PERFORMANCE EVALUATION OF POWER SECTOR IN NAGALAND: AN ANALYTICAL STUDY (1990-2006)

THESIS

SUBMITTED FOR THE DEGREE

OF

DOCTOR OF PHILOSOPHY

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CERTIFICATE

This is to certify that the thesis titled "Performance Evaluation of Power sector in Nagaland: An analytical study (1990-2006)" submitted to Nagaland University for the award of the degree of Doctor of Philosophy in commerce is a record of the research work undertaken by Ms. Tongpangkumla under the joint supervision of Prof. A. K. Mishra and Dr. (Mrs.) N. Martina Solo of Dept. of Commerce, Nagaland University.

She has fulfilled all the requirements laid down in the Ph.D regulations of Nagaland University. Neither the thesis as a whole nor any part of it was ever submitted to any other University or Institution for the award of any research degree.

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DECLARATION

I, Miss. Tongpangkumla, do hereby declare that the subject matter of this thesis entitled "PERFORMANCE EVALUATION OF POWER SECTOR IN NAGALAND: AN ANALYTICAL STUDY (1990-2006)" is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University.

This is being submitted to the Nagaland University for the degree of Doctor of Philosophy in Commerce.

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Miss. Tongpangkumla

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ABBREVIATIONS

ACGR	: Annual Compound Growth Rate
ASEB	: Assam State Electricity Board
AREP	: Accelerated Rural Electrification Program
BPL	: Below Poverty Line
DHEP	: Doyang Hydro Electric Project
CEA	: Central Electricity Authority
CERC	: Central Electricity Regulatory Commission
ED	: Electricity Department
DDG	: Decentralized Distributed Generation
DoP	: Department of Power
HT	: High Tension
KJP	: Kutir Jyoti Program
kV	: Kilo Volt
kWh	: Kilo Watt Hour
LT	: Low Tension
MkWh	: Mega Kilo Watt Hour
MNP	: Minimum Needs Program
MVA	: Mega Volt Ampere
MoP	: Ministry of Power
MSEB	: Meghalaya State Electricity Board
NTP	: National Tariff Policy
NCMP	: National Common Minimum Programme
NEEPCO	: North Eastern Electric Power Corporation
NERC	: Nagaland Electricity Regulatory Commission
NGM	: National Quality Monitors
NHPC	: National Hydro Power Corporation Ltd.
NTPC	: National Thermal Power Corporation Ltd.
NTP	: National Tariff Policy
PFC	: Power Finance Corporation

PIA	: Project Implementing Agency
PGCC	: Project Quality Control Committee
PMGY	: Pradhan Mantri Gramodaya Yojna
REC	: Rural Electrification Corporation
RESCO	: Rural Electricity Supply Co-operatives (RESCO)
REST	: Rural Electricity Supply Technology Mission
RGGVY	: Rajiv Gandhi Grameen Vidyutikaran Yojana
RIDF	: Rural Infrastructure Development Fund
SEB	: State Electricity Board
SPM	: Single Point Meter
T&D	: Transmission and Distribution
V	: Volt
VEMB	: Village Electricity Management Board
VEI	: Village Electrification Infrastructure (VEI)
W	: Watt

CONTENTS

CHAPTER 1

INTRODUCTION

OVERVIEW

Energy is the basic natural resource which is essential for the existence of mankind. From dawn to dusk energy is used in a variety of purpose. Among all other forms of energy, electricity is the most effective energy source for rural transformation, reducing poverty and industrial development. According to United States National Research Council (National Research Council, 1986) historically, the growth rate for electricity demand has outstripped that for other forms of energy. The availability of affordable and quality power or electric energy is one of the main determinants of the quality of life. To the household consumer it represents the most convenient and versatile form of energy and for most of the vital industries there is no substitute for electrical power. In past its uses were mainly confined to industrial and domestic consumer, but now it plays an important role in the agriculture and transport too.

The Indian Electricity Act 2003 defines "electricity" as "electrical energy generated, transmitted, supplied or traded for any purpose". Electricity, power or electric energy is a secondary energy source which means that it is generated from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Electricity is measured in units of power called watts. One watt is a very small amount of power. Power refers to the electrical forces for doing work. This is measured in terms of Megawatt (MW) and kilowatt (kW). A kilowatt represents 1,000 watts. A kilo watt hour (kWh) is equal to the energy of 1,000 watts working for one hour. Energy indicates the power that is used for a specific purpose in a given period of time. So, energy is the product of power and time. This is expressed in terms of kilowatt hour (kWh) or units.

The electric power industry provides the production and delivery of electric energy. The electric power industry is commonly split up into four processes. These are electricity generation such as a power station, electric power transmission, electricity distribution and electricity retailing. In many countries, electric power companies own the whole infrastructure from generating stations to transmission and distribution infrastructure. For this reason, electric power is viewed as a natural monopoly. The industry is commonly government owned and operated, generally heavily regulated often with price controls.

