremely important for project development. It is the leader's main

security that the project will be able to pay its debts. Without it, limited recourse project financing is important.

Contractor:

The traditional approach to hydropower construction has been to let separate contracts for the individual elements of the projects. The developer will also need an engineering firm to plan and describe the project and for project control. A several parties are involved; it may be difficult to apportion the responsibility for cost over runs or delays. An alternative is to use a single contract and sing a turn key contract. The responsibility for completion normally lies then with the contractor, to whom the risk, or a large portion of it, is transferred. Financers may insist on a turn key contract avoid the risk associate with project construction and performance the contractor will demand a higher contract price in return for assuming the risk.

Financial Markets:

Equity Finance:

Investment for the project is done through the share capital for construction of project is known as equity financing. Government policy allows a debt equity ratio of 50:50, however, the lending institutions advocate a Debt Equity ratio closer to 70:30 as a prudent measure for lending.

Debt Finance:

Collection of money for construction of project through the debt is known as debt financing. In raising debt for financing power projects, the cost of funds should be the lowest so that the ultimate cost of electricity, will be cheaper for the consumers. The decision of the project promoter to go for equity or debt finance depends upon various factors such as Government guidelines for power projects, incentives available, returns on equity and cost of debt (Hugus, 1980).

Domestic Capital Market:

Debentures (Convertible/ Non convertible)/ bonds are issued by Government and public/private Ltd. companies to arrange the resources for power sector in the capital market. Presently, internal rates are deregulated and credit rating is mandatory if the maturity of instrument exceeds maturity periods. The area of project financing in the Nepalese context, is mainly limited to term lending institutions like finance company, commercial bank and development banks. The joint venture institutions has started to provide finance as no individual financial institutions can feed to power sector singly because of huge capital requirements and long gestation period of power sector. The concept of loan syndication amongst the financial institutions is slowly starting in Nepal in these days. This also helps in sharing of risk among the financial institutions apart from saving on efforts and cost because of appraisal done by the lead institutions (Khan and Jain, 1999).

International Financial Markets:

Due to limited domestic finance available for power projects, the need to tap international markets becomes inevitable which is characterized by long tenure of maturities and availability of various modes of finances. Nepal has yet to use international markets for financing of hydro project.

Multilateral Institutions:

Institutions like World Bank (WB), International Monetary Fund (IMF), Asian Development Bank (ADB), Common wealth Development Corporation (CDC) have traditionally been financing infrastructure in developing countries. The financing comes with restrictive covenants, affordable cost, long tenure of usually more than 7 years and in an assured manner. The co- financing facility extended by some of the multilateral institutions is gaining popularity. In many of these loans, sovereign guarantee is required.

Syndicated Loans:

The special features of syndicated loans are that they are available for medium to longer period, specific to the requirements of the borrowers to suit their projects, and availability of

floating rate of interest. Most of the investors are Asian/ European banks, financial institutions, insurance companies and pension funds (Agrawal, 2004).

Financing Strategies for Hydropower Projects:

Financing alternatives and conditions will be discussed to optimum financial strategies.

Financing Alternatives:

Financing can be a major problem in many hydro projects. In many cases, the developer does not have sufficient funds for self-financing, nor sufficient assets to provide security for a bank loan. In this situation, the developer can try to finance the project by securing loans against the anticipated cash flow of the project. However, this will require a series of complex contractual arrangements that are expensive to set up.

Use of in-house Funds:

The developer's accumulated reserves may be used to finance a project. This may involve company in-house funds or personal reserves. A hydropower projects involve relatively large up-front investments, the use of in-house funds as the sole source of finance is only possible for the smallest hydropower projects.

Ordinary bank loans/ on balance sheet financing:

A bank loan supplies the majority of the required capital (60-80%). Loans are secured against assets or property owned by the developer. Bank loans are relatively simple to arrange if the developer can provide sufficient security for the bank's involvement. As the lender's interests are well secured the need for a tight network of contracts to control risk can be relaxed, making the financing structure more flexible. This reduces the time and cost involved in arranging the loan. In addition, good security for the lender will normally result in lower annual borrowing costs. However, this route is normally closed to a developer with limited financial resources (Hugus, 1980).

Co-Development with a financially strong partner:

The project is developed as a joint venture with a financially strong partner. A strong partner may provide equity capital and offer security for bank loans (assets/property). In addition to

their risk-sharing potential, the partners may also be selected based on their ability to provide expertise important for the project (engineering, finance and power market). A typical example of co-development might be a farmer who owns a waterfall. A power utility in the area may agree to finance, develop and operate a hydropower project at the site. In return for this the farmer may be allocated a number of shares in the project, a royalty payment or electricity supply.

Limited resource project financing:

The principle difference between on balance sheet financing and limited-resource project financing is the way in which the bank loans are secured. In limited-resource project financing the future cash flows from the project are the lenders' main security. There are 2 important reasons for using limited-resource project financing. The developer may not have sufficient assets to secure a bank loan, or the developer may not wish to bear all the project risk involved in the development. As the lenders can not rely on the liquidation value of the project (or sponsors) as a means of securing repayment, they will "take security". This involves exercising tight control over most aspects of the development:

- Charge over the physical assets.
- Assignment of the project contracts.
- Contract Undertakings.
- Shareholder Undertakings.
- Insurance
- Bonding

All aspects of the project will be arranged to control the risk for the lenders, who will wish to see evidence of the project's economic viability. They will require an independent technical report by a credible consultant. They will examine important agreements such as the power purchase agreement, the operating agreement, and shareholder's agreement. The lenders will wish contractors, suppliers and operators that have a strong record of accomplishment in their field-whenever possible the risk is transferred to third parties. A contractor working on a turnkey fixed-price basis can be used to minimize the completion risk. A long-term power purchase agreement mitigates the market risk. The lenders will even ensure that they have the right to step in and operate the project in the case that it is not paying its debts. Limited-resource project financing involves a series of complex contractual agreement. The initial

arrangement costs are relatively high which makes financing difficult for projects with a capital cost less than US $ 5-10 million (Hugus, 1980).

Leasing:

Leasing the assets is an alternative to ownership. A lease can be defined as: A contractual relationship in which the owner of the asset or property (the lesser) grants to a firm or person (the lessee) the use of the property's services for a specified period of time. In 1980, the annual volume of the leasing industry was around 40 billion US$. In general the types of lease available in the market today can be classified as either operating lease or financial lease. An operating lease is written for a short-period of time, from a few months to a few years. The lesser assumes most of the responsibilities of ownership including maintenance, service, and insurance. The operational lease is not a long-term financial commitment, and is unlikely to be used for financing equipment in hydropower projects. A typical example is the rental of an office-copying machine. A financial lease (capital lease) is a long-term contract by which the lessee agrees to pay a series of payments that in sum will exceed the purchase price of the asset, and provide the lesser with a profit. The lessee takes on the fundamental ownership responsibilities such as maintenance, insurance, property taxes. Normally the agreement is not cancelable by either party, but may provide clauses that allow canceling should certain circumstances occur. Upon termination, the asset is returned to the lesser. Leasing is most suitable for high-volume standard equipment, and is rarely used to finance hydropower equipment. However this may be changing (Khan and Jain, 1999).

Build own operate (BOO):

In a BOO project the owner of the water rights grant the development rights to an independent developer. The developer controls the design, construction and operation of the plant. In return he pays a fee to the rights owner. In many cases, there is an agreement that the project will transfer back to the owner after a period of time-Build Own Operate transfer (BOOT). BOO/BOOT projects do not necessarily involve a new route of financing. The developer may use one of the financing alternative described above.

Payback using Electricity or other goods:

As an alternative to paying the debt in cash, the lender may accept payback in electricity or other goods. For example, a company with higher power consumption may agree to finance a hydropower project. In return, it receives electric power from the developer.

Suppliers' Credit:

Suppliers are often willing to provide financing for their equipment. The purchase price is often closely linked with the financing terms. The conditions are subject to negotiation, and a competitive situation can significantly improve the terms available.

2.1.1 Nepal Electricity Authority

Nepal Electricity Authority is the largest government enterprise in Nepal with the country's highest capital investment, assets and human resources. NEA has been established in the year 2042 Bhadra 1, under the Nepal Electricity Act 2042, by the amalgamation of the existing Government department of electricity, Nepal Electricity Corporation and several development boards in order to make effective and independent institution to generate economic production, transmission and distribution of electricity and to manage proper supply of electricity.

The major responsibilities of NEA are:

- To develop short-term and long term hydropower development policy and to recommend these to Government of Nepal(G/N)
- Planning and construction of new power plants, transmission lines, distribution lines, substations and operation & maintenance of those power plants.
- Selection of proper hydropower sites to promote cottage and agro-based industries, and
- Train the staff to make them more efficient in their job.

NEA is managed by the Board of Directors chaired by the minister of Water Resources. This Board has 8 members in all (including the chairman). Four members representing private sectors are nominated by Government. Secretaries of the ministry of Water Resources and Ministry of finance are the officiating members of the Board. The managing Director

appointed by Government is the member secretary of the Board and is responsible for day to day administration of NEA.

NEA is structured mainly into seven wings namely Distribution and Consumer Service, Electrification, Generation, Transmission and System Operation, Engineering services, Finance and Administration, Planning Monitoring and Information Technology. Level twelve (Deputy Managing Director, General Manager) heads the divided wings.

Distribution and consumer services (DCS) business group is responsible for planning, construction, operation and maintenance of the distribution system up to 33KV voltage level. It is also responsible for consumer services providing new connections, meter reading & billing and revenue collection. DCS is providing its services to the consumers through two departments, five regional offices, thirty four distribution centers and thirty branch offices spread throughout the integrated system of NEA grid (Bajracharya, 2007).

Generation Business group is responsible for generation of power. It has generation, operation and maintenance Department, Kali Gandaki 'A' Hydroelectric department, Generation construction department. This business group is responsible for effective, production of energy, maintenance and operation of power houses throughout the country.

Transmission and system operation business group has Grid operation department, transmission line/substation construction department and system department. 'Grid' generally refer substation of 66KV or higher voltage level. Transmission line refers to the line which transmit the power from power house to consumers via substation system operation department has load dispatch center, which is termed as brain of the system. This center makes the appropriate load flow and keeps appropriate frequency and voltage level (NEA, 2004).

The planning, monitoring and information technology wing of NEA periodically evaluates and monitors on the development projects executed by NEA for their timely and successful completion. The office is supported by five departments namely system planning Department, Information technology Department, Monitoring Department, Corporate planning Department and power trade Department.

The office of finance and Administration looks after the overall activities of the financial management, central accounts, the human resources development and the general administration within NEA. This takes care of the activities in the corporate financing and human resources planning Assisted by directors of Corporate Finance Department, Finance and Accounts Department, Human Resources Department, General Administration Department. This is headed by Deputy Managing Director.

Thus it is evident that NEA is structured to handle multifarious tasks. Task-based structure could be expected to boost expertise and specialization. It is no wonder that NEA now houses best of brains in power sector and is in a position to undertake projects from scratches to completion. Emerging private sectors on power development recruits required manpower among the experienced ex-staff of NEA. This can be considered as a major indirect dividend for the private sector from NEA. The fact that half of the NEA Board comes from private sector tends to assure the general public that their legitimate interest will not be ignored in decision making of NEA. However, the critics maintain that the present system of appointment of chairman and Board members by Government has given rise to political nepotism. Autonomy, an important element of public enterprise has suffered a beating.

2.2 Power Development in Nepal Prior to Plan Period

While giving an overview in the power development in Nepal, it would be relevant to see it in the historical perspective of the country. Nepal was ruled the Rana regime for 104 years till 1951 A.D. There was not a policy of power development. It was mainly for providing facilities to the ruling class of Kathmandu and light some streets of Kathmandu valley.

The history of power development of Nepal begins with the establishment of Pharping Hydro Power Plant of 500 KW capacity in Kathmandu valley in 1911 A.D at the time of Rana Prime Minister Chandra Sumsher and the regime of king Prithivi Bir Bikram Shah. It was a milestone in the power sector and thereafter the commercial activities of power were initiated.

In course of time, to meet the increasing demand of power, another plant of 640 KW capacities was built at Sundarijal at the time of Juddha Sumsher J.B.R in 1935 A.D. The government activities in the power sector were limited to the Kathmandu valley. The need of power was realized outside the valley also. Therefore, some power plants were

established/commissioned, especially in Biratnagar and Birgunj by the private sector. In this connection, Sikarbas hydro power plant was built up by Morang Hydroelectric Co. in 1942 and in 1961 A.D. it was completely washed away by a landslide. Thus it is seen that the development of power was in a very infant stage during the Rana regime.

But even after the dawn of democracy in 1951 A.D., the pace of power development could not be accelerated, prior to the first five year plan period (1956-61), power installation were a few as given in following table.

Table 2.1: Power Installations Prior to Plan Period

S.N.	Power Plant	Capacity (KW)
1.	Pharping Hydro plant	500
2	Sundarijal Hydro Power	640
3	Mahendra Diesel Plant	1728
4	Biratnagar Jute Mills Power Plant i. Steam ii. Diesel	 1400 750
5	Morang Hydro Electric Co.	677
6	Birgunj Electric Supply Co.	225
	Total	5920

Source: Kabita Acharya, Hydro-Electricity development in Nepal and its contribution to Nepalese Economy

2.3 Power Development under Different Plan Periods

2.3.1 Power Development in the First Five Year Plan Period 1956-61

Forty-five years after the commissioning of Pharping hydro plant, the planned economic development was initiated in 1956. Since then, the development of power got a specific direction. Realizing the importance of power for sustainable development high priority was given for power development in the first five-year plan period. It was proposed to increase the generating capacity of power to 20000 KW. The allocated amount for power development was Rs. 30 million i.e. 9 percent of the total plan outlay. Furthermore, it was also emphasized to meet the need of power in other parts of the country.

Table 2.2: Proposed Power Projects Under the First Five-Year Plan

Name of the Project	Generating Capacity (in KW)
A. New Constructions:	
1. Koshi	10000
2. Trishuli	10000
3. Thado Khola	5000
4. Panauti	500
5. Seti	500
6.Tinau	1000 (1st Stage)
	1000
Total	**18000 to 23000**
B. Rehabilitation	
1. Sundarijal and Pharping	1350

Source: Drafts first five year plan, Government of Nepal, Kathmandu, 1956

Since the survey and cost estimation has not been worked out property, many of these projects could not be initiated. Only preliminary works were carried out in some projects. Therefore, to meet the increasing demand of power the following power plants were installed and commissioned in Kathmandu valley during the plan period according to the Kabita Acharya (2009).

a. Teku Diesel Plant	500 KW
b. Bhaktapur Diesel Plant	250 KW
c. Naxal Diesel Plant	500 KW
d. Lainchour Diesel Plant	500 KW
	1750 KW

The diesel plants were installed as a stopgap measure for supply, awaiting completion of Hydro project of Trisuli and Panauti.

Under this plan period an additional power supply of 750 KW was made available from two diesel plants at Teku and Bhaktapur only as a stopgap measurement as against the original plan target. The Naxal and Lainchaur diesel plants with a installed capacity 1056 KW were commissioned during the interim plan period (1961-62). During this period, the rapid growth of diesel plants is observed to meet the immediate demand of Kathmandu valley.

2.3.2 Power Development in the Second Plan Period (1962-65), Three Year Plan

For strengthening the institutional development in power sector, Nepal Electricity Corporation (NEC) was established. It was the most important achievement of this plan. As against the plan target to raise the generating capacity by 22720 KW in the existing supply areas(from hydro projects 11750kW, about 500 KW from micro plants and 10470 KW, from diesel plants), Only 4430 KW was achieved as an additional power as the progress report reveals. Out of which 2400 KW, 1470 KW and 560 KW were added from Panauti Hydro Project, Patan Diesel plant and Birgunj Diesel plant respectively. Thus in this plan period only 19.49 percent power could be generated out of 22720 KW. For power sector development Rs. 91 million was allocated it was 15 percent of the total plan outlay.

Table 2.3: Proposed Power Projects under the Three Year Plan

Name of Project	Power Supply (KW)
A. Hydro Project	
i. Panauti Hydro Project	24000
ii. Trishuli Hydro Project	9000
iii. Thado Khola Hydro Project	350
B. Micro Plants	
i. 4 Diesel Plant of 100 KW each	400
ii. 4 Water Turbines of 25-30 KW each	100-200
C. Diesel Plants	
Birgunj Diesel Plant	500
Nepalgunj Diesel Plant	2500
Biratnagar Diesel Plant	3000
Hetauda Diesel Plant	4470
Total	**22720 or 22740**

Source: The three year plan, Ministry of Economic Planning, 1962

2.3.3 Power Development under the Third Five-Year Plan Period (1965-70)

In this plan period new insight was given by introducing the eastern, central and western power development sectors. This plan had set a target to generate about 60000 KW additional powers in these three regions. But when the plan was revised, it was drastically cut down to 36700 KW. The actual achievement was only 19960 KW at the end of the plan which was 54.39 percent of the target and 260 million rupees was allocated for electricity which was nearly 10.4 percent of the total planned outlay.

Table 2.4: Target of Power Generation in the Third Plan

Name of the Region	Power Supply (in KW)

A. Central Region	
1. Hetauda Diesel Plant	5000
2. Pokhara Hydro Project	500
3. Trishuli Hydro Project	18000
4. Gandak Hydro Project	10000
5. Marsyangdi, Kali & Kulekhani Hydro Project	16000
Total	49500
B. Easter Region	
1. Biratnagar Diesel Plant	1470
2. Koshi Hydro Project	7500
Total	8970
C. Western Region	
1. Diesel Plant	500
Total	500
Total (A+B+C) Regions	58970

Source: Third plan, National Planning Commission, 1965-70

Table 2.5: Achievement of the Third Plan

Name of the Project	Power Supply (in KW)
1. Trishuli Hydro Project	12000
2. Pokhara Hydro Project	4000
3. Hetauda Diesel Plant	4470
4. Patan and Biratnagar Diesel Stations	2490
Total	19960

Source: Fourth plan (1970-75), National Planning Commission, 1970.

2.3.4 Power Development under the Fourth Five-year Plan (1970-75)

In the fourth plan priority was given to transmission, distribution and network improvement in Bagmati and Narayani zones in order to utilize the floating power for industrial, agriculture and domestic purpose by making power tariff more reasonable. The fourth plan had set the target of generating 40300 KW of additional power i.e. 35800 KW from large hydro projects, 500 KW from small hydro projects and 400KW from diesel plants.

But during the first four years of this plan period total increase in generating capacity was only 28502 KW i.e. 70.72 percent of total target of which 26040 KW was generated from hydro projects and the remaining 2462 KW from diesel plants. In this plan period Rs. 255.3 million was allocated for power sector.

Table 2.6: Target and Achievement of Power in the Fourth Plan

Name of the Project	Target (in KW)	Achievement (in KW, During the First Four Years Only)
A. Hydropower:		
1. Trishuli Hydro Project	9000	9000
2. Sunkoshi Hydro Project	10000	10000
3. Gandak Hydro Project	10000	-
4. Koshi Hydro Project	6800	6800
5. Small Hydro Project	500	240 (Only from Dhankuta)
Total Hydropower	36300	26040
B. Diesel		
1. Diesel Power Centers	4000	2662
Total Power Production (A+B)	40300	28502

Sorce: Fifth plan, National Planning Commission, 1970-75.

2.3.5 Power Development under the Fifth Plan (1975-80)

In the fifth plan, the total target of generating additional power was about 58845 to 58945 KW out of which 56945 KW was from hydro-projects, and 2000 KW was from diesel plants.

Table 2.7: Proposed Target of Power Generation under the Fifth Plan

Name of the Projects	Generation Capacity (in KW)
A. Hydro-Power	
1. Devighat Hydro Project	14000
2. Gandak Hydro Project	10000
3. Kulekhani Hydro Project	30000
4. Sikarbas Hydro Project	2400
5. Small Hydro Project	545
Total Hydro Project	56945
B. Diesel Power Centers	
1. Biratnagar Diesel Center	1500
2. Pokhara Diesel Center	500
Total Diesel Power	2000
Total Power Production (A+B)	58945

Source: Fifth plan, National Planning Commission, 1975-80.

But the progress report published in the sixth plan shows that during this period only 18712 KW addition power could be achieved which was only 31.8 percent of the minimum plan target.

Table 2.8: Target and Achievements of the Fifth Plan

Program	Minimum Target (KW)	Progress (KW)	Achievement (%)
Total Power Generation	58845	18712	31.8
Hydro-power	56845	16220	28.5
Big Hydro Projects	56400	15000	26.6
Small Hydro Projects	445	1200	274.2
Diesel Plants	2000	2492	124.6

Source: Sixth plan, National planning commission, 1980-85.

2.3.6 Power Development under the Sixth Plan Period (1980-85)

The sixth plan period has significant place in the development of power sector. Kulekhani was installed during this plan. The total target of power generation in this plan was 144923 kW. Out of which, 124100 kW from big hydro projects, 5823 kW from small hydro projects and 1500 kW from diesel plants. For power development Rs. 3800 million was allocated in this plan.

Table 2.9: Proposed target of Power Generation in the Sixth Plan

Name of the Projects	Power Generation
A. Hydropower Projects	
1.Kulekhani Hydro Project	60000
2. Devighat Hydro Project	14100
3. Masyangdi Hydro Project	50000
4. Small Hydro Project	5583
Total Hydro-power	**129823**
B. Diesel Power Centers	
1. Hetauda Diesel Center	10000
2. Biratnagar Diesel Center	5000
Total	**15000**
Total Power Production (A+B)	**1,44,923**

Source: Sixth plan, National Planning Commission, 1980-85.

The progress report published in the seventh plan shows that there was a wide gap between the proposed and achieved power. During the first four years of the plan period the total increase in generating capacity was 86,045kW that was only 59 percent of the targeted capacity.

Table 2.10: Achievement of Power generation under the sixth plan (During the first four years only)

Name of the Project	Power Generation Capacity
1. Kulekhani Hydro Project	60,000
2. Devighat Hydro Project	14,100
3. Small Hydro Project	1,271
4. Hetauda Hydro Project	10,000
5. Other Small Diesel Plants	674
Total	86,045

Source: Seventh plan, National Planning Commission, 1985-90.

2.3.7 Power Development under the Seventh Plan Period (1985-90)

In this plan period the target of additional power generation was 1,06,629 kW, out of which 1,03,100 kW was from big hydro projects and 3,539 kW was from 16 small hydro projects. The total allocated budget for this (power development) was Rs. 4757.100 million.

Table 2.11: Power Generation Target under the Seventh Plan

Name of the Project	Capacity (in kW)
1. Kulekhani Hydro-electricity Project	32,000
2. Marsyngdi Hydro-electricity Project	66,000
3. Andhikhola Hydro-electricity Project	5,100
4. Small Hydro-electricity Project	3,539
Total	1,06,639

Source: Seventh plan, National Planning Commission, 1985-90.

According to the eighth-plan document 1,04,200 kW power was generated during the seventh plan. In this plan period the targeted goal in power generation was nearly achieved.

There was plan holiday of two years between the seventh and eighth plan and this interim period 32929 kW power was added.

Table 2.12: Power Development under the Seventh and Interim Plan

Electricity Generation(kW)	Seventh Plan (1985-90)	Interim Plan (1991-92)
A. Hydropower	1,03,055	6,690
-Medium & Large Project	1,01,000	5,100
-Small Projects	2,055	1,590
B. Fuels Operated	-	26,000
Alternative sources of Energy		
1. Small Hydropower	1,145	239

Source: Eighth plan, National Planning Commission, 1992-97.

2.3.8 Power Development under the Eighth Plan Period (1992-97)

It is estimated in the eighth-plan document to increase power by 29.7 Mw. The estimated financial allocation for power development is Rs. 32,034 million. The more liberal policy has been adopted under this plan to attract the private sectors for the development of power.

Table 2.13: Target of power Development under the Eighth Plan

Name of the Projects	Capacity (in MW)
1. Jhimruk Hydro-electricity Project	12.5
2. Refurbishing Trishuli and Devighat Hydro-power Stations	12.2
3. Small Hydro-electricity Project	5.0
Total	29.7

Source: Eighth plan, National Planning Commission, 1992-97.

Table 2.14: Achievement of Power Development under the Eighth Plan

Particulars	2048/49	2053/54	Growth (%)
1. Total Connected (kW)			
a. Hydropower	2,38,563	2,52,418	13,855 (5.8%)
b. Diesel or multifuel	683	47,266	46,583 (13.5%)
c. Solar Power	130	130	-
Total	2,39,376	299814	60,438 (25.2%)
2. Transmission Line (km)			
a. 132 kv single ckt.	1191	1178	13 (1.09%)
b. 132 kv single ckt.	-	43	43
c. 66 kv single ckt.	64	179	115 (179.7%)
d. 66 kv single ckt.	158	153	5 (3.2%)
e. 33 kv single ckt.	1096	1349	253 (23.1%)
Total	2509	2902	393 (15.7%)
3. Electricity accessed district	68	73	5 (7%)
4. Beneficial Population (%)	10	14	4 (40%)

Source: Ninth plan, National planning commission, 1992-97.

2.3.9 Power Development under the Ninth Plan Period (1992-97)

Table 2.15: Physical Target of Electricity Development

Particulars	Total	054/55	055/56	056/57	057/58	058 /59
1. Production and Supply Electricity						
a. Large & Middle Hydropower (MW)	293	-	6	104	183	-
b. Small Hydropower (KW)	660	160	500	-	-	-
c. Multifuel (MW)	13	13	-	-	-	-
2. Transmission line (KM)	1024	-	-	286	267	471
3. Rural Electricity	6067	1220	597	1620	1650	980
4. Survey, Feasibility Study & Detailed Engineering Design	31	7	5	8	7	4

(Number)						

Table 2.16: Electricity Development Programme

Hydropower	Capacity (MW)	Completion Year	Sector
Middle Hydropower			
To be Completed in 9th plan:			
1. Indrawati – III	5 MW	2058	Private
2. Puwa Khola	6	2056	Public
3. Modi Khola	14	2058	Public
4. Chilime	20	2058	Private
5. Upper Bhotekoshi	36	2057	Private
6. Khimti – 1	60	2056	Private
7. Kaligandaki 'A'	144	2058	Public
8. Tanakpur	8	2057	Public
Total	293		

Started in 9th Plan

1. Kulekhani – 3		14	
2. Khimti – 2		27	
3. Likhu – 4		44	
4. Middle Marsyngdi		61	
5. Middle Bhotekoshi		120	
6. Upper Karnali		300	
7. Arun – 3		402	
8. Western Seti		750	
Total		1718	
Small Projects	Capacity (KW)	Completion Year	Sector
1. Kalikot	500	2056	Public
2. Dolpa	160	2056	Public
3. Dailekh	300	-	Public
4. Lomanthang	65	-	Public
5. Khotang	2300	-	Public
6. Gandaki	200	-	Public
7. Heldung	250	-	Public
Total	3775		

Source: Ninth plan, National Planning Commission, 1992-97.

Review of the Ninth Plan

Table 2.17: Targets and Achievements of the Ninth Plan

Area	Unit	Target	Achievement
Hydropower installed capacity	Megawatt	538	527.5
Diesel energy installed capacity	Megawatt	60	57
Transmission line (132,66 & 33 KV)	Km	3926	4324
Capacity Substation at higher level (132 & 66kv)	MVA	862	881
Substation capacity of 33/11kv	MVA	650	393
Distribution Line (11 KV and 400/230 volt)	Km	6067	8400
Number of consumers	Thousand	828	878
Benefited people	Percentage	20	40

Source: Tenth plan, National Planning Commission, 2002.

As shown in table, the production capacity of hydropower compared to the target of the Ninth plan. The contribution of 144 Mw Kali Gandaki 'A' Hydropower project is remarkable to achieving the target. Similarly, the extension of transmission lines of 33/11 KV, substations of 132 and 66 KV and 11 KV and 400/230 volt distribution lines, (according to national census 2058) 40 percent people are estimated to be benefited by the end of ninth plan. During the ninth plan total 584.5 MW electricity was generated.

The real consumers of electricity have been calculated counting the people consuming electricity from alternative sources and those who are not the direct consumers of Nepal Electricity Authority. It is estimated that out of 40 percent, 33 percent have been using the power from the national grid and the rest of percent from alternative sources of energy.

By the end of the eighth plan, electricity was available to about 800 Village Development Committees (VDCs) and 57 municipalities of 72 districts. Till date the facilities is available in about 1600 VDCs and 58 municipalities of all the 75 districts of the country. Power generated from the national grid is available in 57 districts.

By the end of the eight-plan period, the highest demand for electricity was 300 megawatt, which has shot up to 426 megawatt by the end of the ninth plan. Currently, per capita electricity consumption is 60-kilowatt hour. The average electricity tariff effected from 14 may 1996, a year before the beginning of the ninth plan, was Rs. 5 per unit. The tariff was

raised on 16 November 2000 and on 17 September 2001 and the current average tariff per unit is Rs. 6.81.

Problems and Challenges:

The problems and challenges faced during the implementation of the Ninth plan are as follows:

- It has become necessary to amend the Electricity Act, 2049 in order to revise the royalty that the government receives as per the hydroelectricity Development policy, 2058, and to rectify the shortcomings.
- It has been felt that the private sector has been facing difficulties in accelerating the growth of electricity development due to the inefficiency of the one window policy.
- Non-fixation on wheeling, charge and lack of proper management of grid code have been creating problems in power development.
- There has been difficulty in recovering the due tariff from government agencies, corporations and municipalities.
- Both the public and private investors have not invested enough in transmission and distribution system compared to the production of electricity.
- Lack of investment has hindered the use and expected development of hydropower.
- There has been seasonal imbalance between demand and supply of hydroelectricity as majority of the existing hydro projects are run of river type.
- Although efforts have been made to stem leakage in the existing system, it has not been satisfactory.
- The coordinated use of all alternatives of power has remained challenge due to the topography of Nepal which has made it difficult to provide electricity to all Nepalese.
- Given the purchasing power of the majority of people, the current electricity tariff is very high and to bring it down is challenge.

Table 2.18: Quantitative targets of tenth plan

Area	Unit	Target
Production & supply of electricity	MW	842
Per capita Electricity consumption	KWH	100
Electricity benefited people (including alternative source)	Percentage	55%
Number of VDCs		2600 VDCs
Transmission line (132 KV, 66 KV)	Km	430 addition

Source: Tenth plan, national planning commission, 2002-07.

2.3.10 Present Scenario of Power Development in Nepal

Since the installation of Pharping hydro plant in 1911 A.D., Nepal has traveled about one century in the journey of power development. But even after the completion of 10th plan, half of the interim plan also, the development of power in Nepal is still in infant stage. According to the NEA report of FY 2004/05 the present total installed capacity of power is 613.557 MW. Out of the total, 556.80 MW is generated from hydro i.e. 0.67% of total hydro power potentialities. Similarly, 56.756 MW from Diesel.

However, the existing scenario of power generating capacity of Nepal can be presented as follows:

Power plants under operation in the grid as of Fiscal Year 2007/08:

(A) Major Hydropower (Existing)	**Capacity**	**Commissioned Year**
1. Trishuli	24 MW	2023 B.S. (1967 A.D.)
2. Sunkoshi	10.05 MW	2029 B.S. (1972 A.D.)
3. Gandak	15.0 MW	1979 A.D.
4. Kulekhani-1	60.0MW	1982 A.D.
5. Kulekhani-2	32.0MW	1986 A.D.
6. Devighat	14.1MW	2040 B.S. (1984 A.D.)
7. Marsyangdi	69.0MW	1989 A.D.
8. Puwa khola	6.2MW	2056 B.S. (2000 A.D.)
9. Modi Khola	14.8MW	2057 B.S. (2000 Oct.)
10. Kali Gandaki 'A'	144.0MW	2058 B.S. (2002 A.D.)
11. Middle Marsyangdi	70	2065 B.S
Sub Total	**459.150MW**	

(B) Thermal power Stations (Existing)

1. Hetauda	12.750MW
2. Duhabi Multifuel 1	26.0MW
3. Duhabi Multifuel 2	13.0MW
4. Mahendra	1.728MW
5. Biratnagar	1.028MW
6. Marsyangdi	2.250MW
Sub Total	**56.756MW**

(C) Small Hydro Power Stations Existing (Grid Connected)

1. Panuti	2400KW

2.	Sundarijal	640KW	1936 A.D.
3.	Phewa (Pokhara)	1,088KW	
4.	Seti(Pokhara)	1,500KW	
5.	Tinau (Butwal)	1,024KW	
6.	Baglung	200KW	
7.	Tatopani/Myagdi (i+ii)	2,000KW	
8.	Jomsom **	240KW	
9.	Chatara	3,200KW	1996 A.D.
10.	Pharping***	500KW	1911 A.D.
	Sub Total	**12.792 MW**	

(D) Private sector plants (Existing)

1.	Andhi Khola (BPC)	5.1MW	1991 A.D.
2.	Jhimruk (BPC)	12.3MW	1994 A.D.
3.	Khimtikhola (HPL)	60MW	2056B.S. (2000 A.D.)
4.	Bhotekoshi (BKPC)	36MW	2057B.S.
5.	Sange khola (SHP)	0.183MW	
6.	Indrawati (NHPC)	7.5MW	
7.	Chilime (CPC)	20 MW	2060 B.S.(2003 A.D.)
8.	Piluwa khola (AVHP)	3MW	
9.	Chakukhola (APCO)	1.5MW	
10.	Sunkoshi small (SHP)	2.6MW	
11.	Rairang (RHPD)	0.5MW	
	Sub Total	**148.683MW**	

(E) Isolated (Existing)

1.	Dhankuta	240 KW
2.	Jhhupra (Surkhet)	345 KW
3.	Doti	200 KW
4.	Phidim**	240 KW
5.	Jumla**	200 KW
6.	Dhading	32 KW
7.	Helambu	50 KW
8.	Salleri**	400 KW
9.	Darchula (i & ii)**	300 KW
10.	Chame	45 KW
11.	Taplejung**	125 KW
12.	Manang	80 KW
13.	Chaurjhari** (Rukum)	150 KW
14.	Syarpudaha** (Rukum)	200 KW

15. Khandbari**	250 KW
16. Terhathum**	100 KW
17. Bhojpur**	250 KW
18. Ramechhap	150 KW
19. Bajura	200 KW
20. Bajang**	200 KW
21. Arughat Gorkha	150 KW
22. Okhaldhunga**	125 KW
23. Rupalgad (Dadeldhura)	100 KW
24. Surnaiyagad (Baitadi)	200 KW
25. Namche	600 KW
26. Achham	400 KW
27. Dolpa	200 KW
28. Kalikot	500 KW
29. Gorkhe (Ilam)***	64 KW
30. Syangja***	80 KW
Sub Total	**6.176 MW**

Total installed capacity in NEA (including private & others) 683.557 MW

Note: - * Private & others ** Leased to the private sectors

*** Not in normal operation

(Source: Nepal Electricity Authority, Fiscal Year 200//08 – A Year in Review)

The same source reveals that the projects under construction are middle Marsyangdi (70 MW) from NEA and Khudi (3.45 MW), Sisnekhola (750 KW) and Baramchi (999 KW) from private sector. Besides Gamgad (400 KW) and Heldung (500 KW) power projects are under construction as isolated projects. Similarly, proposed 9 projects are Kulekhani III (14MW), Chamelia (30MW), upper Tamakoshi (309 MW), Upper Seti storage (122 MW), Tammar (83 MW), Mewa (18 MW), upper Hewa (10 MW), upper Trishuli (61 MW), Middle Marsyangdi (70) and Kankai storage (90 MW).

The review of power development during the history of planned development of 50 years has revealed the following issues: -

a) Most of the targets of power development were not met. This indicates that the targets are set on higher side, without taking into consideration the capability of the nation.
b) Power sector planning is not well developed to meet the growing demand for power in the country.
c) Lack of investment has hindered the use and expected development of hydropower.
d) There has been seasonal imbalance between demand and supply of hydroelectricity as majority of the existing hydro projects are run-off river type.
e) The coordinated use of all alternatives of power has remained challenge due to the topography of Nepal which has made it difficult to provide electricity to all Nepalese.

Only 40% people have electricity access which only constitutes the lower portion of rural people. This means a huge population of villages is still living inside the dark room.

f) The target to complete the project was also not met. Most of the hydropower projects were delayed and crossed the deadline. This not only avoided the time but estimated cost will also be added largely. For eg. Middle Marsyangdi was to be built on 2004 Dec. but till now its work in the progress and targeted to be completed in 2007 Dec. i.e. 3 years late.
g) Similarly, there is high consumption of electricity in eastern region. But no big power houses are built there. This has created high voltage drop, transmission losses in the core industrial areas of eastern part.
h) Power sector development is heavily dependent on foreign aid. Any problem in inflow a foreign aid also causes the untimely completion plus cost variation.

Internal resources for financing power sector could also not be mobilized adequately.

2.4 Review of Related Studies

Some of the notable literatures relevant to the study are reviewed in this study to identify the relevance of the present study.

Karki (2006) study on '*Pricing on Nepal Electricity Corporation*' included the objectives as to examine the pricing policy of Nepal Electricity Corporation and to recommend the criteria for earning the tariff structure in future. The research had made an attempt to analyze and evaluate financial aspects of NEC. The major variables taken in the study were cost and price, demand & price and profit of NEC. The major finding of Karki's study was that NEC's tariff has not been adjusted with the fluctuation in cost and demand. In this research, the study found that the corporation loan made financially weak in NEC in the short run due to investment in capital expenditure, the corporation has been over-burdened through loan capital rather than equity, the level of sales of electricity is below the break even point and NEC's rate of return is negative and this rate is below the prevailing market rate of return.