Historically, commercial production of electricity, for the first time began in New York in 1878 (Wikipedia, 2010), with the commissioning of an electric company set up by Thomas Edison in 1878. The successful record of this company resulted in a mushrooming of similar power companies in many parts of the United States in the ensuring years. The United Kingdom also took to commercial production of electricity after a few years, closely following the US. However at the beginning of the 20th century, even in these pioneering countries, gaslights were the dominant means of illumination and steam engines ruled most of factory floors. But within a few years electricity emerged not only as the most popular and convenient form of energy, but also an essential tool of development as well as a symbol of modernity, largely because of its ability to run a variety of new industrial equipment and household appliances. In the earlier years, electricity was generated from coal (through coal fired thermal stations). Later electricity came to be produced from other sources such as oil products, natural gas, solar, wind, hydro and nuclear.

In India, power is generated mainly by thermal, hydro and nuclear stations. Energy requirement in India are met from both conventional and non conventional sources. Generation of power in India is done mostly by government sector entities, and is controlled by various central public sector corporations, like National Hydroelectric Power Corporation, National Thermal Power Corporation and various state level corporations (State Electricity Boards (SEBs) and Electricity Departments). The transmission and distribution is done by the SEBs, Electricity Departments or private companies.

SOURCES OF ELECTRIC ENERGY

Conventional Sources of Energy:

Coal, Petroleum (oil), and Natural Gas are the three conventional sources of energy used in thermal power station to generate electricity. Coal is the principal heat source for electricity generation in most countries. Coal and natural gas are burned in large furnaces to heat water to make steam and to produce hot combustion gases that pass directly through a turbine, spinning the blades of the turbine to generate electricity. Petroleum can also be used to make steam to turn a turbine. Residual fuel oil, a product refined from crude oil, is often the petroleum product used in electric plants that use petroleum to make steam.

The installed capacity of Thermal Power in India, as of June 30 2011, was 115649.48 MW which is 65.34% of total installed capacity. Current installed base of Coal Based Thermal Power is 96,743.38 MW which comes to 54.66% of total installed base. Current installed base of Gas Based Thermal Power is 17,706.35 MW which is 10.00% of total installed capacity. Current installed base of Oil Based Thermal Power is 1,199.75 MW which is 0.67% of total installed capacity. The state of Maharashtra is the largest producer of thermal power in the country.

Non-conventional Sources of Energy:

Nuclear Energy is the energy that is trapped inside each atom. An atom's nucleus can be split apart. This is known as fission. When this is done, a tremendous amount of energy in the form of both heat and light is released by the initiation of a chain reaction. This energy, when slowly released, can be harnessed to generate electricity. As of 2011, India had 4.8 GW of installed electricity generation capacity using nuclear fuels. India's nuclear plants generated 32455 million units or 3.75% of total electricity produced in India.

Hydropower is one of the best, cheapest, and cleanest source of energy, this is in fact one of the earliest known renewable energy sources, in the country (since the beginning of the 20th century). Hydro power is generated from the flowing and falling water, river current and from ocean waves and tides. The energy in the flowing and falling water can be used to produce electricity. Waves result from the interaction of the wind with the surface of the sea and represent a transfer of energy from the wind to the sea. Energy can be extracted from tides by creating a reservoir or basin behind a barrage and then passing tidal waters through turbines in the barrage to generate electricity. India is one of the pioneering countries in establishing hydro-electric power plants. The present installed capacity of hydro power as of 30 June 2011 is approximately 37,367.4 MW which is 21.53% of total electricity generation in India.

Geothermal Power comes from heat energy buried beneath the surface of the earth. In some areas of the country, enough heat rises close to the surface of the earth to heat underground water into steam, which can be tapped for use at steam-turbine plants.

India's geothermal energy installed capacity is experimental. Commercial use is insignificant. India plans to set up its first geothermal power plant, with 2–5 MW capacity at Puga in Jammu and Kashmir.

Solar power is derived from the energy of the sun. Photovoltaic conversion generates electric power directly from the light of the sun in a photovoltaic (solar) cell. Solar-thermal electric generators use the radiant energy from the sun to produce steam to drive turbines. India is bestowed with solar irradiation ranging from 4 to 7 kWh/square meter/day across the country, with western and southern regions having higher solar incidence. The first Indian solar thermal power project (2X50MW) is in progress in Phalodi (Rajasthan).

Wind power is derived from the conversion of the energy contained in wind into electricity. Wind energy is the kinetic energy associated with the movement of atmospheric air. It has been used for hundreds of years for sailing, grinding grain, and for irrigation. Wind energy systems convert this kinetic energy to more useful forms of power. Wind turbines transform the energy in the wind into mechanical power, which can then be used directly for grinding etc. or further converting to electric power to generate electricity. India has the fifth largest installed wind power capacity in the world. In 2010, wind power accounted for 6% of India's total installed power capacity, and 1.6% of the country's power output. As on December 2011, the installed capacity of wind power in India was 15.9 GW, spread across many states of India.