Bhatta (2007), study on "*An Evaluation of financial position of NEA*" concluded that there is no effective utilization of assets in NEA. NEA has been seriously facing the problem of outstanding debt collection, the accounts receivables is high so average collection period is also high in each fiscal year, negative profitability, capacity of assets in the generation of revenue is not satisfactory, increasing cost in each fiscal year, lack of cost control tools and techniques, low internal cash generation causing lack to meet investment requirement thereby leading high foreign loan dependency, high electricity loss causing negative impact on profitability, high operation & maintenance cost expenditure.

Shrestha (2008), study on "*Emergence of Private Players in Nepalese Electricity Market and Its Financial Implication for NEA*" was to evaluate the financial performance of NEC and auditors view to suggest measures of the improvement of the performance of NEC. The study covered seven years period i.e. F/Y 2000/01-2006/07. In his study he found that funds were mainly collected through share capital, loans and depreciation funds were mainly used in expanding fixed assets, the contribution of NEC to national economy in the form of value added was increasing. He concluded that the net working capital position was not satisfactory. Operation ratio was unsatisfactory due to high operating expenses, the position of funds collection was in heavily fluctuating. The trend was satisfactory mainly from utilization point of view. He also pointed out that the contribution to the national economy in the form of value added was noticeable, pricing structure had noticeable impact on the profitability situation, impact of power generation and revenue generation of profitability was poor and no control measure was in operation at NEC.

Dangol (2009) studied on "*Role of hydropower for Economic development in Nepal*". Some of the major conclusions of the author are:

1. Power, irrespective of its form and nature, is indispensable for the industrialization, and in this modern era, industrialization of any country plays an important role in economic development.
2. Per capita energy consumption is a basic factor not only for the comparison of the living standard but also for the measurement of the role of economic growth.
3. Though water power development activities of Nepal have considerably long history, Nepal due to the several reasons, could not achieve in this filed so much as one should have.

4. The development activities of power and power consuming centers of the country shows the unbalanced nature of their development.

Acharya (2009) studied the dissertation entitled "*Hydro-electricity development in Nepal and its contribution to Nepalese Economy*" has shown the following findings.

1. Hydro-electricity is the most useful natural resource for the economic development of Nepal. It is the backbone of industry, agriculture, transportation, and it is most useful thing for social service purpose also.

2. The present level of hydro-electricity development in Nepal, being abundant resources, very insignificant portion has been harnessed yet which inadequate.

3. Power distribution in different development regions is unbalanced.

4. The water power potential of Nepal is its greatest assets; Development of these resources will not only earn foreign exchange but with efficient management it will be turn as Arabian oil in future.

5. Nepal is facing many problems in the hydro-electricity development, they are lack of capital, manpower, technical know how and sufficient market within the country. Besides this the most important problem is the poor power plan of Nepal.

A Comprehensive study done by the World Bank (2010) on 'Nepal Power sub-sector review' is another useful document for the review. Some of the findings are as follows:

1. Nepal's power system is still in the early stages of development. The average consumption of electricity is 25 kWh/month, which is one of the lowest in the world.

2. The Nepal power sub-sector faces numerous impediments to its development, chief of which are the lack of well defined tariff policy and intuitional weakness in the sub-sector, primarily in the Nepal Electricity Authority (NEA), the national public power utility.

3. Government of Nepal views the efficient exploitation of this resource as one of the Nepal's most important economic priorities because of the need to reduce substantially

the cost and improve the availability of power to the domestic market and the potential for export of competitively priced hydropower to India.

4. NEA needs to address three key issues:

   a. Improvement on NEA managers understanding and application of basic utility management concept and tools.
   b. Preparation of a corporate development plan; and
   c. Improvement of conditions of service for its employees.

5. Electricity pricing should reflects the economic cost of supply to consumers while satisfying government's social objectives and taking into account of NEA's financial viability and financing requirement.
6. While load forecasting and generation planning are of a high standard at NEA, more attention needs to be paid to transmission/distribution and operational planning.
7. Although bulk export of competitively priced hydropower to India represents Nepal's most attractive medium and long-term foreign exchange earning option, government does not yet have a detailed strategy to achieve this goal.
8. Only two percent of the rural population has assess to electricity; however, government does not have a master plan for rural electrification that should form part of a wider strategy of meeting rural energy need at least cost. Analysis indicates that carefully designed schemes can be cost effective, financial viable and competitive with alternative fuels.

Shrestha (2010) study entitled "*Hydropower in Nepal: Issues and concept of Development*" has also noted the following major findings:

1. Major achievements in the economic development of Nepal could be realized through proper harvesting of the vast water resources. But a nearly 100 percent dependency on overseas professionals and a failure to gradually develop our manpower prevents realization of this goal.
2. The opportunities in hydropower development do not connote merely approving new projects but also commitment to maintaining and optimizing the efficiency of existing hydropower plants. Such opportunities means institutional development, but this has been grossly overlooked for obvious reasons.

3. An alterative strategy for the hydropower development in Nepal would be to open the doors for privatization, where there would be a chance for development through competition and decrease of bureaucratic control.
4. To demonstrate the assessments of conditions that have been made throughout the history of development of hydropower in Nepal, facts and figures suggest that many past mistakes continue into the present decision-making process.
5. Because of improper information management, non-existent human resource development and myopic decision making, we have made ourselves vulnerable to the dictates of outside help where terms are drawn up to the advantage of multinational funding agencies.
6. As the development of hydropower in Nepal has always been dictated by many constraints and conditions, projects are selected by planning procedure which is deliberately designed to produce a 'no option' situation in decision making.

Another report published by Development Research Group (2010), entitled "*Power sector in Nepal: prophesy for blackouts and economic stagnation*" is also found relevant for the review. Some of the conclusions of this report are:

1. Nepal is on the threshold of a massive power crisis which will ultimately result in economic collapse due to extreme shortage of power.
2. Nepal's electric power system needs storage type hydroelectric project for reliability and regulation to complement the run-of-the river hydroelectric schemes and to substitute for thermal additions, this would facilitate increased quantum of committed power export and rational utilization of surplus energy which would have been spelled or sold at throw-away price.
3. Thermal capacity addition should be avoided in the national interest.
4. A major objective of the vast hydropower potential development should be to improve the standard of living of the people, sustainable economic development, poverty alleviation, rural development and regional balance etc.
5. The efficient exploitation of water resource to improve the availability of power in the domestic market and to enable export of competitively priced hydro energy to India should be the most important economic priority of the country; the export of large

quantum of less expensive hydro-power to India is an attractive long-term foreign exchange earning option which would help reverse the current trade deficit with India.

6. Nepal should take up the cheapest and the most appropriate project.
7. Before taking any hasty decision, the current power sector situation needs to be reviewed impartially. It is high time to look for unbiased review and assessment of the critical situation and for restorative decisions no matter how painful they are.

Thapa and Pradhan (2010), studied on "*Water Resources Development: Nepalese Perspectiv*e" published by IIDS is another valuable book in this regard. Some of the relevant findings are:

1. Forest in Nepal provide more than 25 percent of the rural energy needs, about 20-25 percent of the fodder for livestock and all the domestic timber needs. Deforestation is one of the most challenging and rapidly worsening environmental problems in Nepal.
2. Nepal's energy scenario reflects an imbalance between energy consumption and energy resources endowment.
3. The theoretical power potential of the water resources in Nepal is estimated to be about 83000 MW out of which 42133 MW is estimated to be the output of technically and economically viable schemes. The installed capacity of hydropower stations developed till now works out to less than 1 percent of the potential identified up to date. Thus, Nepal's enormous potential of water resources to generate hydropower is in the early stage of exploitation.
4. Future development of agro-industries and processing facilities would also need reliable supply of power. Storage type projects can substantially increase opportunities for large scale year-round irrigation as well as hydropower generation for export and use in power-intensive industries.
5. Development of water resources is essential in order to meet human needs like increasing agricultural and industrial production, meeting energy needs and earning foreign exchange from power export.
6. The strategy for power development in Nepal should aim at maximizing the economic benefits from hydropower development through an optimum development of the country's river basins. Optimum utilization of this resources calls for meaningful co-operation among the riparian countries.

7. High investment requirement for the development of hydropower and lack of financial resources are the major constraints at present.

An article by Shrestha (2011) on "*Privatization of power sector in Nepal*", discussed the role of privatization in power sector. Some of the messages conveyed by him in this article are as follows:

1. Following the success of energy related privatization and private power development efforts in the United States and the United Kingdom in 1980s, a similar movement towards private ownership of projects is now taking place through out the world.
2. Nepal is in its initial stage of privatization power sector.
3. For many developing countries the issue is not whether to privatize. But to find out an appropriate approach to privatization and to asses the effects of privatization.
4. Private sector initiatives and market oriented behavior are expected to improve the power sector's performance and efficiency.
5. The private sector can be an important source of financing power sector development.
6. In a matured power sector, private sector could be interested in investing on its own or jointly with public sector, or in making equity investment in power sector entities that have been successfully structured into corporation and listed on the stock exchange.
7. The development of private project can be proceed successfully only with a appropriate allocation of risk scope of surplus hydro energy and export market, size of private generation project and the role of government etc.
8. Private sector development of power sector does not guarantee the development of indigenous manpower.
9. There are some negative impacts of privatization of power sector subject to the high electricity tariff compared to NEA, that lead to rural electrification expensive. Rural people can not afford it unless subsidies given by the government.
10. Besides this, significant portion of cash flow goes out of the country as debt service and dividend payment, compared to the one developed by public utility when a project is developed on private basis that create a problem in balance of payment. Furthermore, private electricity generators will give less attention towards environmental impacts.

Pradhan (2011), hydropower expert in NEA express that monopoly status enjoyed by NEA in the power sector is on the decline. In such a changing context, NEA has been striving to

enhance its operational efficiency and capability by adopting commercial modes of management. To improve supply situation and to remain competitive in the market with independent power producers (IPPS) it has to make future investment strategies accordingly. Referring to challenges faced by NEA in relation to shape tariff increase, he suggests that NEA has to explore different alternatives that would help in reducing sharp rise in its electricity tariff rates. In his opinion, following alternatives measures can be helpful in responding to this challenge:

a) Significant amount of hydro-energy is unutilized during the wet season. Ways and means of utilizing the surplus energy should be sought in order to increase the revenue. The seasonal surplus energy could be sold to domestic market through appropriate pricing schemes or if possible exported to neighboring countries.
b) Local market sources should also be explored for financing, in this regard NEA has carried out the study to explore the feasibility of alternative sources of financing from the local market. The study indicates the possibility of issuing of power bonds and short term borrowings from local banks.
c) Efficient working capital management and rigorous loss reduction programs would help reduce the required electricity tariff. Efforts should be made for reducing the accounts receivable and reducing the inventory level.
d) Government receives soft loan from donors at a very low interest rate, however, this loan is relent to NEA at a very high interest rate of 12%. Similarly, some of the grants received by the Government are also lent of NEA at a high interest rate. Request should be made to Government to reduce the on lending interest rate which would significantly reduce the required tariff.
e) Semi automatic tariff increase mechanism should be developed, whereby electricity tariff would increase based on expected change in the retail price index. This would smoothen the sharp increase in tariff.

Earlier PPAs which are dollar based and rapid escalation in exchange rates has put excessive burden on NEA. Revisiting the purchase agreements to dilute the effects of such escalation would help in reducing the tariff.

Kafle, (2011) study entitled" *water; a white gold mine of Nepal and role of Nepal electricity Authority for exploitation*" is one of the useful article. Some findings are:

1. The physiographic of Nepal facilitates to mine water in 3 forms as snow, rainfall and groundwater. These forms have generated more than 6000 rivers and rivulets. These perennial river systems carry about 225 billion cubic meter of water every year and flow down to Indian Ocean.
2. To attract the invertors, government had announced hydropower development policy 1992 and related legislation. Following the policy the private sector has already exploited hydropower and selling to NEA as per Power Purchase Agreement (PPA) made before construction.
3. There is a need of collective effort to achieve sustainable development of water resources for poverty reduction among the government and non government organization, private and civil society. A mutual consensus between India and Nepal should be developed in trading water related services through a single window system including flood control mechanism to enhance water resources utilization for the benefit of both countries.

Dhungel (2011), in his dissertation entitled "*Trends and patterns of energy consumption in Nepal*" is one of the useful dissertations. From this it is concluded that energy and its consumption are the major factors of economic development and are closely related to the GNP of a country; commercial energy consumption is a yardstick of economic development. Economic development requires, and also stimulates, increases in commercial energy consumption. This relationship is expressed in terms of the GDP elasticity of demand for energy, which is the ratio between the rates of growth of commercial energy consumption and GDP. The main purpose of the study is to find out the energy income, price elasticity coefficients and energy intensity of the Nepalese economy during the last two decades. The study would seek answers to questions, such as how energy consumption changes with the change in income and energy prices and what are the impacts of economic development on energy consumption. The trend of electricity consumption reveals that its demand is increasing with the increase in per capita GDP. The demand for electricity is highly sensitive. The income elasticity coefficients of electricity demand in 1980s and 1990s are 2.04 and 2.26 respectively. This implies that the economy consumes more electricity per unit increase in the per capita GDP. The accelerating pace of economic development measured in terms of per capita GDP would require more unit of electricity.

The high electricity income elasticity in Nepal indicates high demand, necessitating supply of more electricity to all the sectors of the economy. The price elasticity shows that the demand for electricity is less elastic, implying that the consumers' responsiveness to the demand for electricity remains unchanged with the change in price, though the demand for electricity is highly sensitive to the change in the per capita GDP. The growth rate of electricity consumption has been found exceeding the growth rate of GDP; people or household seek to climb up to the highest ladder despite their living standards. Thus, in this given scenario, Says law of market that 'supply creates its own demand' is relevant for electricity product.

CHAPTER - III
RESEARCH METHODOLOGY

3.1 Research Design

Research design is mean an overall framework or plan for the collection and analysis of data. The research design serves as a framework for the studies, guiding the collection and analysis of the data. Specifically speaking the research design describes the general plan for collecting, analyzing and evaluating data. Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. Study is based on descriptive and analytical research design. The study is based on recent historical data, policy, rules etc.

3.2 Population and Sample

Nepal Electricity Authority is the organization to be studied. Investors of hydropower projects such as government, national investors, foreign country, agency and individual are also studied.

3.3 Source of Data

Data may be obtained from several sources. Each research project has its own data needs and data sources. However, the general classification of data sources has the following dimension.

Secondary Sources

Secondary sources are to those for already gathered by others. The sources of secondary data can be divided into two groups: internal and external. The internal secondary data has been found within the company. External secondary data has been collected from sources outside the company. Secondary data has been collected from annual reports, official journal of NEA, published different magazines policy of government, reports, various websites, economic surveys, budget speeches, various books, five year plans and previous studies made in these fields.

3.4 Method of Data Analysis

Information collected from different source will be systematized, arranged in order and analyzed by using both financial and statistical tools.

(1) Financial Tools used are

a. Debt Equity Ratio

Long debt to equity ratio reflects the relative claims of creditors and a shareholder against the assets of the firms.

i. Capital employed
ii. Composition of equity and loan

b. Liquidity Analysis

Liquidity ratio refers to the ability of a firm to meet current/short-term obligation of a firm. It indicates the ability of the business to pay its short – term liabilities. "A firm should ensure that it does not suffer lack of liquidity and also that it does not have excess liquidity. The failure of a company to meet its obligations due to lack of sufficient liquidity, will result in a poor credit worthiness, loss of creditor's confidence or even in legal tangles resulting in the closure of the company.

i. Current ratio
ii. Quick ratio
iii. Absolute cash ratio
iv. Cash position to total assets ratio

c. Profitability Analysis

Profitability ratios give final answers about how effectively the firm is being managed. In this study following profitability ratio are calculated.

i. Operating expenses ration
ii. Net profit ratio

d. Activity Analysis

Activity ratio is also called the turnover ratio and a performance ratio. Activity ratio concerned with measuring the efficiency in assets management. The activity ratios are used to measure the efficiency speed and rapidity with assets and are converted into cash. It reflects the firm's efficiency in utilizing its assets. In this study following ratio are calculated.

i. Fixed assets ratio
ii. Capital employed
iii. Total assets

(2) Statistical Tools used are

For supporting the study, Statistical tool such as Mean, Standard deviation, Coefficient of Variation, and trend analysis have been used.

i. Arithmetic Mean (Average):

Average is statistical constants which enables us to comprehend in a single effort the significance of the whole." It represents the entire data by a single value. The mean is the most commonly-used type of average and is often referred to simply as the average. The term "mean" or "arithmetic mean" is preferred in mathematics and statistics to distinguish it from other averages such as the median and the mode. It provides the gist and gives the bird's eye view of the huge mass of unwieldy numerical data. It is calculated as:

$$\overline{X} = \frac{X}{N}$$

Where:

$\overline{X}$ = Arithmetic mean

N = Number of observations

X = Sum of observations

ii. Standard Deviation (S.D.):

The standard deviation is the square root of mean squared deviations from the arithmetic mean and is denoted by S.D. or σ." It is used as absolute measure of dispersion or variability. It shows how much variation there is from the "average" (mean). A low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data are spread out over a large range of values. The equation for the computation of the standard deviation $(\pm)$ is

$$\pm \; X\sqrt{\frac{fX \; Z\bar{X}\text{Å}^{2}}{n \; Z1}}$$

$\bar{X}$ = The average (mean)

n = Total number of observation

iii. Coefficient of Variation (C.V.):

"The Co-efficient of variation (C.V.) is the relative measure based on the standard deviation and is defined as the ratio of the standard deviation to the mean expressed in percent". A series with smaller C.V. is said to be less variable or more consistent or more homogeneous or more uniform or more stable than the others and vice versa. It is calculated as:

$$C.V. = \frac{\pm}{\bar{X}} \times 100$$

It is usual for the risk/return model. It shows the return per unit of risk.

Where,

$\bar{X}$	=	Mean
σ	=	Standard Deviation
C.V.	=	Coefficient of Variation

CHAPTER – IV
DATA PRESENTATION AND ANALYSIS

4.1 Financing Power Development in Nepal

For the socio-economic development and there by to uplift the living standard of people, it is necessary to exploit and mobilize natural as well as physical resources of a country. In this concern, the abundant water resources and vast potentiality of power generation come first place as a basis for sustainable development of Nepal. Out of the world's theoretical possibility of power production, Nepal possesses 2.27 percent of it (Dhungel, 2011). This capacity lies at the second rank in the world after Brazil. The development procedure of power began since 1911 A.D., however, the achievement till now seems to be insignificant. One of the prime causes of it is lack of adequate fund.

While talking about financing on power development, it is seen that the initiation was taken mainly by the government. The Pharping Hydro Project established in 1911 A.D. was the first power project in the history of power development in Nepal that was constructed totally from the government resources. To complete this project, 'General Electric Company' and some foreign technicians were assigned. After this, some hydro projects like Sundarijal and Sikarabas were commissioned. Moreover, some other diesel plants including private sectors were launched in Kathmandu, Biratnagar, Birganj, Nepalgunj, etc to meet the increasing demand of power. But information on the actual costs of these projects could not be found.

Prior to the implementation of the First Plan (1956-1961), there was not clear vision and policy to harness the hydropower. Therefore, the scale of financing was small and limited. But to reap maximum benefit from immense power potentiality, it was insufficient only through internal sources. As power is a capital intensive sector and Nepal being a poor and developing country, she could not afford it economically and technically. Besides this, "the best sites for power dams are often in remote localities in which transport facilities are practically non-existent. The initial investment for the sizeable project is heavy." That's why, the government took initiation to mobilize foreign aid of friendly courtiers and multilateral donor agencies from the First plan period. In consequence of this, the hydro projects like Trishuli and Pokhara were installed by the help of the Govt. of India. Likewise, Thadokhola hydro projects, Panauti hydro projects and some diesel plants in Kathmandu valley and Hetauda were commissioned with an assistance of the Govt. of Britian, USSR and USA

respectively. Furthermore, for the feasibility study of Karnali river, the aid was available from the special fund of UN. Up till now, foreign assistence is continued for power development. From the Eighth plan(1992-97) periods, the government has tried to mobilize the private sector for financing power sector development.

Following table 4.1 depicts the allocation and trend of expenditure/financing during the period of 2002/03 to 2010/11.

Table 4.1: Expenditure in Power During the Period (2002/03-2010/11)

(Rs. in Million)

F/Y	Expenditure in Power				Govt. Exp.	% of in	Foreign Aid Commitment	Foreign Aid Disbursement			% of in
	Regular / Recurrent	Dev.	Total	% Change				Grant	Loan	Total	
2002/03	31.4*	3881.6	3913.0	-	84006.1	4.66	6282.1	3074.5	472.5	3547.0	90.65
2003/04	34.3*	4746.2	4780.5	22.17	89442.6	5.34	1866.4	3788.6	449.8	4238.4	88.66
2004/05	85.2*	7219.1	7304.3	52.79	102560.4	7.12	0.00	5649.2	510.0	6159.2	84.32
2005/06	105.30	6256.40	6361.7	52.79	110889.2	5.73	1230.30	3373.70	866.20	4239.90	66.64
2006/07	102.80	5450.0	5552.8	-12.71	133604.60	4.15	1728.60	1229.70	1981.0	3210.70	57.82
2007/08	101.27	5847.63	5948.9	7.13	161349.90	3.68	2725.00	3116.68	868.31	3984.99	66.98
2008/09	86.60	3300.5	3387.1	-43.06	181620.50	1.86	3541.50	-	-	-	
2009/10	80.50	4447.55	4528.5	33.68	211350.50	2.10	4210.10	-	4210.10	4210.10	92.97
2010/11	75.45	2800.60	2876.05	-36.49	241625.60	1.15	2754.25	-	2754.25	2754.25	95.75
Total	551.92	43949.58	44652.85								

Source: Economic Survey, FY 2010/11, Nepal Government, Ministry of Finance.

During F/Y 2004/05 expenditure has been classified as recurrent, capital and principal repayment

Regular/recurrent expenditure was found increased from 2002/03. During F/Y 2004/05 expenditure has been classified as recurrent, capital and principal repayment, so past figures are found changed. The table showed that expenditure in power is increasing which reflects the government high priority. In F/Y 2004/05 Foreign aid commitment was seen nil which is due to the political instability/lack of democratic government in Nepal. As previous plans, in the recent years of this plan also occurred high foreign aid dependency. This shows high negligence or inability in managing different internal sources of financing. But there were more grant than loan in foreign aid disbursement.

4.2 Issues on Financing of Power Development

In a developing country like Nepal where the prerequisites of development are seriously lacking, many issues on financing power development have emerged. Some of the main issues that are affecting seriously have been highlighted in this section.

4.2.1 Shortage of Capital

The main and burning issue for financing hydropower/power development in Nepal is the shortage of capital. Theoretically, conducting the large scale project, the growth of electricity could be at the higher stage by the economies of scale. But the large scale project also needs huge amount of investment which cannot be easily financed by a single donor. So it will take time to manage such amount by different donors with a joint venture that is also causing late to start the project. It is also one of the reasons that power could not be produced at a cheap cost within proper time in Nepal. Till now, the investment done by Nepal on power sector is found only about 20 to 25 percent of the total investment of power, which is very low (Karmacharya, 2002).

On the other hand, due to topographical complexities of the project site, lack of accessible road, trained manpower and technology etc., all these require much capital. Similarly, in the case of using electricity only by small percent of the villagers, rural electrification also needs subsidy by the government.

4.2.2 Dependency on Foreign Aid

Though Nepal has immense water resources and vast potentiality of hydropower but due to the shortage of capital, she has to depend on foreign aid. The greater dependency on foreign sector is also one of the main issues for hydropower development in Nepal. Since the first five-year plan, Nepal is mobilizing the foreign aid for hydropower development, which is continue till now. This is obtained in the form of loan and grant. The share of loan is greater than grant. For small to large, all dependent of foreign aid can be observed.

Due to the lack of data, the trend of foreign aid cannot be clear prior to the fifth plan. However from the fifth to ninth plan, it is found that out of total expenditure on power sector, the share of foreign aid is found to be 77.42%, 74.22%, 84.80%, 83.48% & 88.92% respectively. In the interim period (1990/91 to 1991/92), it was 86.66%. Similarly, during the initial three years of the tenth plan i.e. 2002/03 and 2004/05, it was 90.65%, 88.66% & 84.32% respectively (Dhungel, 2011).

The greater dependency on foreign aid in power development financing, and the delay and cancellation of the aid have become tragedy for Nepal is financing power.

4.2.3 Risk of Investment

Nepal has to depend on the bilateral and multilateral donor agencies, banks and countries for financing power sector development. The investors theoretically judge the projects for its viability from economic, technical and financial stand points prior to financing them. Apart from this the investors also evaluate the risk analysis that mainly consist the condition of socio, security, political, operational and legal provisions of the country.

Developing countries are considered to be a high-risk zone by the developer especially from the financing point of view. The main reasons for such perception are macro-economic instability, high rate of inflation and currency exchange risk, poor credit rating and the poor financial health of the recipient institution. Although Nepal does not have good credit rating, historically it has not defaulted on loan repayment.

Due to political uncertainties, which has been prolonging since few years, the overall economic affair of state has not been satisfactory.

The other risk of investment that the donor agencies, banks or countries analyze is the political one. It also includes the legal provisions of the concerning country. The political risk is mainly reflected in the government policies. However, it is also affected by the changes in the political system and the government strength of the political system and the government, strength of the political institutions, acceptability of the leadership, the stability of the region and its importance on the world stage, refugee inflow, role of the military, openness to and the success of the foreign private sector investors etc. Prior to the cold war, the donors also used to invest for spreading their influence on the country or region regardless to its return. But now they are investing on the commercial basis.

In Nepal, due to the lack of national consensus among the major the major political parties and also due to the dilemma taking political parties and also due to the dilemma taking and policy, the donors did not take risk to invest in Arun – 3 hydropower project. Thus, the project, once approved, was cancelled. Similarly, according to the article 126 of the constitution of the Kingdom of Nepal 1990, for the utilization and allocation of the natural resources that affect for the long term must be approved by the two third majority of the parliament.

Thus the risk of investment in Nepal for the donors from economic and political point of view is very is very high. It shows that before the investment there must be national consensus among the political parties and also an agreement between donors and government and between governments (especially Nepal and India) for power purchase and exchange. But our political culture is not so satisfactory. It is very hard to see their common view on national issues. This is also causing bad effects on private sector investment.

Solving these issues are as much as important as the hydropower development for the sustainable economic development of the country but they are not simple and easy to solve for the country like Nepal. It demands for meal-concerted efforts of all the concerned groups of the country.

The affirmative engagement with risk is the important step to mitigate risks. International agencies such as the World Bank can play an important role in addressing these risks. Similarly, pubic-private participation provides a financing model where by which each the partner shares the risk. In the hydropower development the civil construction carries significant risk where as supplying electro-mechanical/hydraulic steel structure is less risky. In PPP arrangement, if the civil construction part of the funding is provided by public sector, private sector may find it relatively easy to arrange financing for equipments. Furthermore, risk management study can also be taken as risk mitigation. The risk assessment will be comprehensive, collaboration and professional. The study will provide a good indication of what a risk management action plan should contain, in order to improve the probability of getting hydropower schemes realized.

4.3 Financial Dynamics of Nepal Electricity Authority

In this regard, it would be relevant to study the position of capital structure of NEA. Here the study is confined with the trend analysis of it and the pattern of increment of Assets, Equity, Liabilities and their inter dependency. The revenue and Expenditure, Profit/Loss position of NEA is also analyzed. Similarly, to know the liquidity position of NEA some ratios such as: current ratio, Quick ratio, Absolute cash ratio, Cash position to total assets ratio are analyzed.

A. Status of Assets

Here, the trend of increment of the total fixed assets, total current assets, total other assets and total assets is given in table.

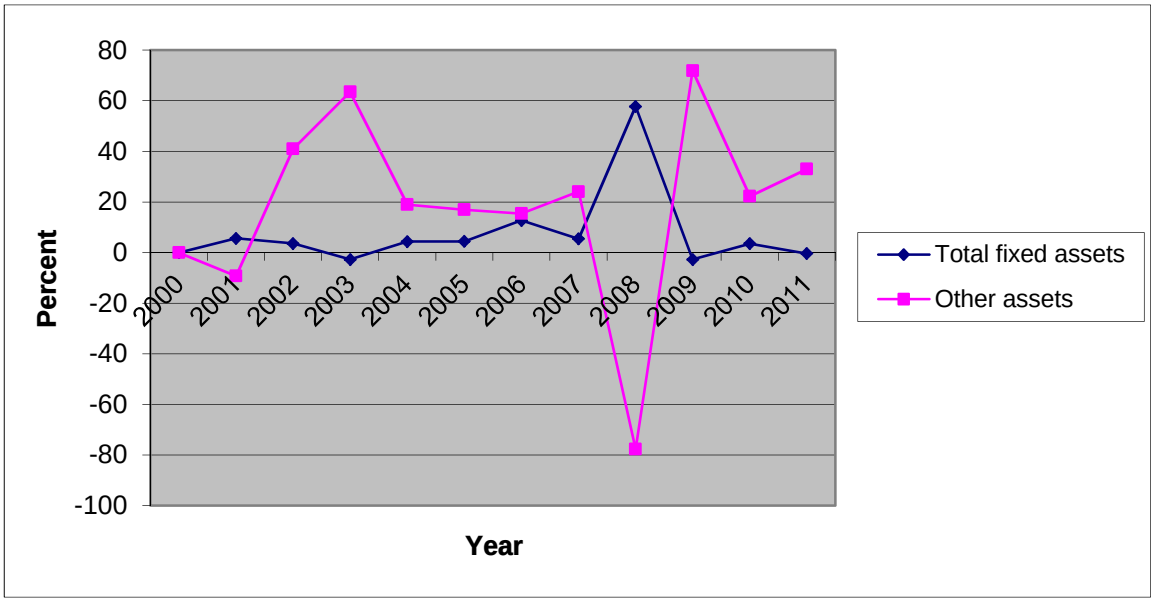
Table 4.2: Status of Assets

(Rs. in Million)

FY	Total Fixed Assets (1)	% Change in (1)	Total Current Assets (2)	% Change in (2)	Total Other Assets (3)	% Change in (3)	Total Assets (4)	% Change in (4)
2000	26894.50	-	2191.3	-	5796.0	-	34881.8	-
2001	28414.00	5.65	2932.6	33.83	5259.6	-9.25	36606.2	4.94
2002	29438.30	3.60	3751.1	27.91	7416.7	41.01	40606.1	10.93
2003	28633.40	-2.73	4868.6	29.79	12125.2	63.49	45627.2	12.37
2004	29891.30	4.39	5692.2	16.92	14426.7	18.98	50010.2	9.61
2005	31223.00	4.45	5053.2	-11.23	16868.8	16.93	53145.0	6.27
2006	35196.00	12.72	5761.1	14.00	19468.1	15.41	60425.2	13.70
2007	37104.00	5.42	6313.6	9.59	24157.1	24.09	67574.7	11.83
2008	58538.20	57.77	7322.0	15.97	5390.8	-77.68	71251.0	5.44
2009	56949.00	-2.71	7690.5	5.03	9268.5	71.93	73907.9	3.73
2010	58963.4	3.54	7883.4	2.51	11332.6	22.27	78179.4	5.78
2011	58747.5	-0.37	9033.3	14.59	15072.7	33.00	82853.5	5.98
Mean	39999.38		5707.74		12215.23		57922.35	
SD	13815.14		2083.004		6019.51		16750.11	
CV	34.53		36.49		49.27		28.91	

Source: NEA, FY 2011/12, A Year in Review

Figure 4.1: Percentage Change in Total Fixed Assets and Other Assets



The table 4.2 revealed that the status of fixed assets, current assets and total assets are in fluctuating trend. The increase in fixed assets is seen significant in 2008, fixed assets are decreased in year 2003 by -2.73 percent and in 2009 by -2.71 percent. The increment in total assets is maximum in 2001 as 33.83 percent and minimum in 2005 as -11.23 percent. Total other assets (capital work in progress and investment) is increased heavily in 2009 by 71.93 percent and decreased heavily in 2008 by -77.68 percent. The mean investment of fixed assets, current assets and total assets is Rs. 39999.38, Rs. 5707.74 and Rs. 57922.35 million respectively. Similarly the standard deviation of fixed assets, current assets and total assets is Rs. 13815.14, Rs. 2083.004 and Rs. 16750.11 million respectively. The co-efficient of variation (CV) of current assets is 36.49 percent which is higher as compared to the CV of fixed assets (34.53 percent) and total assets (28.91 percent). Similarly, figure 4.1 depicted the change in fixed assets highly fluctuated in 2008 and other assets during 2003, 2008 and 2009.

B. Status of Equity and Liabilities

The pattern of increment in total equity, total long term loan, total current liabilities & provision and total liabilities & equity is presented below table 4.3

Table 4.3: Status of Equity and Liabilities

(Rs. in million)

FY	Total Equity (1)	% Change in (1)	Total Long Term Loan (2)	% Change in (2)	Total Current Liabilities & Prov. (3)	% Change in (3)	Total Liabilities & Equity (4)	% Change in (4)
2000	20826.6	-	12880.6	-	1416.9	-	35124.1	-
2001	22317.4	7.16	13367.0	3.78	1654.8	16.79	37339.2	6.31
2002	24648.5	10.45	14900.4	11.47	1803.7	9.00	41352.6	10.75
2003	25699.3	4.26	17403.2	16.80	2925.2	62.18	46027.7	11.31
2004	25788.8	0.35	20848.4	19.80	4005.0	36.91	50642.2	10.02
2005	25406.1	-1.49	23824.3	14.27	4786.5	19.51	54016.9	6.67
2006	26323.6	3.61	30155.7	26.58	5477.4	14.43	61956.7	14.70
2007	25853.0	-1.79	36707.5	21.73	6113.7	11.62	68674.2	10.84
2008	24755.1	-4.25	41474.5	12.99	5948.1	-2.71	72177.7	5.10
2009	22561.2	-8.86	43786.0	5.57	8198.1	37.83	74545.3	3.28
2010	22766.5	0.91	45252.0	3.35	10389.2	26.73	78407.7	5.18
2011	23227.4	2.02	49201.3	8.73	10664.8	2.65	83093.5	5.98
Mean	24181.13		29150.08		5281.95		58613.15	
SD	1773.146		13610.41		3196.02		16751.24	
CV	7.33%		46.69%		60.50%		28.57%	

Source: NEA, FY 2011/12, A Year in Review

Figure 4.2: Percentage Change in Current Liabilities, Total Equity and Total Long Term Loan

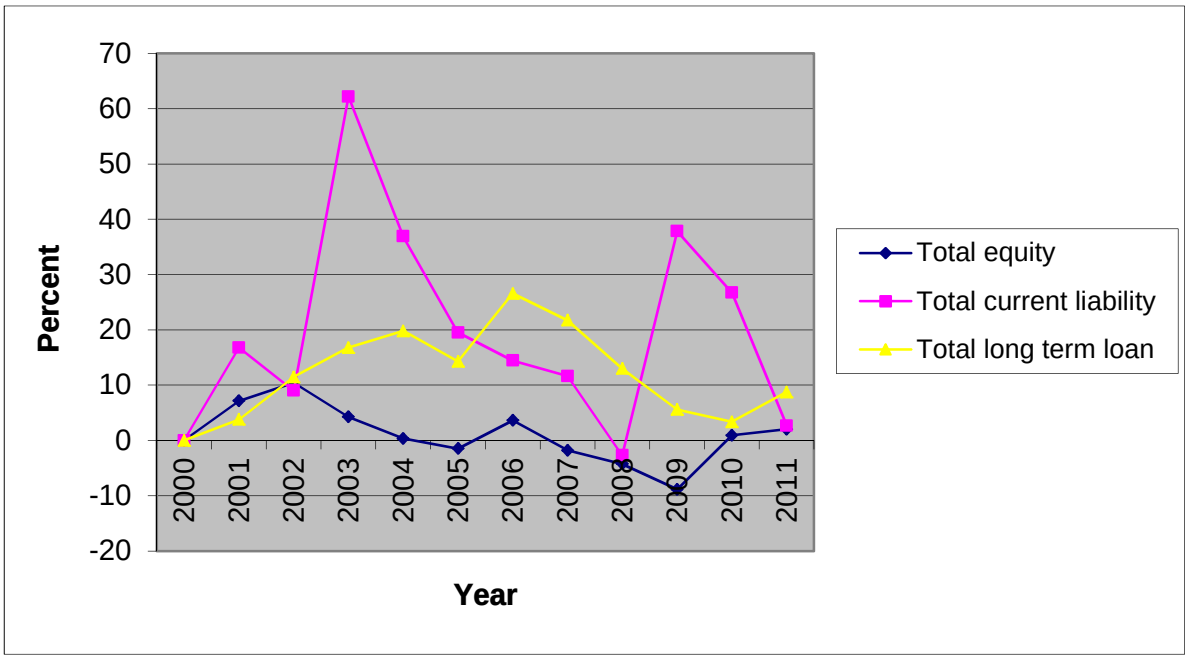


Table 4.3 and figure 4.2 revealed the fluctuating trend in the equity, long term loan and current liabilities. The equity (share capital + Reserve and accumulated profit) increment is maximum in year 2002 i.e. 10.45 percent and decreased maximum in 2009 i.e. -8.86 percent. Total long term loan is increased maximum in 2006 i.e. 26.58 percent. Total current liabilities and provision is increased maximum is 2009 i.e. 37.83 and decreased in 2008 i.e. -2.71 percent. Similarly total liabilities and equity increment is maximum in 2006 i.e. 14.70 percent. However, the CV of total equity (7.33%) is lower than CV of long term loan (46.69%) and current liabilities (60.50%).

C. Status of Equity and long - term on Total Assests

Now the interdependency or relation among the total assets, total equity and total long term loan (liabilities) is studied under this topic.