POWER SECTOR IN INDIA: EVOLUTION AND GROWTH

For a variety of reasons, not least being India's geographical size and the diversity of its electricity usage, electricity is included in concurrent list under the Indian constitution – i.e. both the Central and State Governments in India may legislate on the subject. Each State has the power to legislate in respect of matters relating to the generation, transmission and distribution of electricity within its territorial domain. The Central Government, through the Ministry of Power, is primarily responsible for the development of electrical energy throughout India and for formulating and evolving Indian policy in respect of energy.

The era of electricity in India began at the end of 19th century when the first hydro-electric station was set up in 1897 at Darjeeling. This small hydro project continues to generate power even after over a century bears testimony to the cheap source of power-hydro. In 1899, Calcuttta Electricity supply Corporation gave its first electricity supply. The next development was the setting up of Sivasamudram hydro power plant in 1902 on Cauvery River (Planning Commission, 2010). This hydro electric station also continues to generate electricity even now.

Private participation in the power is not a novel concept in the Indian context. In the pre independence period the generation and distribution of electricity was run by private companies and it was restricted to the urban areas. With hydro power generation projects coming up in a big way during the first decade after independence the available power from grid supply became cheaper. Thermal power generation was also started with medium pressure boilers and cheaper coal, enabling electric supply companies in smaller towns also to supply cheaper power in line with hydro which involved expenses in laying the transmission lines and consequent power losses. As a result, the private companies discontinued their own power generation.

With the private companies discontinuing in the power generation, the responsibility for power generation was virtually transferred to the government. The Electricity Act 1910 was passed in India with a view to bring the electricity policy under legal jurisdiction. With the increasing need in proper management and to bring systematic growth of power supply industries all over the country, the Government of India enacted the Electricity (supply) Act in 1948. The Act provides the creation of the State Electricity Boards (SEB) at the state level with Central Electricity Authority (CEA) for policy planning and coordination at the national level. Electricity sector has been included in the concurrent list of the constitution which implies joint responsibility of both central and state government for its development.

During the post independence period, the various States played a predominant role in the power development. Most of the States have established State Electricity Boards. In some of these States separate corporations have also been established to install and operate generation facilities. In the rest of the smaller States and UTs the power systems are managed and operated by the respective electricity departments.

From, the Fifth Five Year Plan onwards i.e. 1974-79, the Government of India got itself involved in a big way in the generation and bulk transmission of power to supplement the efforts at the State level and took upon itself the responsibility of setting up large power projects to develop the coal and hydroelectric resources in the country as a supplementary effort in meeting the country's power requirements. The National Thermal Power Corporation (NTPC) and National Hydro-electric Power Corporation (NHPC) were set up for these purposes in 1975. North-Eastern Electric Power Corporation (NEEPCO) was set up in 1976 to implement the regional power projects in the North-East. Subsequently two more power generation corporations were set up in 1988 viz. Tehri Hydro Development Corporation (THDC) and Nathpa Jhakri Power Corporation (NJPC). To construct, operate and maintain the inter-State and interregional transmission systems the National Power Transmission Corporation (NPTC) was set up in 1989. The corporation was renamed as POWER GRID in 1992.

In 1991, the Government of India announced the policy of liberalization and consequent amendments in Electricity (Supply) Act have opened new vistas to involve private efforts and investments in electricity industry. Considerable emphasis has been placed on attracting private investment and the major policy changes have been announced by the Government in this regard. The Electricity (Supply) Act, 1948 was amended in 1991 to provide for creation of private generating companies for setting up power generating facilities and selling the power in bulk to the grid or other power consumers. This initiative widened the scope for private investment in the electricity sector by introducing certain financial, administrative, structural, regulatory and legal reforms and modifications. But private participation was encouraged only in generation, protecting SEBs from competition.

This change necessitated a comprehensive new set of regulations covering generation, transmission, trading and distribution. The culmination of a decade of piecemeal efforts at reforming the power sector finally passed in Parliament as the Electricity Act 2003. To enhance the scope of power sector reforms the Electricity Bill 2003 was approved in Indian Parliament in the month of May 2003. This act consolidates all the existing laws and introduce provisions with respect to new developments in the sector and completely restructured the country's power sector; the main aim being to break up each state's vertically integrated electricity supply entities into a transmission utility and a number of generating and distribution utilities.

Since independence, the Indian power sector has grown manifold in size and capacity. The generating capacity has increased from a meager 1, 362 MW in 1947 to 1,73,626 MW as on 31.3.2011. The gross electricity generation as on 31.12.1950 was 5,106 MkWh which was increased to 8,11,056 MkWh . Though India’s generation has increased at a modest pace of about 8% since independence, the power sector has been characterized by shortage of supply vis-à-vis demand. The peak shortage has been hovering between 11 to 13 per cent and energy shortage between 6 to 8.5 per cent (approx). During the year 2010-11, the peak deficit was 10.3 per cent whereas the energy deficit was about 8.9 percent.

The number of power transmission lines in India has increased from 3,708 circuit kilo metres (Ckms) in 1950 to about 220,794 Ckms in 2009. They are estimated to reach 293,372 Ckms by the end of 2012. India is divided into five regions for transmission systems —northern, North-eastern, eastern, southern and western. A national grid is being developed and is estimated to have a grid capacity of 200,000 MW and inter-regional transmission capacity of 37,000 MW by the end of 2012. The country's current (2010-11) sub-station capacity is 302,615 Mega Volt Ampere (MVA), which is estimated to increase by about 41 per cent to 428,000 MVA by the end of 2012.