Table 4.4 shows that the percentage of total equity in the total assets increased in 2011 from 59.71% (2000) to 60.97% (2001). After, that decreasing till 2011. On the other hand, the percentage of the total long term loan in the total assets decreased in 2001 from 36.93% (2000) to 36.52% (2001) and increasing after that gradually. It symbolizes that, at the time when equity is decreasing more or less it is covered by the

total long – term loan. Here also, in comparison of equity and long-term loan with assets, the crucial role of loan is observed, which shows its effect in NEA.

Table 4.4: Share of Equity and Long – term Loans on Assets

(Rs. in Million)

FY	Total Assets	Total Equity	Total Long-term loan	% of total Equity in Total Assets	% of Total Long-term Loan (liab.) in Total Assets
2000	34881.8	20826.6	12880.6	59.71	36.93
2001	36606.2	22317.4	13367.0	60.97	36.52
2002	40606.1	24648.5	14900.4	60.70	36.69
2003	45627.2	25699.3	17403.2	56.32	38.14
2004	50010.2	25788.8	20848.4	51.57	41.69
2005	53145.0	25406.1	23824.3	47.81	44.83
2006	60425.2	26323.6	30155.7	43.56	49.91
2007	67574.7	25853.0	36707.5	38.26	54.32
2008	71251.0	24755.1	41474.5	34.74	58.21
2009	73907.9	22561.2	43786.0	30.53	59.24
2010	78179.4	22766.5	45252.0	29.12	57.88
2011	82853.5	23227.4	49201.3	28.03	59.38
Mean	57922.35	24181.13	29150.08	45.11	47.81
SD	16750.11	1773.14	13610.41	12.78	9.67
CV	28.91%	7.33%	46.69%	28.35%	20.24%

Source: NEA, Fiscal Year 2011/2012- A year in Review

The co-efficient of varation (CV) of total long-term loan is 46.69% is higher as compared to the CV of total equity (7.33%) and total assets (28.91%).

D. Debt Equity Ratio

The ratio of debt to equity is important for shareholder and creditor. Lower ratio is preferred by creditors and higher ration is preferred by equity holders. The formula for debt equity ratio is given by:

$$\text{Debt equity ratio} = \frac{\text{Debt}}{\text{Equity}}$$

Table 4.5 below shows the debt and equity position of NEA.

Table 4.5: Debt Equity Ratio

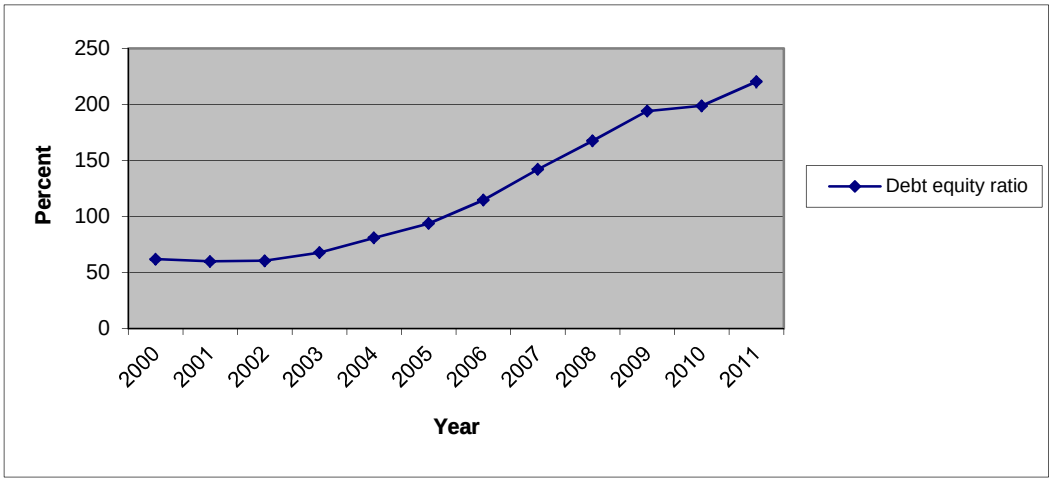
(Rs. in Million)

FY	Total Equity (Rs.)	Total Debt	Debt Equity ratio (%)
2000	20826.6	12880.60	61.84
2001	22317.4	13367.00	59.89

2002	24648.5	14900.40	60.45
2003	25699.3	17403.20	67.72
2004	25788.8	20848.40	80.84
2005	25406.1	23824.30	93.77
2006	26323.6	30155.70	114.56
2007	25853.0	36707.50	141.98
2008	24755.1	41474.50	167.54
2009	22561.2	43786.00	194.08
2010	22766.5	45252.00	198.77
2011	22327.4	49201.30	220.36
Mean	24106.13	29150.08	121.81
SD	1835.10	13610.41	60.29
CV	7.61%	46.69%	49.49%

Source: NEA, Fiscal Year 2011/12 – A year in Review

Figure 4.3: Debt Equity Ratio



Above table 4.5 and figure 4.3 revealed the percentage of debt in the total equity in increasing trend. The ratio 198.77 percent is very high in 2010 (leaving 2011 figure as provisional). This is decreased to 59.89 percent in 2001 but increased from 2002 gradually. The portion of long term loan is less than total equity till 2005 but after that total debt is more than total equity. This shows the high dependency of NEA in foreign as well as outside sources. The co-efficient of variation (CV) of total debt is 46.69 percent is higher as compared to the CV of total equity (7.61 percent).

E. Liquidity Ratios

Liquidity denotes the short-term solvency of the undertaking. This ratio is of the special significance to the short-term creditors. In our context liquidity position of NEA attracts keen attention of independent power producers (IPPs) and NEA management itself. Even though dealing with a government undertaking may provide a feeling of assurance in the part of IPPs timely payment of their bills against energy supplied is their prime concern. On the other hand, increasing IPPs, increasing long outstanding balance and a discrepancy between NEA's average selling price and cost of sales of electricity is making NEA management worried about its liquidity to meet the current obligation.

i. Current Ratio

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

This study included the current assets as, inventories, sundry debtors and other receivables, cash and Bank balance, prepaid, advance, loan and deposits. Similarly the current liabilities included are: sundry creditors, payable and provision.

General assumption the current ratio is that higher the ratio greater is the liquidity position. The traditional belief is that 2:1 current ratio is an indicator of good liquidity position.

Since NEA is the only on organization of its nature in the kingdom of Nepal no horizontal standard is also available for comparison. The historical trend of ratio indicates that NEA on 2003 backward was nearly maintaining the absolute standard of 2:1. However from 2004 onward it seems to be 1:1and seems less than 1:1 in 2009, 2010 and 2011. It showed the decreasing trend reflecting its unsatisfactory liquidity position.

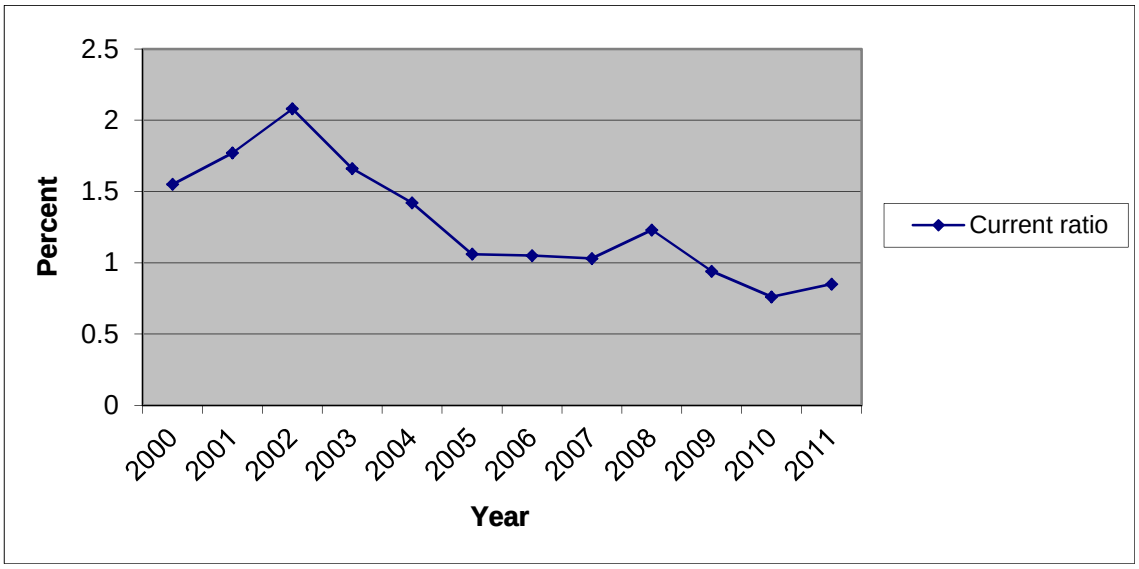
Table 4.6: Comparison of Current Ratio

(in Million Rupees)

Year	Current Assets				Total	Current Liabilities	Ratio
	Inventories	S. Debtors & Other Receivables	Case & Bank Balance	Prepaid, Advance, Loan & Deposit			
2000	340.40	569.90	1131.20	149.8	2191.3	1416.9	1.55
2001	429.10	682.60	1349.20	471.7	2932.6	1654.8	1.77
2002	617.9	1040.00	1244.8	848.4	3751.1	1803.7	2.08
2003	804.0	1209.1	1526.5	1329.0	4868.6	2925.2	1.66
2004	914.9	1435.4	1632.3	1709.6	5692.2	4005.0	1.42
2005	740.0	1530.9	1148.1	1634.2	5053.2	4786.5	1.06
2006	982.3	1525.5	1321.3	1932.0	5761.1	5477.4	1.05
2007	960.9	1678.5	1039.3	2634.9	6313.6	6113.7	1.03
2008	1058.1	2284.5	664.6	3314.4	7322.0	5948.1	1.23
2009	1017.2	3380.2	1076.2	2216.9	7690.5	8198.1	0.94
2010	1048.0	3735.7	1036.4	2063.3	7883.4	10389.2	0.76
2011	1197.8	4123.3	1225.4	2486.8	9033.3	10664.8	0.85
Mean	842.55	1932.96	1199.60	1732.58	5707.74	5281.95	1.28
SD	264.52	1192.71	251.37	920.41	2083.0	3196.02	0.41
CV	31.39%	61.70%	20.95%	53.12%	36.49%	60.50%	31.99%

Source: NEA, FY 2011/12, a year in Review

Figure 4.4: Current Ratio



The mean value of current assets and current liabilities are Rs. 5707.74 and Rs. 5281.95 million respectively. The co-efficient of variation (CV) of current assets is 36.49 percent is lower as compared to the CV of current liabilities (60.50 percent).

ii. Quick Ratio

$$\text{Quick ratio} = \frac{\text{Current assets- (Inventories+ Pre-paid \& advance expenses)}}{\text{Current Liabilities}}$$

Academically, it is recommended as a more accurate measure of liquidity than the current ratio. The Quick ratio also has an absolute standard of 1:1. The quick ratio more than this indicates that the organization has excessive quick assets as a result of inefficiency on the part of management to effectively use its assts.

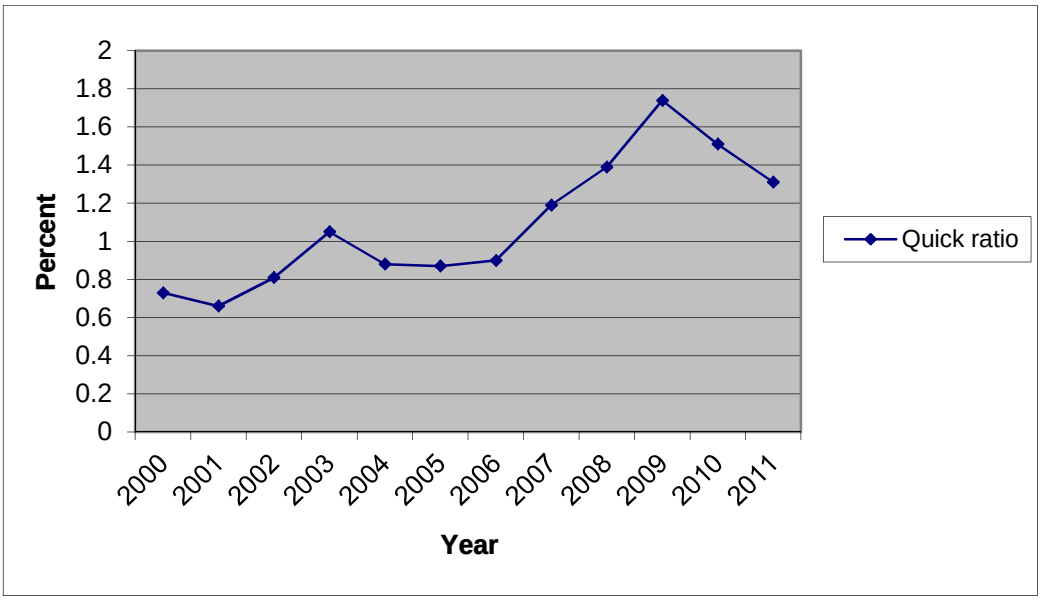
Table 4.7: Quick Ratio

(Rs. in Million)

Year	Quick Assets			Total	Current Liabilities	Ratio
	S. Debtors & Other Receivables	Case & Bank Balance	Prepaid, Advance, Loan & Deposit			
2000	4123.3	1225.4	2486.8	7835.5	10664.8	0.73
2001	3735.7	1036.4	2063.3	6835.4	10389.2	0.66
2002	3380.2	1076.2	2216.9	6673.3	8198.1	0.81
2003	2284.9	664.6	3314.4	6263.9	5948.1	1.05
2004	1678.5	1039.3	26.34.9	5352.7	6113.7	0.88
2005	1525.5	1321.3	1932.0	4778.8	5477.4	0.87
2006	1530.9	1148.1	1634.2	4313.2	4786.5	0.90
2007	1435.4	1632.3	1709.6	4777.3	4005.0	1.19
2008	1209.1	1526.5	1329.0	4064.6	2925.2	1.39
2009	1040.0	1244.8	848.4	3133.2	1803.7	1.74
2010	682.6	1349.2	471.7	2503.5	1654.8	1.51
2011	569.9	1131.2	149.80	1850.9	1416.9	1.31
Mean	1933	1199.60	1513.0	4865.19	5281.95	1.08
SD	1192.72	251.37	918.18	1828.85	3196.02	0.33
CV	61.70%	20.95%	60.68%	37.59%	60.50%	31.27%

Source: NEA, FY 2011/12, a year in Review

Figure 4.5: Quick Ratio



From the table 4.7, quick ratios seem to be more than the absolute standard of 1:1 in 2007 to 2011. But ratio showed less than 1:1 in 2006 backwards except in year 2003. Trend shows that quick ratios are above standard (1:1) in recent years which showed the sound position of quick assets to discharge the current liabilities. The figure 4.5 also showed the upward moving of quick ratio in an average. Thought the SD of the ratio is 0.33 but the CV is very high.

The mean value of quick assets and current liabilities are Rs. 4865.19 and Rs. 5281.95 million respectively. The co-efficient of variation (CV) of quick assets is 37.59 percent is lower as compared to the CV of current liabilities (60.50 percent).

iii. Absolute Cash Ratio

This indicates the cash sufficiency to meet obligation towards current liabilities. A better ratio indicates a better position of the undertaking to pay off its current liabilities.

$$\text{Absolute cash ratio} = \frac{\text{Cash Reservoir}}{\text{Current Liabilities}}$$

Cash reservoir is the most liquid assets which constitute cash in hand, cash at bank capable of being freely used for the day to day operations and marketable securities, if any, in the nature of non-trade investment.

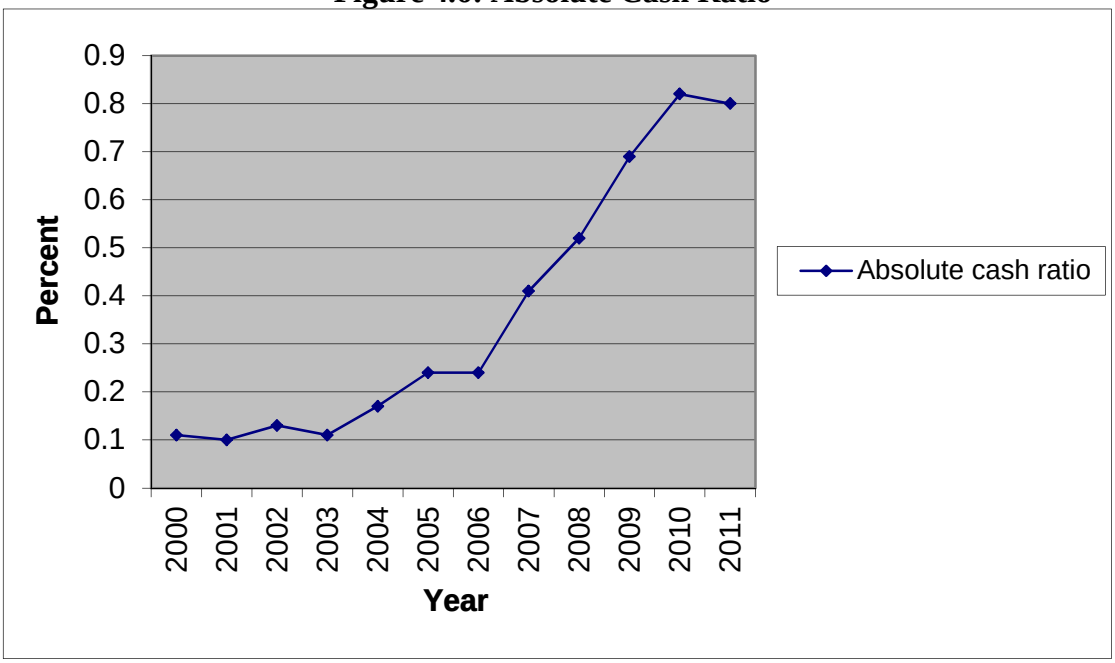
Table 4.8: Absolute Cash Ratio

(Rs. in Million)

Year	Cash & Bank (Rs.)	Current Liabilities (Rs.)	Ratio
2011	1225.4	10664.8	0.11
2010	1036.4	10389.2	0.10
2009	1076.2	8198.1	0.13
2008	664.6	5948.1	0.11
2007	1039.3	6113.7	0.17
2006	1321.3	5477.4	0.24
2005	1148.1	4786.5	0.24
2004	1632.3	4005.0	0.41
2003	1526.5	2925.2	0.52
2002	1244.8	1803.7	0.69
2001	1349.20	1654.8	0.82
2000	1131.20	1416.9	0.80
Mean	1199.60	5281.95	0.36
SD	251.37	3196.02	0.27
CV	20.95%	60.50%	76.97%

Source: NEA, FY 2011/12, a year in Review

Figure 4.6: Absolute Cash Ratio



Analysis of absolute cash ratio reflects the decreasing trend for the period under analysis. The ratio of 0.24 in 2005 has been just maintained in the year 2006 even

after the effect of tariff increment. This indicates that no cash sufficiency to meet obligation towards current liabilities.

The mean value of cash and bank and current liabilities are Rs. 1199.60 and Rs. 5281.95 million respectively. The co-efficient of variation (CV) of cash and bank is 20.95 percent is lower as compared to the CV of current liabilities (60.50 percent).

iv. Cash Position to Total Assets Ratio

This ratio is a measure of liquid layer of the assets deployed by business. Cash is the most liquid asset. How much cash is maintained by others who are in the same business or how much cash was maintained in the business earlier ma give some idea about the cash position to total assets ratio.

Table 4.9: Cash Position to Total Assets

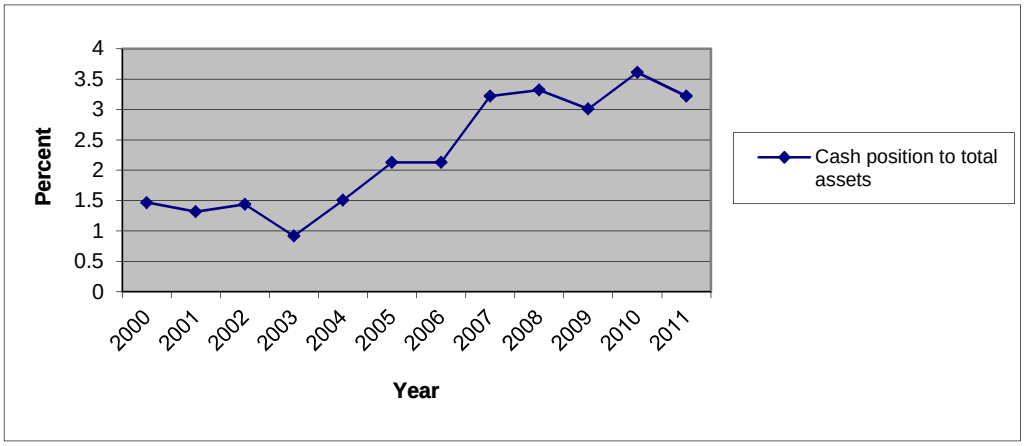
(Rs. in Million)

Year	Cash & Bank (Rs.)	Total Assets (Rs.)	Ratio (%)
2011	1225.4	83093.5	1.47
2010	1036.4	78407.7	1.32
2009	1076.2	74545.3	1.44
2008	664.6	72177.7	0.92
2007	1039.3	68674.2	1.51
2006	1321.3	61956.7	2.13
2005	1148.1	54016.9	2.13
2004	1632.3	50642.2	3.22
2003	1526.5	46027.7	3.32
2002	1244.8	41352.6	3.01
2001	1349.20	37339.2	3.61
2000	1131.20	35124.1	3.22
Mean	1199.60	58613.15	2.27
SD	251.37	16751.24	0.94
CV	20.95%	28.57%	41.74%

Source: NEA, FY 2011/12, a year in Review

$$\text{Cash Position to Total Assets Ratio} = \frac{\text{Cash and Bank Balance}}{\text{Total Assets}}$$

Figure 4.7: Cash Position to Total Assets



The ratio of cash position to total assets of NEA is decreasing slowly from 2001 onwards. Although, it has reflected the impact of tariff increment in 2006 maintaining the ratio at 2.13 same as in the year 2005. But sharp decrease in recent years is due to clear impact of IPPs emergence.

The mean value of cash and bank and total assets are Rs. 1199.60 and Rs. 58613.15 million respectively. The co-efficient of variation (CV) of cash and bank is 20.95 percent is lower as compared to the CV of total assets (28.57 percent).

E. Revenue Pattern and Trend of NEA

Revenue has an important role in any organization for its operation. Without it, it will be almost impossible to conduct the work of that organization. There may be different sources of revenue. The goods produced by the organization is the main sources of it. Apart from this, there may be other sources of revenue that come to the secondary sources. The pattern and trend of revenue also indicate the efficiency and performance as well as the economic status and position of the organization.

Under the sources of revenue of NEA, two main sources are:

a. Net sale of electricity
b. Income from other services

The revenue pattern and trend of NEA is shown in table 4.10

Table 4.10: Revenue Pattern and Trend of NEA

(Rs. in Million)

Particulars	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Net Sale of Electricity	3218.50	3728.90	4767.50	5082.50	5396.70	6856.00	8160.80	9476.2	11012.6	11874.7	12822.9
% Growth	-	15.85	27.85	6.61	6.18	27.0 4	19.03	16.12	16.21	7.83	7.99
Other Income	245.00	283.20	316.30	350.20	384.70	356.40	593.10	459.6	512.5	671.4	566.1
Total	3463.5	4012.1	5083.8	5432.7	5781.4	7212.4	8753.9	9935.8	11525.1	12546.1	13389.0

Source: NEA, FY 2011/12, a year in Review

Figure 4.8: Trend Analysis

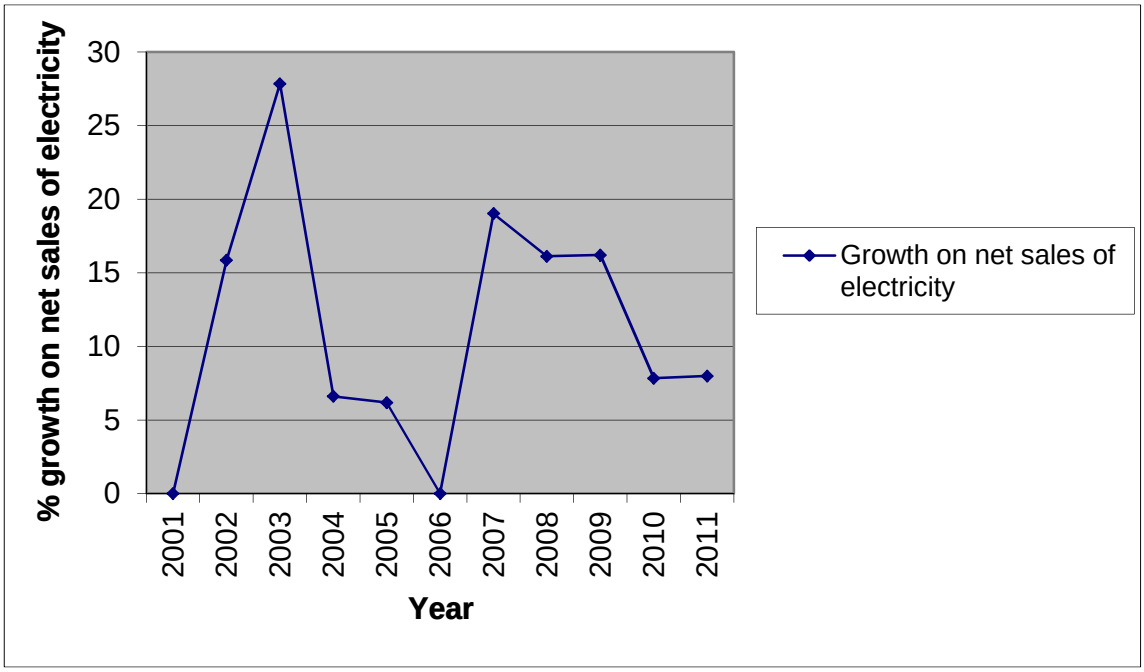


Table 4.10 revealed that the revenue pattern of NEA is in increasing trend but the change in revenue from the growth point of view is fluctuating. Net sale of electricity is the main source of revenue in NEA. The above figure shows that the growth on net sales of electricity is fluctuating. Net sale of electricity is increased greatly in 2003 i.e. 27.85%.

Table 4.11: Comparison of Revenue

(Rs. in million)

Particular	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sales	4767.50	5082.50	5396.70	6856.00	8160.80	9476.2	11012.6	11874.7	12822.9
Other Income	316.30	350.20	384.70	356.40	593.10	459.6	512.5	671.4	566.1
Total Revenue	5083.8	5432.7	5781.4	7212.4	8753.9	9935.8	11525.1	12546.1	13389.0
Domestic	1769.84	1895.84	2056.05	2622.03	3161.38	3641.43	4249.81	4578.99	5079.876
% of Total Revenue	34.81	34.89	35.56	36.35	36.11	36.65	36.87	36.50	37.94
Industrial	1801.58	1973.37	2093.88	2599.34	3086.10	3608.13	4039.65	4380.22	4851.4
% of Total Revenue	35.44	36.32	36.22	36.04	35.25	36.31	35.05	34.91	36.23
Commercial	446.96	477.04	515.72	661.58	555.62	818.75	894.91	986.07	1015.47
% of Total Revenue	8.79	8.78	8.92	9.17	6.35	8.24	7.76	7.86	7.58
Non-commercial	386.36	405.14	419.58	527.40	835.78	722.12	783.99	816.01	947.11
% of Total Revenue	7.60	7.46	7.26	7.31	9.55	7.27	6.80	6.50	7.07

Source: NEA, FY 2011/12, a year in Review

Table 4.11 showed sector wise contribution in total revenue. Industrial consumers contributed high percentage of total revenue till 1998-2002 but after that domestic consumers' contribution is higher in total revenue. This decrease of industrial consumers' contribution is due to the insurgency, political instability in the country. In 2006 July 15 the domestic consumers contributed 37.94 percent of the revenue while the industrial, commercial and non-commercial categories contributed 36.23, 7.58 and 7.07 percent respectively.

F. Operating Expenses Pattern and Trend of NEA

The operating expenses consist of generation expenses (including power purchase), transmission expenses, distribution expenses, administration expenses, depreciation expenses, deferred revenue expenditure written off.

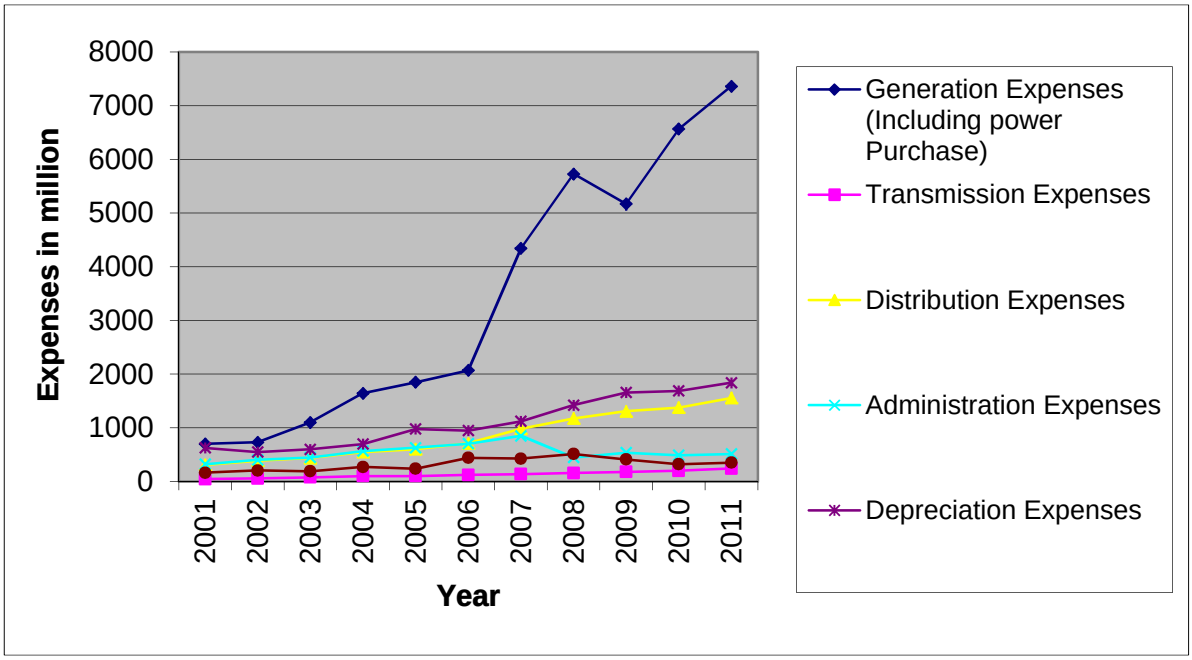
Table 4.12: Operating Expenses Pattern and Trend of NEA

(Rs. in Million)

Particulars	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Generation Expenses (Including power Purchase)	700.11	729.86	1098.82	1642.82	1849.32	2068.53	4343.40	5728.7	5169.4	6565.9	7362.0
Transmission Expenses	44.69	54.94	77.48	100.78	101.18	121.73	137.30	158.0	178.6	199.5	240.7
Distribution Expenses	307.72	386.95	436.88	546.69	600.26	711.53	982.22	1174.4	1308.6	1376.1	1556.2
Administration Expenses	320.28	402.75	445.12	564.21	629.24	703.47	850.08	447.4	536.1	489.1	511.6
Depreciation Expenses	624.40	547.80	598.90	696.70	976.40	948.80	1119.30	1420.1	1656.7	1686.0	1838.8
Deferred Revenue Expenditure Written off	162.00	204.40	188.70	270.10	236.80	440.80	426.90	512.5	411.1	320.1	350.0
Total	2159.2	2326.7	2845.9	3821.3	4393.2	4994.86	7859.2	9441.1	9260.5	10636.7	11859.3

Source: NEA, FY 2011/12, A year in Review

Figure 4.9: Trend Line of Operating Expenses



Trend analysis shows that generation expenses has highest increasing trend than others.

Operating Expenses Ratio

From this ratio, the relationship between operating expenses and sales become clear. To ascertain this ratio the operating expenses is divided by sales.

$$\text{Operating Expenses Ratio} = \frac{\text{Net profit}}{\text{Operating Expenses}}$$

Table 4.13: Operating Expenses Ratio

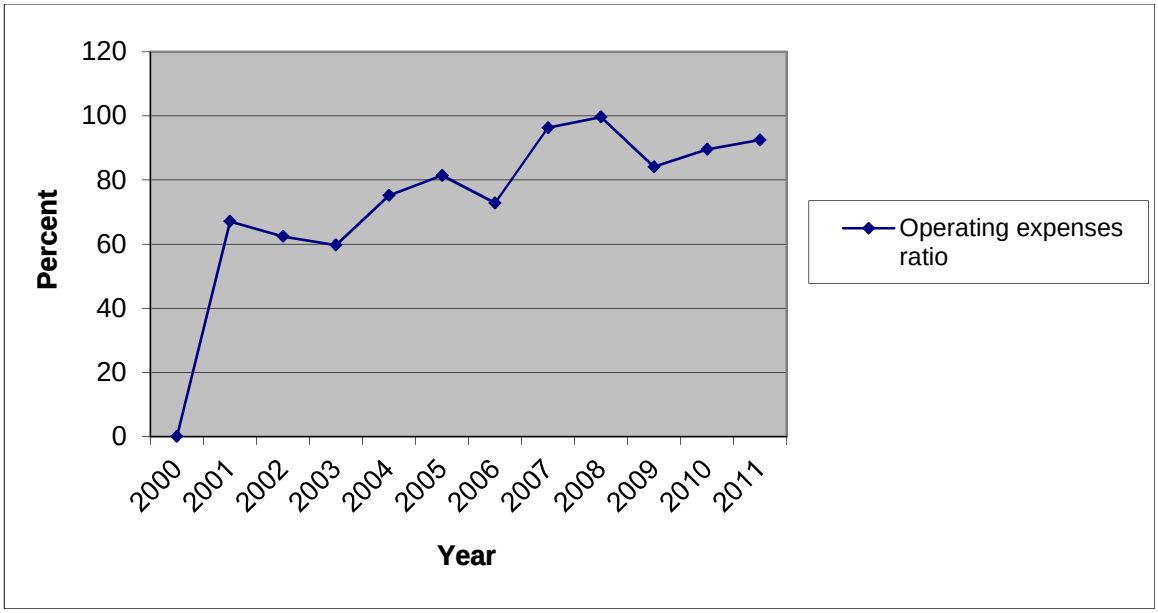
(Rs. in Million)

Year	Operating expenses (Rs.)	Sales (Rs.)	Ratio (%)
2001	2159.2	3218.5	67.08
2002	2326.7	3728.9	62.39
2003	2845.9	4767.5	59.69
2004	3821.3	5082.5	75.18
2005	4393.2	5396.7	81.40
2006	4994.86	6856	72.85

2007	7859.2	8160.8	96.30
2008	9441.1	9476.2	99.62
2009	9260.5	11012.6	84.09
2010	10636.7	11874.7	89.57
2011	11859.3	12822.9	92.48
Mean	6327.08	7490.66	80.06
SD	3565.30	3388.99	13.71
CV	56.34%	45.24%	17.12%

Source: NEA, FY 2011/12, a year in Review

Figure 4.10: Operating Expenses Ratio



The mean value of operating expenses and sales are Rs. 6327.08 and Rs. 7490.66 million respectively. The co-efficient of variation (CV) of operating expenses is 56.34 percent is higher as compared to the CV of total sales (45.24 percent).

Table 4.14: Net Profit/Loss Position of NEA

(Rs. in million)

Particular	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Profit from Operation	2090.7	2437.6	3025.6	2578.20	2601.4	3607.1	2440.9	2427.3	4332.4	3915.5	3718.5
Interest	797.0	813.5	1207.5	1317.2	1141.2	1244.3	1188.2	1395.5	2973.4	2991.5	3324.6
Profit/loss on foreign exchange	0.0	0.0	0.0	0.0	0.0	0.0	0.0	271.6	0.0	59.1	50.0
Loss on fixed assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.0	191.5	0.0	0.0
Depreciation	624.4	547.8	598.9	696.7	976.4	948.8	1119.3	1420.1	1656.7	1686.0	1838.8
Deferred revenue expenditure written off	162.0	204.4	188.7	270.1	236.8	440.8	426.9	512.5	411.1	320.1	350.0
Profit/loss from operation including interest+Dep^{n}	507.3	871.9	1030.5	294.2	247.0	973.2	-293.5	-1209.4	-900.3	-1141.2	-1844.9
Prior years adjustment (net)	-397.0	-99.0	-176.6	-91.7	-79.4	-216.7	291.6	492.0	444.4	344.9	50.0
Net profit/loss before tax	110.3	772.9	853.9	202.5	167.6	756.5	-1.9	-717.4	-455.9	-1486.1	-1894.9
Provision for tax	3.9	74.4	146.3	28.8	263.6	571.4	49.1	143.3	1497.8	-274.2	-
Net profit/loss after tax	106.4	698.5	707.6	173.7	-96.0	185.1	-51.0	-860.7	-1953.7	-1760.3	-1894.9

Source: NEA, FY 2011/12, A year in review

Profit from operation is obtained by subtracting expenses (Generation, transmission, distribution, administrative) from total revenue (sales of electricity + other income). Then subtracting interest, depreciation, loss on foreign exchange, loss on fixed assets and deferred revenue expenditure written off from profit from operation it is obtained profit/loss from operation. NEA is in net profit after tax position in years 2001, 2002, 2003, 2004 and 2005 but in net loss after tax position in years 2005, 2007, 2008, 2009, 2010 and 2011. Accumulated loss has crossed Rs.5 arab till date as published in auditing news.