SOCIO-ECONOMIC BACKGROUND OF NAGALAND

Nagaland, part of Assam and North East Frontier Agency (NEFA) in 1947, became the 16th State of India on 1st December 1963. The state was created by the State of Nagaland Act, 1962, with the provision under the Article 371A of the constitution on India. For the purpose of administration, the state at present comprises of 11 districts and 18 sud-divisions. The capital of the state is Kohima, situated at an altitude of 463 meters high sea level.

The state is mostly mountainous except those areas bordering Assam valley. One of the smaller hill states of India, Nagaland is known for its myriad tribes with rich culture and traditions. The State has a distinct character both in terms of its social composition as well as in its developmental history.

Nagaland is situated in the North Eastern part of India. The state lies between 25º 60' and 27º 40' latitude North of equator and between the longitudinal lines 93º 20' E and 95º 15' E having an area of 16,579 sq. km. The state is bounded by Assam in the north and west, by Burma and Arunachal Pradesh in the East and Manipur in the South.

The total population of Nagaland as per 2001 Census is 19.88 lakh. Nagaland has recorded progressively high decadal growth in population, increasing from 39.9 per cent in 1979 to 64.4 per cent in 2001. This decadal growth has been one of the highest in the country. The literacy rate of the state as per 2001 census is 67.11 per cent.

Nagaland is rich in flora and fauna. About one-sixth of Nagaland is under the cover of tropical and sub-tropical evergreen forests—including palms, bamboo, and rattan as well as timber and mahogany forests. 20 percent of the total land area of the state is covered with wooded forest, rich in flora and fauna. The evergreen tropical and the sub tropical forests are found in strategic pockets in the state. Forest cover is 80.49 per cent of the total area of Nagaland. As such, forests represent the richest natural resource of the State. Rivers such as the Doyang and Diphu to the north, the Barak River in the southwest and the Chindwin river of Burma in the southeast, dissect the entire state.

Agriculture has traditionally been and continues to be the mainstay of Naga life; 75 per cent of the people in Nagaland are engaged in agriculture. The state has not yet attained appreciable level of industrial development and still in the state of infancy. Though the state is richly endowed with mineral resources like Coal, limestone, nickel, cobalt, chromium, magnetite, copper, zinc, and recently discovered platinum, petroleum and natural gas; and forest and water resources yet it has still been considered as an industrially backward state in the country. The State has huge caches of unutilized and unexploited limestone, marble, granite, petroleum and natural gas.

For disadvantages of geographical location it is really very difficult to promote conventional industries in the state. The majority of the industrial units/village industries are based on local forest products, agro products and traditional handloom and cottage industries. Industrial development in the state is the main priority for the socio economic development of the state.

Nagaland started the planned process of development much later than the rest of the country. It missed out on the benefits of the first three Five Year Plans. The State has also been inhibited in its growth because of insurgency and much of its scarce resources had to be spent on establishment costs. Given these constraints, the State's rapid strides in planned socio-economic development, especially in the fields of infrastructure and development indicators, are commendable (GoN, NSHDR, 2004). Despite the progress made in a span of 40 years, Nagaland's economy still confronts many developmental challenges. Foremost among them is relative isolation, the difficult terrain, inaccessibility to the rest of the world and continued insurgency. These handicap the State's endeavors towards industrial and entrepreneurial development, private sector partnership in spearheading development initiatives and all round regional planning. Remoteness and inaccessibility are also the predominant cause for regional disparities in the State.

Availability of cheap electric power along with other infrastructure facility such as industrial shed, transport, marketing facility etc. will facilitate the socio-economic development of the state. Without these facilities an area cannot develop. The Government concentrates all its effort on building up the infrastructure for the industrial development yet the status of infrastructural development is poor in the state.

POWER SCENARIO IN NAGALAND

There was hardly any electricity generation in Nagaland before 1960, except for a few isolated diesel stations operated by military authorities.

The state of Nagaland came into the arena of electric power supply towards the end of second five year plan (1956-61). During the second five year plan, electrification of 7 towns by diesel generating sets was envisioned, out of which only one town, Kohima was electrified in the year 1960, with an install capacity of 150 KW. During 1961-62 and 63-64 all the remaining towns were electrified (Saleh, 1989). In the third five years plan period, 12 more administrative headquarters and villages were electrified with an installed capacity of 1500 KW. Towards the end of the third five year plan, the energy demand increases very rapidly, particularly in Kohima and Mokokchung. Augmentation of power system in the places was promptly undertaken.

Power development works in Nagaland were taken up in a planned manner commencing from the end of third five year plan. In 1964 Department of Power (DoP), Nagaland was set up as a departmental undertaking of the state to generate, transmit and distribute power in Nagaland. Before the establishment of the DoP, all the power works were undertaken by the Public Works Department (PWD), Nagaland. The state power requirement was entirely dependent on the purchase of power from Assam.