H. Net Profit Ratio

From this ratio, the relationship between sales and net profit become clear. Amount after subtracting the whole operating expenses, income tax, interest etc. from the gross profit is known as net profit. To ascertain this ratio the net profit is divided by sales.

$$\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Sales}} * 100$$

Table 4.15: Net Profit Ratio

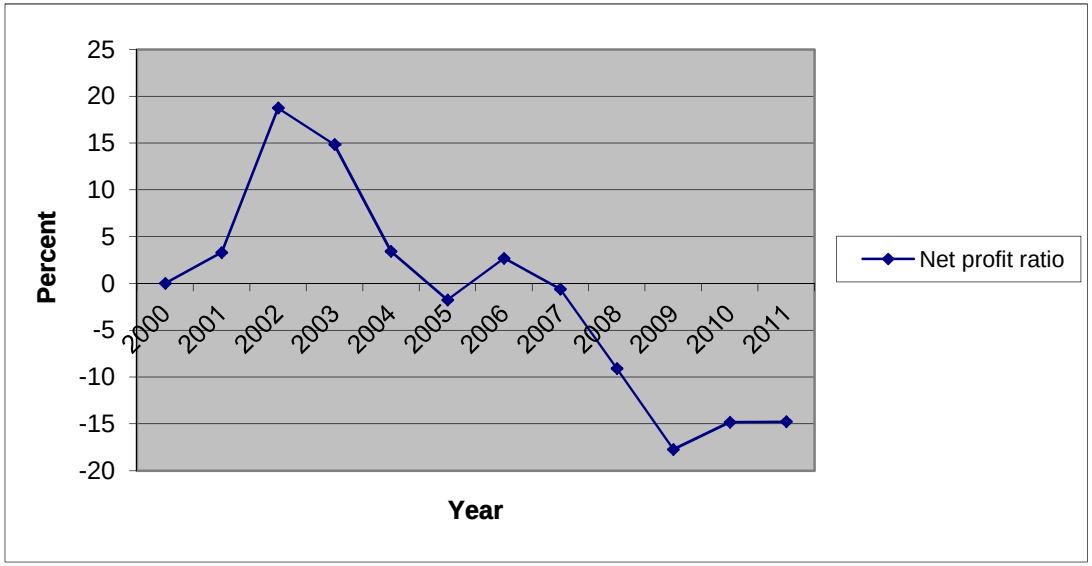
(Rs. in Million)

Year	**Sales (Rs.)**	**Net profit** (Rs.)	**Ratio (%)**
2001	3218.5	106.4	3.30
2002	3728.9	698.5	18.73
2003	4767.5	707.6	14.84
2004	5082.5	173.7	3.41
2005	5396.7	-96	-1.77
2006	6856	185.1	2.69
2007	8160.8	-51	-0.62

2008	9476.2	-860.7	-9.08
2009	11012.6	-1953.7	-17.74
2010	11874.7	-1760.3	-14.82
2011	12822.9	-1894.9	-14.77
Mean	7490.66	-431.39	-1.43
SD	3388.99	1013.71	11.90
CV	45.24%	-234.98%	-827.17%

Source: NEA, FY 2011/12, a year in Review

Figure 4.11: Net Profit Ratio



The ratio of sales to net profit of NEA is positive till 2004. It is decreasing slowly from 2007 onwards. In most of the year NEA has negative profit margin ratio. The sharp decrease in ratio of recent years is due to higher expenditure as compare to revenue collection.

The mean value of sales and net profit are Rs. 7590.66 and Rs. -431.39 million respectively. The co-efficient of variation (CV) of sales is 45.24 percent is lower as compared to the CV of total assets (-234.98 percent).

I. Fixed assets Turnover Ratio

Turnover ratio is employed to evaluate the efficiency of the firm that manages and utilized its fixed assets to measure the effectiveness of the investment that are used to produce sales. Unlike other manufacturing concerns that hydropower produces loans, advances and other investments. High ratio depicts the managerial efficiency in utilizing the resources.

$$\text{Fixed assets turnover ratio} = \frac{\text{Sales}}{\text{Fixed assets}}$$

Table 4.16: Fixed Assets Turnover Ratio

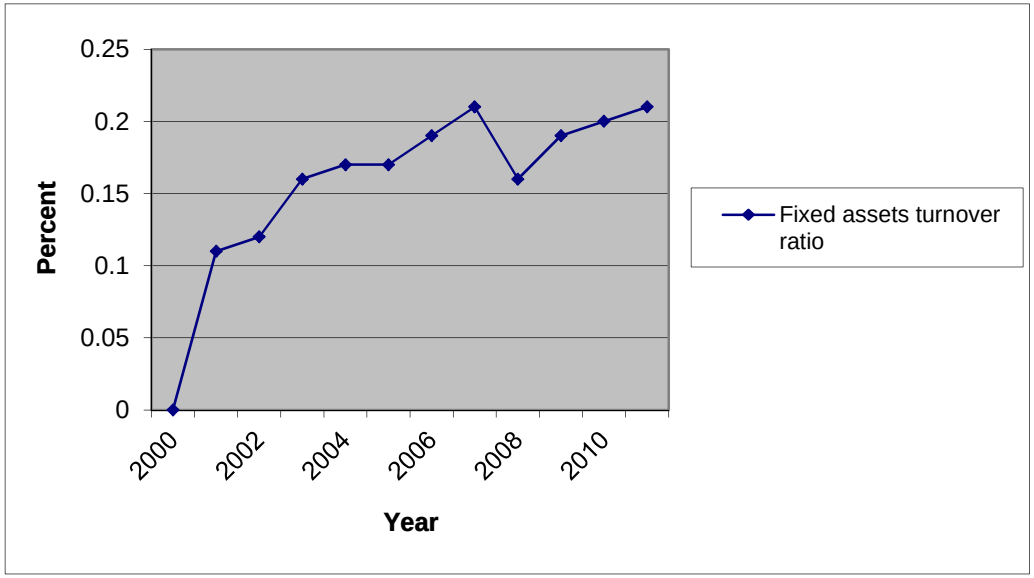
(Rs. in Million)

Year	**Total Fixed assets** (Rs.)	**Sales (Rs.)**	**Ratio (Times)**
2001	28414	3218.5	0.11
2002	29438.3	3728.9	0.12
2003	28633.4	4767.5	0.16

2004	29891.3	5082.5	0.17
2005	31223	5396.7	0.17
2006	35196	6856	0.19
2007	37104	8160.8	0.21
2008	58538.2	9476.2	0.16
2009	56949	11012.6	0.19
2010	58963.4	11874.7	0.20
2011	58747.5	12822.9	0.21
Mean	41190.74	7490.66	0.17
SD	13827.83	3388.99	0.034
CV	33.57%	45.24%	19.42%

Source: NEA, FY 2011/12, a year in Review

Figure 4.12: Fixed Assets Turnover Ratio



Fixed assets turnover ratio of NEA is increasing till 2007. It is increasing slowly from 2001 onwards. In most of the year NEA has positive fixed assets turnover ratio. The sharp increase in ratio of recent years is due to lower expenditure in fixed assets as compare to sales. However, the efficiency of fixed assets generating reasonable sales found unsatisfactory.

The mean value of total fixed assets and net profit are Rs. 41190.74 and Rs. 7490.66 million respectively. The co-efficient of variation (CV) of total fixed assets is 33.57 percent is higher as compared to the CV of total Sales (45.24 percent).

J. Capital Employed turnover ratio

Turnover ratio is employed to evaluate the efficiency of the firm that manages and utilized its capital to measure the effectiveness of the capital that is used to produce profit. Unlike other manufacturing concerns that hydropower produces equity and long term loan. High ratio depicts the managerial efficiency in utilizing the resources and secures high return.

$$\text{Capital Employed turnover Ratio} = \frac{\text{Sales}}{\text{Capital employed}} * 100$$

The ratio of capital employed turnover ratio of NEA is decreasing till 2004. It is decreasing slowly from 2001 onwards. In most of the year NEA has positive capital employed turnover ratio. The sharp increase in ratio of recent years is due to higher expenditure in capital as compare to sales.

The mean value of total capital employed and net sales are Rs. 55033.38 and Rs. -7490.66 million respectively. The co-efficient of variation (CV) of total capital employed is 23.08 percent is lower as compared to the CV of sales (45.24 percent).

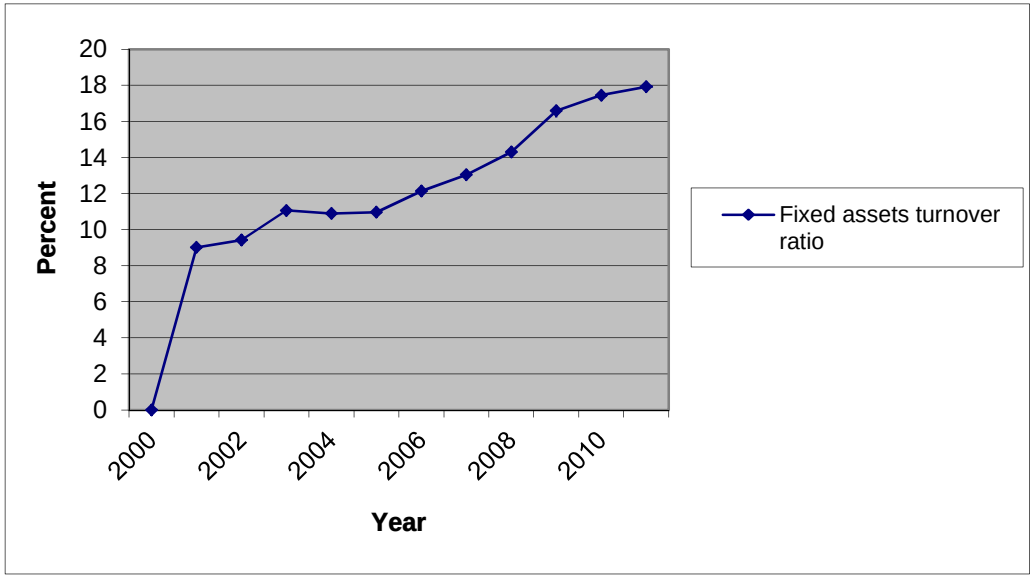
Table 4.17: Capital Employed Turnover Ratio

(Rs. in Million)

Year	Sales (Rs.)	Capital employed (Rs.)	Ratio (%)
2001	3218.5	35684.4	9.01
2002	3728.9	39548.9	9.42
2003	4767.5	43102.5	11.06
2004	5082.5	46637.2	10.89
2005	5396.7	49230.4	10.96
2006	6856	56479.3	12.13
2007	8160.8	62560.5	13.04
2008	9476.2	66229.6	14.30
2009	11012.6	66347.2	16.59
2010	11874.7	68018.5	17.45
2011	12822.9	71528.7	17.92
Mean	7490.66	55033.38	12.98
SD	3388.99	12702.3	3.16
CV	45.24%	23.08%	24.41%

Source: NEA, FY 2011/12, a year in Review

Figure 4.13: Capital Employed Turnover Ratio



K. Total Assets Turnover Ratio

Total assets turnover ratio is employed to evaluate the efficiency of the firm that manages and utilized its total assets to measure the effectiveness of the investment that are used to produce sales.

Total assets turnover ratio = $\frac{\text{Sales}}{}$

Total assets

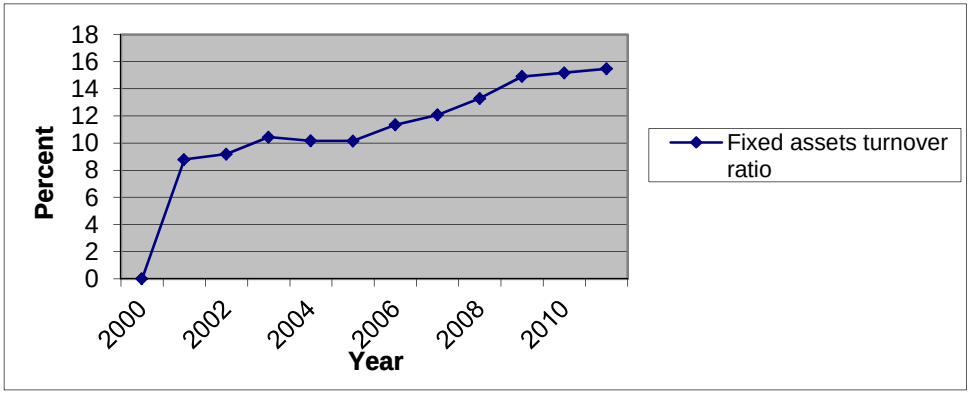
Table 4.18: Total Assets Turnover Ratio

(Rs. in Million)

Year	**Sales** (Rs.)	**Total assets (Rs.)**	**Ratio (%)**
2001	3218.5	36606.2	8.79
2002	3728.9	40606.1	9.18
2003	4767.5	45627.2	10.44
2004	5082.5	50010.2	10.16
2005	5396.7	53145.0	10.15
2006	6856	60425.2	11.34
2007	8160.8	67574.7	12.07
2008	9476.2	71251.0	13.29
2009	11012.6	73907.9	14.90
2010	11874.7	78179.4	15.18
2011	12822.9	82853.5	15.47
Mean	7490.66	60016.95	11.91
SD	3388.99	15833.82	2.45
CV	45.24%	26.38%	20.58%

Source: NEA, FY 2011/12, a year in Review

Figure 4.14: Total Assets Turnover Ratio



The ratio of total assets turnover ratio of NEA is positive and increasing through out the study period. It is increasing slowly from 2001 onwards. In most of the year NEA has positive total assets turnover ratio. The sharp increase in ratio of recent years is due to lower expenditure in fixed assets as compare to sales.

The mean value of total assets and sales are Rs. 60016.95 and Rs. 7490.66 million respectively. The co-efficient of variation (CV) of total assets is 26.38 percent is lower as compared to the CV of sales (45.24 percent).

4.4 Major Findings of the Study

Based on the study the major findings are presented as follows:

- Power development in Nepal was started in a planned way with the introduction of the first five year plan (1956-61). Though the first initiation was taken by the government financing Pharping hydro plant of 500 KW in 1911 A.D.

- About 1% of total capacity of Hydropower 83000 MW is harnessed yet. Only 40% of people are enjoying electricity mainly in urban areas and in some pockets of the rural areas at the end of ninth plan. It must be painful for all us that current total installed capacity is only about 614 MW. Average capital electricity consumption 60 KWH per annum among the lowest in the world.
- The trend of financing in power development shows that the Nepalese government only covers about 10 to 25 percent and rest is covered by the foreign aid. The share of foreign loan is greater than the grant.
- NEA is not able to fulfill the requirements of funds from the successful operation of the corporation's activities. It has been taking considerable amount of loan to fulfill the requirements of funds.
- Electricity leakage, theft and wastage have been the major reasons reducing the profit earning capacity of NEA.
- The financial dynamics of NEA shows that the total assets (fixed + current + others) is in increasing trend. The percentage of debt in its equity is very high. Generation expenses (including power purchase) have highest proportion than other expenses.
- Current ratio shows NEA's unsatisfactory liquidity position. Trend shows that quick ratios are above standard in recent years which shows ineffective use of quick assets. Similarly, absolute cash ratio, cash position to total assets ratio is also in decreasing trend. This indicates that no cash sufficiency to meet obligation.
- NEA has been incurring loss of million Rupees annually. Main reasons are said to be increased corruption, mismanagement, high interest rate, dollar based power purchase agreement, overstaffing and unwanted political preserve etc.
- Assets turnover ratio capital employed turnover observed increasing in recent years but they are not utilized properly.

CHAPTER – V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Nepal is one of the least developed countries is the world. More than 80% of the total people are still in the rural areas and most of them are still deprived from the minimum requirement of human livelihood. In Nepal still 25% of people are under the line of poverty. Nepal is one of the richest countries in the world in terms of water resources possessing about 2.27% out of the total world water resources. The theoretical hydropower potential of Nepal is about 83000 MW of which an estimated 43000 MW are deemed commercially exploitable.

Nepal's electricity generation is dominated by hydropower, though in the entire scenario of the country, the electricity is a tiny fraction, only 1% energy need is fulfilled by electricity, the energy need is dominated by fuel wood (68%), agricultural waste (15%), animal during (8%) and imported fossil fuel (8%). Nepal electricity authority (NEA) is the principal producer and supplier of power in Nepal established in August 1985 (B.S. 2042 Bhadra 1) for the proper management of electricity supply by making the production, transmission and distribution of electricity capable, dependable and accessible to all.

About 1% of total capacity of hydropower 83000 MW is harnessed yet. Only 40% people are enjoying electricity mainly in urban area and in some pockets of the rural area at the end of ninth plan. Investment of hydropower projects require huge amount of money, manpower, improved technology and long period of time etc. which has made us parasites on hydropower development. Moreover, problems faced by hydropower developers, financial institutions, government agencies and NEA are taken as the statement of the problem in this study.

The general objectives of the study are to study and analyze the power sector investment in Nepal. More specifically power development in different plan periods, investment done on different plan period, financial health of NEA, sources of financing, problems of financing and policy related to financing.

Significance of the study is that it shows power development, investment policy, capital investment on power projects, financial health of NEA, private participation, power purchase agreement with private investors and their financial implication on NEA. Study is based on descriptive and analytical research design. The study is based on recent historical data, policy, rules etc. NEA is the organization to be studied. Data has been collected from both primary and secondary sources.

During the start of ninth plan, 58 municipalities and about 800VDCs of 72 districts have electricity access. Till date the facilities is available in about 1600 VDCs and 58 municipalities of all 75 districts of the country. Power generated from the national grid is available in 59 districts.

Power in a capital intensive sector for a country like Nepal, it is impossible to shoulder all the cost of investment. Therefore she has been mobilizing foreign resources since the first five year plan. The trend of financing in power development shows that the Nepalese government only covers about 12 to 25 percent and rest is covered by the foreign aid. The share of foreign loan is greater than the grant.

The financing of hydropower schemes is Nepal can be achieved by: Public sector financing, Public-Public sector financing, Public–private sector financing, Private sector financing and NEA self financing. The main source of revenue of NEA is sales of electricity. Domestics' consumers' contribution is higher in total revenue for same years. On the expenditure side, operating expenses consists of generation expenses including power purchase, transmission/distribution/administration/depreciation expense and deferred revenue expenditure written off. Generation expenses (including power purchase) have highest proportion than other expenses. Total operating expenses is in increasing trend. NEA has been suffering by net loss after tax since 2007. In year 2010, net loss after tax is Rs. 1760.3 million. Historical trend of current, quick & absolute cash

ratio is not satisfactory. Nepal is hardly confined with totally 613.5 MW power with its all power houses plus private sectors power houses, while Bhutan, which is less developed than Nepal is producing about 2000 MW.

5.2 Conclusions

It is concluded that about 1% of total capacity of Hydropower 83000 MW is harnessed yet. Only 40% of people are enjoying electricity mainly in urban areas and in some pockets of the rural areas at the end of ninth plan. It must be painful for all us that current total installed capacity is only about 614 MW. Average capital electricity consumption 60 KWH per annum among the lowest in the world. The trend of financing in power development shows that the Nepalese government only covers about 10 to 25 percent and rest is covered by the foreign aid. The share of foreign loan is greater than the grant.