Due to acute shortage of power in the entire North East region, the Assam State Electricity Board was not in position to meet the power requirements of the state in full and thus there was a huge power crisis in the state. The DoP proposed for the construction of 1500 KW hydro electric project during the fourth five year plan. The construction works of the project were commenced during the financial year 1973-74. More diesel electrification works were also completed during the fourth five year plan. By the end of fourth five year plan 120 towns and villages were electrified in the state. In 1986-87, the number of towns and villages electrified was 897, it rose to 1, 105 in 1990-91. At present all the towns in the state are electrified and number of villages electrified stands at 1230.

The DoP has made substantial progress in power development works in the state since its inception. At present the total installed capacity of the state is 28.3 MW, present peak demand is 95 MW and the off peak demand is 50 MW.

The present cost of power supply is particularly high in Nagaland on account of excessive reliance on power purchases from outside sources. The low density, scattered village locations, difficult terrain and absence of any appreciable industrial load have made the electrification a heavily subsidized welfare proposition in Nagaland. The state has not yet attained appreciable level of industrial development and still in the state of infancy; therefore large majority of commercial sales are mostly for domestic lighting and commercial establishments which bring very little revenue. The state has been facing acute power shortage without any improvement over the last 20 years under study.

GENERATION

Nagaland does not have state owned major generation projects and therefore power requirement of the state depends mainly on central sector allocation from the Central Public Sector Units operating in the NE region. Despite the availability of adequate hydro power potential in the state, Nagaland is yet to harness its energy mainly because of limited resources. The state projected demand by the end of the Eleventh Five Year Plan for industrialization, economic development and growth in the state is 200 MW from the existing level of 95 MW. Further, by the end of Twelfth Five Year Plan and by 2020 the Department is forecasting load growth of 300 MW and 500 MW respectively. The need to focus on the exploration and harnessing different sources of energy in the state has become an utmost importance. Table 1.1 shows the present generation capacity of the state. At present (as on 31st March 2010), the state has 28.30 MW installed capacity which generates 78.81 MkWh of energy.

Table 1.1

Generation Capacity

(as on 31st March 2010)

Name of the power Station	**Total Installed Capacity (MW)**	**Energy Generated (MkWh)**
Hydel:		
1. Dzuza MHP	1.50	0.00
2. Duilumroi MHP	0.50	0.25
3. Tsutha MHP	0.70	0.00
4. Duilumroi-II	0.20	0.02
5. Telengsao MHP	0.60	0.26
6. Likimro HEP	24.00	78.18
Deisel Standby Gen.sets	0.80	0.10
NEEPCO Owned Projects:		
DHEP (Doyang Hydro Electric Project)	75	12% of Energy Generated

Source: Assessment of Financial Resources for the Annual Plan. DoP, Nagaland, 2010.

Dzuza MHP (1.50 MW) was commissioned in early 1979-80. It is the first micro hydel electric power project commissioned in Nagaland. In the late early 1980s, micro hydel projects viz., Kithuri MHP, Gekhu MHP and Dikhu MHP were also developed and commissioned. But due to geo-physical condition of the Dikhu River, the MHP had rundown in the early 1990s. And due to technical difficulties Kithuri MHP has not been generating energy since 2002-03 and the Gekhu MHP was also dilapidated in 2003-04.

Duilemroi- I MHP (0.50 MW) was commissioned in 1990-91 and has been generating energy till date (DoP, 1995). In 2009-10, the Duilemroi HEP generated 0.25 MkWh. Duilemroi II (0.20 MW) was commissioned in

March 1999 and in the same year 0.70 MW Tsutha MHP was commissioned in the month of May (DoP, 1999).

Likimro HEP of 24 MW was commissioned in the month of December 2001. But within a short span of time after commissioning, the Likimro HEP suffered from several problems including technical breakdown and was not able to restore till the financial year 2005-06. The Department faces difficulties with the operation and maintenance works of the already commissioned small hydro electric projects mainly due to fund constraints. As a result, the Department, failed to operate and maintain the Likimro HEP. Consequently, the Likimro HEP was leased out to a private firm for its operation and maintenance.

In Tobu area of Mon district another MHP, the Telengsao (0.60MW), was technically commissioned in June 2002. This MHP has been generating energy till date. The 75 MW Doyang Hydro Electric Project under NEEPCO was technically commissioned in July 2000 in Nagaland. The state is benefited by way of free power of 12% of its generation.