The financial dynamics of NEA shows that the total assets (fixed + current + others) is in increasing trend. The percentage of debt in its equity is very high. Generation expenses (including power purchase) have highest proportion than other expenses. In NEA, domestic Consumers Contribution seems higher than industrial, commercial and non-commercial of the total revenue in recent years. NEA has been incurring loss of million Rupees annually. Main reasons are said to be increased corruption, mismanagement, high interest rate, dollar based power purchase agreement, overstaffing and unwanted political preserve etc.

Current ratio shows NEA's unsatisfactory liquidity position. Trend shows that quick ratios are above standard in recent years which shows ineffective use of quick assets. Similarly, absolute cash ratio, cash position to total assets ratio is also in decreasing trend. This indicates that no

cash sufficiency to meet obligation. Operating expenses found very high and observed low ratio of net profit. The position of utilization of assets and capital fund is also observed unsatisfactory.

NEA is not able to fulfill the requirements of funds from the successful operation of the corporation's activities. It has been taking considerable amount of loan to fulfill the requirements of funds. Electricity leakage, theft and wastage have been the major reasons reducing the profit earning capacity of NEA. During the wet seasons the demand for electricity is significantly reduced on one hand and on the other hand the electricity generation is increased due to ratio raise in river flows. As a result spill energy is increased while compulsion of taking power from IPPs remained.

5.3 Recommendations

On the basis of the above conclusions of the study, the following recommendations are suggested.

a. To lessen the pressure on the traditional sources of energy, especially fuel wood, causing deforestation and adverse environmental effects, a special consideration should be given its proper management and the use of commercial as well as alternative sources of energy should be increased.
b. In commercial sources of energy, hydropower being clean, pollution free and indigenous source with immense potentiality, it should be exploited from small to large scale in cost effective way so as to boost up the economy and minimize adverse balance of payment due to heavy import of other sources of commercial energy.
c. There must be definite/firm government policy and national consensus among the political parties for the utilization and allocation of the natural resources especially hydropower.

d. NEA should be given more authority and autonomy for conducting its work.

e. Though private sector participation as IPPs in power business is seen as potential source of funding, the costs of services are very high because of the high rate of power purchase. This ultimately affects the financial viability of NEA and attracts increase in retail tariff of electricity in small intervals. Thus, it is desirable that NEA enters into the power purchases agreement looking at the prevailing retail tariff of electricity and not restructuring the tariff looking at the power purchase costs.

f. Presently, power purchase rates are very high in comparison to the generation cost, which obviously means that the Individual Power Producers are making very high profits. But, NEA is forced to make loss in every unit of sales of purchased energy from Individual Power Producer. This is totally a 'win' situation for Individual Power Producers and 'lose' situation for NEA. However, in the long run this may be developed to 'lose-lose' situation for both parties due to financial crisis to be faced by NEA in future. Hence, the review of Individual Power Producer is highly recommendable for bringing the situation to 'win-win' one.

g. NEA's own efficiency in respect of operation should be increased. The following measures must be taken to improve the operational efficiency.

   i. Utilization of surplus Hydro-energy: Significant amount of hydro-energy is utilizing this surplus energy should be sought in order to increase the sales revenue. The seasonal surplus energy could be sold to domestic market through appropriate pricing schemes or if possible exported to neighbouring countries.

   ii. Alternative Sources of Financing: Local market sources should also be explored for financing in this regard NEA has carried out the study to explore the feasibility of alternate sources of financing from the local market. The study indicates the possibility of issuing of power bonds and short-term borrowings from local banks.

   iii. NEA's Internal Efficiency Improvement: Efficient working capital management and rigorous loss reduction program would help reduce the required electricity tariff. Efforts should be made for reducing the accounts receivable and reducing the inventory level.

iv. Review of Loan Condition with Government: Government receives soft loan from donors at a very low interest rate, however, this loan is relent to NEA at a very high interest rate. Similarly some of the grants received by the Government are also lent of NEA at a high interest rate. Request should be made to Government to reduce the on lending interest rate which would significantly reduce the required tariff.

v. Retail Price Index Based Tariff: Semi automatic tariff increase mechanism should be developed, whereby electricity tariff would increase based on expected change in the retail price index. This would smoothen the sharp increase in tariff.

vi. Reduce overstaffing: The overstaffing situations of NEA and opening up of unnecessary budget centers have been instrumental to increase the general administrative expenses. If government wants to see the public enterprises operating at surpluses, it should not pressurize them for unwanted appointments.

vii. Financial position of the corporation should be timely evaluated through ratio analysis, fund flow analysis and other relevant financial mathematical tools and models. These models help the corporation to know the financial strength and weakness.

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Annex – I

Expenditure in Power During the Period (2002/03-2010/11)

(Rs. in Million)

F/Y	Expenditure in Power				Govt. Exp.	% of in	Foreign Aid Commitment	Foreign Aid Disbursement			% of in
	Regular / Recurrent	Dev.	Total	% Change				Grant	Loan	Total	
2002/03	31.4*	3881.6	3913.0	-	84006.1	4.66	6282.1	3074.5	472.5	3547.0	90.65
2003/04	34.3*	4746.2	4780.5	22.17	89442.6	5.34	1866.4	3788.6	449.8	4238.4	88.66
2004/05	85.2*	7219.1	7304.3	52.79	102560.4	7.12	0.00	5649.2	510.0	6159.2	84.32
2005/06	105.30	6256.40	6361.7	52.79	110889.2	5.73	1230.30	3373.70	866.20	4239.90	66.64
2006/07	102.80	5450.0	5552.8	-12.71	133604.60	4.15	1728.60	1229.70	1981.0	3210.70	57.82
2007/08	101.27	5847.63	5948.9	7.13	161349.90	3.68	2725.00	3116.68	868.31	3984.99	66.98
2008/09	86.60	3300.5	3387.1	-43.06	181620.50	1.86	3541.50	-	-	-	
2009/10	80.50	4447.55	4528.5	33.68	211350.50	2.10	4210.10	-	4210.10	4210.10	92.97
2010/11	75.45	2800.60	2876.05	-36.49	241625.60	1.15	2754.25	-	2754.25	2754.25	95.75
Total	551.92	43949.58	44652.85								

Source: Economic Survey, FY 2010/11, Nepal Government, Ministry of Finance.

- During F/Y 2004/05 expenditure has been classified as recurrent, capital and principal repayment

Annex - II

Power Investment in Different Plan Period
Power Installations Prior to Plan Period

S.N.	Power Plant	Capacity (KW)
1.	Pharping Hydro plant	500
2	Sundarijal Hydro Power	640
3	Mahendra Diesel Plant	1728
4	Biratnagar Jute Mills Power Plant iii. Steam iv. Diesel	 1400 750
5	Morang Hydro Electric Co.	677
6	Birgunj Electric Supply Co.	225
	Total	5920

Source: Acharya, 1983

Proposed Power Projects Under the First Five-Year Plan

Name of the Project	Generating Capacity (in KW)
A. New Constructions:	
1. Koshi	10000
2. Trishuli	10000
3. Thado Khola	5000
4. Panauti	500
5. Seti	500
6.Tinau	1000 (1st Stage)
	1000
Total	**18000 to 23000**
B. Rehabilitation	
1. Sundarijal and Pharping	1350

Source: Drafts first five year plan, Government of Nepal, Kathmandu, 1956

Proposed Power Projects under the Three Year Plan

Name of Project	Power Supply (KW)
A. Hydro Project	
iv. Panauti Hydro Project v. Trishuli Hydro Project vi. Thado Khola Hydro Project	24000 9000 350
B. Micro Plants	
iii. 4 Diesel Plant of 100 KW each iv. 4 Water Turbines of 25-30 KW each	400 100-200
C. Diesel Plants	
Birgunj Diesel Plant Nepalgunj Diesel Plant Biratnagar Diesel Plant Hetauda Diesel Plant	500 2500 3000 4470
Total	**22720 or 22740**

Source: The three year plan, Ministry of Economic Planning, 1962

Target of Power Generation in the Third Plan

Name of the Region	Power Supply (in KW)
A. Central Region	
1. Hetauda Diesel Plant	5000
2. Pokhara Hydro Project	500
3. Trishuli Hydro Project	18000
4. Gandak Hydro Project	10000
5. Marsyangdi, Kali & Kulekhani Hydro Project	16000
Total	49500
B. Easter Region	
1. Biratnagar Diesel Plant	1470
2. Koshi Hydro Project	7500
Total	8970
C. Western Region	
1. Diesel Plant	500
Total	500
Total (A+B+C) Regions	58970

Source: Third plan, National Planning Commission, 1965-70

Target and Achievement of Power in the Fourth Plan

Name of the Project	Target (in KW)	Achievement (in KW, During the First Four Years Only)
A. Hydropower:		

1. Trishuli Hydro Project	9000	9000
2. Sunkoshi Hydro Project	10000	10000
3. Gandak Hydro Project	10000	-
4. Koshi Hydro Project	6800	6800
5. Small Hydro Project	500	240 (Only from Dhankuta)
Total Hydropower	36300	26040
B. Diesel		
1. Diesel Power Centers	4000	2662
Total Power Production (A+B)	40300	28502

Sorce: Fifth plan, National Planning Commission, 1970-75.

Proposed Target of Power Generation under the Fifth Plan

Name of the Projects	**Generation Capacity (in KW)**
A. Hydro-Power	
1. Devighat Hydro Project	14000
2. Gandak Hydro Project	10000
3. Kulekhani Hydro Project	30000
4. Sikarbas Hydro Project	2400
5. Small Hydro Project	545
Total Hydro Project	56945
B. Diesel Power Centers	
1. Biratnagar Diesel Center	1500
2. Pokhara Diesel Center	500
Total Diesel Power	2000
Total Power Production (A+B)	58945

Source: Fifth plan, National Planning Commission, 1975-80.

Proposed target of Power Generation in the Sixth Plan

Name of the Projects	**Power Generation**
A. Hydropower Projects	
1.Kulekhani Hydro Project	60000
2. Devighat Hydro Project	14100
3. Masyangdi Hydro Project	50000
4. Small Hydro Project	5583
Total Hydro-power	**129823**
B. Diesel Power Centers	
1. Hetauda Diesel Center	10000
2. Biratnagar Diesel Center	5000

Total	**15000**
Total Power Production (A+B)	**1,44,923**

Source: Sixth plan, National Planning Commission, 1980-85.

Power Generation Target under the Seventh Plan

Name of the Project	Capacity (in kW)
1. Kulekhani Hydro-electricity Project	32,000
2. Marsyngdi Hydro-electricity Project	66,000
3. Andhikhola Hydro-electricity Project	5,100
4. Small Hydro-electricity Project	3,539
Total	1,06,639

Source: Seventh plan, National Planning Commission, 1985-90.

Target of power Development under the Eighth Plan

Name of the Projects	Capacity (in MW)
1. Jhimruk Hydro-electricity Project	12.5
2. Refurbishing Trishuli and Devighat Hydro-power Stations	12.2
3. Small Hydro-electricity Project	5.0
Total	29.7

Achievement of Power Development under the Eighth Plan

Particulars	2048/49	2053/54	Growth (%)
1. Total Connected (kW)			
a. Hydropower	2,38,563	2,52,418	13,855 (5.8%)
b. Diesel or multifuel	683	47,266	46,583 (13.5%)
c. Solar Power	130	130	-
Total	2,39,376	299814	60,438 (25.2%)
2. Transmission Line (km)			
a. 132 kv single ckt.	1191	1178	13 (1.09%)
b. 132 kv single ckt.	-	43	43
c. 66 kv single ckt.	64	179	115 (179.7%)
d. 66 kv single ckt.	158	153	5 (3.2%)
e. 33 kv single ckt.	1096	1349	253 (23.1%)
Total	2509	2902	393 (15.7%)
3. Electricity accessed district	68	73	5 (7%)
4. Beneficial Population (%)	10	14	4 (40%)

Source: Ninth plan, National planning commission, 1992-97.

Target of power Development under the Eighth Plan

Name of the Projects	Capacity (in MW)
1. Jhimruk Hydro-electricity Project	12.5
2. Refurbishing Trishuli and Devighat Hydro-power Stations	12.2
3. Small Hydro-electricity Project	5.0
Total	29.7

Source: Eighth plan, National Planning Commission, 1992-97.

Achievement of Power Development under the Eighth Plan

Particulars	2048/49	2053/54	Growth (%)
1. Total Connected (kW)			
a. Hydropower	2,38,563	2,52,418	13,855 (5.8%)
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d. 66 kv single ckt.	158	153	5 (3.2%)
e. 33 kv single ckt.	1096	1349	253 (23.1%)
Total	2509	2902	393 (15.7%)
3. Electricity accessed district	68	73	5 (7%)
4. Beneficial Population (%)	10	14	4 (40%)

Source: Ninth plan, National planning commission, 1992-97.

Power Development under the Ninth Plan Period (1992-97)

Physical Target of Electricity Development

Particulars	Total	054/55	055/56	056/57	057/58	058 /59
1. Production and Supply Electricity						
a. Large & Middle Hydropower (MW)	293	-	6	104	183	-
b. Small Hydropower (KW)	660	160	500	-	-	-
c. Multifuel (MW)	13	13	-	-	-	-
2. Transmission line (KM)	1024	-	-	286	267	471
3. Rural Electricity	6067	1220	597	1620	1650	980
4. Survey, Feasibility Study & Detailed Engineering Design (Number)	31	7	5	8	7	4

Annex - III

Electricity Development Programme

Hydropower	Capacity (MW)	Completion Year	Sector
Middle Hydropower			
To be Completed in 9th plan:			

1. Indrawati – III	5 MW	2058	Private
2. Puwa Khola	6	2056	Public
3. Modi Khola	14	2058	Public
4. Chilime	20	2058	Private
5. Upper Bhotekoshi	36	2057	Private
6. Khimti – 1	60	2056	Private
7. Kaligandaki 'A'	144	2058	Public
8. Tanakpur	8	2057	Public
Total	293		

Started in 9th Plan

1. Kulekhani – 3		14	
2. Khimti – 2		27	
3. Likhu – 4		44	
4. Middle Marsyngdi		61	
5. Middle Bhotekoshi		120	
6. Upper Karnali		300	
7. Arun – 3		402	
8. Western Seti		750	
Total		1718	
Small Projects	Capacity (KW)	Completion Year	Sector
1. Kalikot	500	2056	Public
2. Dolpa	160	2056	Public
3. Dailekh	300	-	Public
4. Lomanthang	65	-	Public
5. Khotang	2300	-	Public
6. Gandaki	200	-	Public
7. Heldung	250	-	Public
Total	3775		

Source: Ninth plan, National Planning Commission, 1992-97.

Review of the Ninth Plan

Table 2.17: Targets and Achievements of the Ninth Plan

Area	Unit	Target	Achievement
Hydropower installed capacity	Megawatt	538	527.5
Diesel energy installed capacity	Megawatt	60	57
Transmission line (132,66 & 33 KV)	Km	3926	4324

Capacity Substation at higher level (132 & 66kv)	MVA	862	881
Substation capacity of 33/11kv	MVA	650	393
Distribution Line (11 KV and 400/230 volt)	Km	6067	8400
Number of consumers	Thousand	828	878
Benefited people	Percentage	20	40

Source: Tenth plan, National Planning Commission, 2002.

Annex - IV

Present Scenario of Power Development in Nepal

The exiting scenario of power generating capacity of Nepal can be presented as follows:

Power plants under operation in the grid as of Fiscal Year 2007/08:

(A) Major Hydropower (Existing)	**Capacity**	**Commissioned Year**
12. Trishuli	24 MW	2023 B.S. (1967 A.D.)
13. Sunkoshi	10.05 MW	2029 B.S. (1972 A.D.)
14. Gandak	15.0 MW	1979 A.D.
15. Kulekhani-1	60.0MW	1982 A.D.
16. Kulekhani-2	32.0MW	1986 A.D.
17. Devighat	14.1MW	2040 B.S. (1984 A.D.)
18. Marsyangdi	69.0MW	1989 A.D.
19. Puwa khola	6.2MW	2056 B.S. (2000 A.D.)
20. Modi Khola	14.8MW	2057 B.S. (2000 Oct.)
21. Kali Gandaki 'A'	144.0MW	2058 B.S. (2002 A.D.)
22. Middle Marsyangdi	70	2065 B.S
Sub Total	**459.150MW**	

(B) Thermal power Stations (Existing)

7. Hetauda	12.750MW	
8. Duhabi Multifuel 1	26.0MW	
9. Duhabi Multifuel 2	13.0MW	
10. Mahendra	1.728MW	

11. Biratnagar	1.028MW	
12. Marsyangdi	2.250MW	
Sub Total	**56.756MW**	

(C) Small Hydro Power Stations Existing (Grid Connected)

11. Panuti	2400KW	
12. Sundarijal	640KW	1936 A.D.
13. Phewa (Pokhara)	1,088KW	
14. Seti(Pokhara)	1,500KW	
15. Tinau (Butwal)	1,024KW	
16. Baglung	200KW	
17. Tatopani/Myagdi (i+ii)	2,000KW	
18. Jomsom **	240KW	
19. Chatara	3,200KW	1996 A.D.
20. Pharping***	500KW	1911 A.D.
Sub Total	**12.792 MW**	

(D) Private sector plants (Existing)

12. Andhi Khola (BPC)	5.1MW	1991 A.D.
13. Jhimruk (BPC)	12.3MW	1994 A.D.
14. Khimtikhola (HPL)	60MW	2056B.S. (2000 A.D.)
15. Bhotekoshi (BKPC)	36MW	2057B.S.
16. Sange khola (SHP)	0.183MW	
17. Indrawati (NHPC)	7.5MW	
18. Chilime (CPC)	20 MW	2060 B.S.(2003 A.D.)
19. Piluwa khola (AVHP)	3MW	
20. Chakukhola (APCO)	1.5MW	
21. Sunkoshi small (SHP)	2.6MW	
22. Rairang (RHPD)	0.5MW	
Sub Total	**148.683MW**	

(E) Isolated (Existing)

31. Dhankuta	240 KW
32. Jhhupra (Surkhet)	345 KW
33. Doti	200 KW
34. Phidim**	240 KW

35. Jumla**	200 KW
36. Dhading	32 KW
37. Helambu	50 KW
38. Salleri**	400 KW
39. Darchula (i & ii)**	300 KW
40. Chame	45 KW
41. Taplejung**	125 KW
42. Manang	80 KW
43. Chaurjhari** (Rukum)	150 KW
44. Syarpudaha** (Rukum)	200 KW
45. Khandbari**	250 KW
46. Terhathum**	100 KW
47. Bhojpur**	250 KW
48. Ramechhap	150 KW
49. Bajura	200 KW
50. Bajang**	200 KW
51. Arughat Gorkha	150 KW
52. Okhaldhunga**	125 KW
53. Rupalgad (Dadeldhura)	100 KW
54. Surnaiyagad (Baitadi)	200 KW
55. Namche	600 KW
56. Achham	400 KW
57. Dolpa	200 KW
58. Kalikot	500 KW
59. Gorkhe (Ilam)***	64 KW
60. Syangja***	80 KW
Sub Total	**6.176 MW**