The Department has identified various potential Hydro projects and the three most viable are:

- 150 MW Tizu-Zungki HEP (Kiphire)
- 140 MW Dikhu HEP (Mon/Longleng)
- 40 MW Yangyu HEP (Mon/Longleng)

The proposal of these projects is now under examination at governmental level for development under joint venture with private firms. The Government has also initiated setting up a coal based thermal power project in Nagaland through joint venture with a private company. Along with these power projects, the Department has also identified about 72 small and micro hydro projects in state; some of which the Department intends to develop in phase manner are:

1. 7 MW Dzuza (Dimapur)
2. 6 MW Shiloi HEP (Phek)
3. 12 MW Doyang HEP – III (Zunheboto)
4. 5 MW Doyang HEP – IV (Zunheboto)
5. 4 MW Doyang HEP – V (Zunheboto)
6. 5 MW Doyang HEP – VI (Zunheboto)
7. 5 MW Zunki – Yai HEP (Tuensang)
8. 500 KW Dzu (Kohima)
9. 1 MW Mela (Zunheboto)
10. 3 MW Likimro – II HEP (Kiphire)
11. 3 MW Duilumroi – III HEP (Peren)
12. 5 MW Tapi (Mon)
13. 1 MW Langa (Zunheboto)
14. 1 MW Tulo MHP (Zunheboto)
15. 4.5 MW Arachu HEP – I (Phek)
16. 4.5 MW Arachu HEP – II (Phek)
17. 3 MW Arachu HEP – III (Phek)

The two ongoing hydro projects, 1 MW Lang HEP and 1 MW Tehok HEP, which started during 2001-02, are still under progress.

TRANSMISSION AND DISTRIBUTION NETWORK

The growth in transmission and distribution system is characterized by the physical growth in transmission and distribution network (Circuit kilo meter and Transmission Capacity) as well introduction of higher transmission voltages and new technologies for bulk power transmission. With growth in energy demand in the state, transmission and distribution network during the past five decades has been developed significantly.

The total high tension (HT) Lines was 880 Ckms in 1971-72. In 1973-74, for bulk purchase of power from Assam Electricity Board, more than 155 Ckms was extended bringing the total length of transmission lines to over 1005 Ckms (DoP, 1974). In 1979-80 more transmission lines were constructed: 66 KV lines 20 Ckms, 33 KV lines 600 Ckms, 11 KV lines 400 Ckms and LT lines 300 Ckms. And in 1981-82, 132/66 KV sub-station in Dimapur and 132 KV Transmission lines between Dimapur and mariani, Dimapur and Mao and Dimapur and Bokajan were commissioned. This has improved the power supply in the state considerably. Likewise, under different schemes the Department has been developing, augmenting and maintaining the transmission and distribution network in the state. Table 1.2 and 1.3 presents the existing transmission and distribution network in the state.

Table 1.2

Transmission Lines and Sub-stations

(as on 31st March 2010)

Voltage level	Dimapur Transmission Division	Kohima Transmission Division	Mokokchung Transmission Division	Total
Transmission Lines:				
EHV132/66 KV				625 Ckm
132KV/66 KV	106.28 Ckm	300.24 Ckm	332.01 Ckm	738.53 Ckm
33/11 KV	-	-	-	6200 Ckm
Sub-stations:				
132KV/66KV	75 MVA	63.5 MVA	75 MVA	213.5 MVA
66/33/11 KV	10 MVA	37.53MVA	7.5 MVA	55.03 MVA

Source: Departmental data.

At Present the Transmission and Distribution network in Nagaland consists of 132 KV, 66 KV, 33 KV, 11 KV and LT lines. Nagaland is connected to main grid through 132 KV Dimapur (PG) – Dimapur (Nagaland) S/C line, 132 KV Karong (Manipur) – Kohima (Nagaland) S/C line, 132 KV Doyang – Mokokchang S/C, 132 KV Mariani - Mokokchung S/C line, 66 KV Bokajan (Assam) – Dimapur (Nagaland).

Table 1.3

Distribution Lines and Sub-stations

(as on 31st March 2010)

Distribution Lines	**Feeders**	
	Nos.	Length (Ckm)
33 KV	47	1,216
11 KV	164	4,965
LT Lines 440/220 KV		7,300
	Distribution Sub-stations	
	Nos.	Transformation capacity (MVA)
11/0.4 KV	1396	124.49
33/0.4 KV	72	5.86

Source: Departmental data

The Department has so far created Extra High Voltage (EHV) 132/66 KV transmission line of 625 Ckms, 132/66 KV transmission lines of total 738.53 Ckms and 33/11 KV transmissions lines of 6200 Ckms. At present the Department has distribution lines of 33 KV, 11 KV, and Low tension (LT) lines of 1216 Ckms, 4965 Ckms and 7300 Ckms respectively. The current transmission sub-station capacity of 132 KV/66 KV is 213.3 MVA (Mega Volt Ampere) and 66/33/11 KV is 55.03 MVA. And distribution sub-station capacity is 11/0.4 KV and 33/0.4 KV lines of 124.49 MVA and 5.86 MVA. However, the present capacity of the transmission system at 132 KV and 66 KV level is inadequate to cater to the full requirement of the state.

REVIEW OF LITERATURE

The pioneering study in the realm of energy economics is attributed to Scaelotte and Eugene (1952). This Study mainly focused on the reserve potential of major forms of commercial and non-commercial energy, and their rate of utilization. Though the scope of the study covered the world as a whole, the authors' examination was largely confined to the developed countries, due to severe data constraints in the underdeveloped world. This work generated considerable interest on the part of economists in examining the contribution of energy to economic growth. Joel Darmstadter, in his study on "Energy in the World Economy: A Statistical Review of Trends in Output, Trade and Consumption since 1925" merits special mention in this context. He found that as GNP increased, energy consumption rose in close conformity.

P. Agenor and B. Moreno-Dodson, in their paper on Public Infrastructure and Growth: New Channels and Policy Implications" have also recognized that the energy infrastructure affects economic growth through a number of channels. It delivers both direct and indirect impacts on the development process and most studies recognize that the effects of energy infrastructure on development indicators are positive. Direct effects occur as energy infrastructure acts as an intermediate factor of production supporting commercial activities. Indirect influence occurs through a number of channels including facilitating the diffusion of ideas and technology and quality of life improvements that encourage the retention of higher skilled workers in a region – both factors that fit within the endogenous growth theories – encouraging the development of technology and human capital (Agenor and Moreno-Dodson, 2006).

B. Sudhakara Reddy, in his article on “Econometric Analysis of Energy Use in Urban Households” analyzed the pattern of energy carrier consumption in residential sector. In this article the dependence of Income on the energy carrier utilized was established by using a Carrier Dependence index. Using regression analysis, the index verified the impact of different explanatory variables on consumption. The study showed that income played a very important role not only in the selection of energy carrier, but also on the quantity of consumption per household. In an another research work on the end use pattern of power consumption of the people of the metropolis of Bangalore, Reddy found out that the share of traditional fuels, household energy consumption has been declining rapidly from 67%, in 1953-54 to 25% in 1989-90. In contrast to this, there is a sharp increase in the demand for LPG & electricity. The major finding of this study is that with increase in income, household energy carrier consumption increased in favor of electricity (Reddy, 1995).

W. Romp and J. Haan De, in their study on “Public Capital and Economic Growth: A Critical Survey” argued that electricity is a unique and particularly complex commodity. It is difficult to store and requires instantaneous matching of supply and demand over large geographical areas. It is characterized by a need for large capital investments and strong institutions to manage a large and pervasive infrastructure. Historically, electricity systems were often managed as large, centralized monopolies to ease the challenge of coordinating such a large and technically complex infrastructure. Given the criticality of electricity to both economic and social activity, this led, in many countries, to the politicization of the delivery of electricity. It is therefore apparent that the provision of electricity cannot be analyzed as a solely technical or even economic activity (Romp and Haan De, 2007).

K. P. Kannan and N. Vijayamohanan Pillai have endeavored to examine the historical health of the state electricity boards from a physical efficiency and financial perspective. Their analysis is one of a very few that considers the economic and technical characteristics of electricity system development such as scale economies and innovation. In their joint article on "Plight of Power Sector in India I & II (Physical and Financial Performance of the State Electricity Boards)" have examined the significant aspects of inefficiency costs involved in SEBs functioning. The article dealt with physical performance focusing on such aspects as technical inefficiency, T & D Losses, it's possible underestimation, supply cost of electricity, tariff and revenue, and financial performance. They observed that the unaccountability of the State Electricity Boards (SEBs) in India has let to gross inefficiency at all levels. And the inefficiency continue to rot the system, the inefficiency bred and fed by a host of factors at technical, institutional and organizational, financials as well as socio-political policy levels. However, the authors brought out that the most relieving aspect of this system predicament is that the problems are just internal to the system. Therefore, in this article the authors accentuated that the system badly requires the essence-specific reforms not structure-specific ones (Kannan and Pillai, 2002).

V. Anbumani and K. Amutthavalli in their paper on "Performance of State Electricity Boards" have evaluated the performance of 18 SEBs, for 13 years w.e.f 1980-81 to 1991-92, in terms of physical and financial parameters. A notable feature observed from the comparative analysis of the SEBs in this study was that nearly all the board with reference to financial performance showed negative returns during that study period. And as per their analysis they have ranked the SEBs according to their performance (both physical and financial); Andhra Pradesh was ranked number one, the second spot was earned by Maharashtra, third spot was shared by Tamil Nadu and Madhya Pradesh, fourth Spot was shared by Punjab and Gujarat (Anbumani and Amutthavalli, 1997).

D. Parameswara Sharma, P.S. Chandramohanan Nair and R. Balasubramanian, in their paper on “Analytical search of problems and prospects of power sector through Delphi study: Case Study of Kerala State, India” have reviewed and analyzed the critical issues that afflict the power sector of Kerala, a developing state in India through a Delphi study. The paper illustrated the process followed for the conduct of Delphi survey and evaluated the responses obtained. The study fetched informative and revealing results, which will aid to formulate and review future planning strategies for the expansion of power sector of the state. The general consensus derived out of this Delphi study affirmed that power crisis prevails in the Kerala power sector. And the results of the survey were found to generally corroborate with the results of the analytical studies carried out earlier by other authors. Kerala is facing a ‘real’ issue of energy crisis. The study revealed that the problems and their best possible solutions are almost clear. The authors recommended the effective implementation of an integrated planning strategy for revitalizing the Kerala power sector; which is highly imperative to avoid an ‘energy famine’ in the near future. Valuable recommendations on various points like future fuel-mix for generation expansion, power sector reforms, etc. also evolved in this survey (Sharma, Nair and Balasubramanian, 2003).

Niranjan Swain, J. P. Singh and Deepak Kumar in their paper on “Analysis of Power Sector in India: A Structural Perspective” has observed that the inhibitors to growth in power sector were many—small and big but the main roadblock in the growth path was Government Policy, which made it difficult or rather impossible for a private player to enter. This further aggravated the problem that Indian entrepreneurs didn’t have enough knowledge and experience in developing power projects. To worsen the scenario, the SEBs and other Government Agencies became financially weak to propel any future expansion or growth in the sector. Electricity Act, 2003 was a major step in solving the above underlying problems of the power sector. A whole new system was evolved where private players were invited to be an active participant. The system demanded financial, political and other infrastructural growth—with major requirement in roads and communication. Some of the bold steps taken in the Act were moving generation and distribution out of ‘License Raj’ regime, opening access to national grid and demolishing the ‘Single Buyer’ model. The failure of the huge federal structure and the changing global scenario has forced Government to think of ways to revive this fundamental infrastructure sector. Two of the avenues that government can count on for future growth of this sector is “Midgets or Small Power Plants” and “CDM—Clean Development Mechanism” (Swain, Singh and Kumar, 2004).

The article on “Energy Sector in Gujarat: Performance and Prospects” the author, Sudha Menon, presented an overview of the major public and private players in energy sector, performance and prospects of energy sector including oil and natural gas and renewable energy sources. The author observed that the massive expansion is needed to cater the growing power needs in order to sustain a growth in not only secondary but also in the primary and tertiary sectors of the economy. The author remarked that the energy structure should not only depend on the conventional sources of energy, but should also utilize the possibilities of power generation through the unconventional sources of energy (Menon, 2008).

Abhijit Dutta in his article “Power Sector Reforms in Orissa” has acknowledged that the power sector reform in India had started with a motive to reorient the system. On one hand the task was to increase like environment and on the other hand a better distribution with effective change to the exchequer. The steps of privatization had been mostly to redesign the SEB’s. Unfortunately, few myopic acts like remaining the SEB’s as corporate instead of principally refocusing the function in most of the state marred the process itself. As a result of this the new formed private power sector was an “old wine in new bottle”. Marred with the social agenda and conflicting goals, the power sector reform in most of the state including Orissa has taken a nose drive. He suggested that an all out effort needs to be made by the government, distribution companies, regulatory authority, media, body politic and public at large to improve the health of the distribution system for in it lies the success of reform (Dutta, 2003).

Kulwant Singh, Rajesh Kumar and Surender Kumar in their joint article on “Power Sector Reforms (A Case Study of Punjab)” have assessed the technical and financial performance and the reforms process in the power utility of Punjab. They observed in their study that technical as well as financial performance of the utility has been found unsatisfactory, mainly due to lack of commercial outlook and unaccountable and unnecessary political interference in the functioning of the utility. Therefore, to ensure financial viability with transparency and accountability in its functioning and to insulate it from political interference, power sector reforms were initiated in Punjab in 1999. However, they observed that a special feature of this reforms process is that the PSEB (Punjab State Electricity Board) continues to be an integrated utility and the power sector reforms in Punjab primarily of constituting the Punjab State Electricity Regulatory Commission (PSERC). But, the filling of annual revenue requirements and the institution of public hearing where the boards has to reply queries to the satisfaction of the (PSERC) is a great step forward and hence has facilitated to some extent, the process of maintaining transparency in decision making. They suggested that PSEB to install interface meters at different voltage levels to conduct an energy audit, the rationalization of tariffs and subsidies, autonomy of State Electricity commission must be ensured and PSEB must be reoriented and should develop a commercial outlook (Singh, Kumar and Kumar, 2006).

A. R. Sihag, Neha Misra and Vivek Sharma, in their study on “Impact of Power Sector Reform on Poor: A Case Study of South and South East Asia” has observed that to meet the challenges of ever-increasing demand for electricity different models for reforming the power sector have been adopted across the developing world. Following a decade of energy sector reforms in many developing countries, it is appropriate to ask the extent to which these reforms have benefited the poor; in particular, their impact on access, quality and reliability of electricity available to the poor. This paper investigates this in a systematic manner by critically examining the impact of reform processes, adopted in selected states in India and in the Philippines, on access of electricity to the poor. The authors observed that the focus of Indian reform legislation has been more on improving financial viability of the ailing power sector than on improving access to electricity. The legislation does not explicitly spell out the provisions for the extension of electricity services to the poor and the need and mechanism for subsidizing marginalized consumers. In contrast, the Philippines legislation has provision of lifeline rates for the poor and the approach to cross-subsidy, subsidy and the expansion of network. The Act stipulates a definite time frame for the elimination of cross-subsidy and at the same time it ensures subsidized rates for the identified poor. The authors, in this paper brought out the need to have a proactive legislation that addresses issues linked to access to reliable and affordable sources of electricity in India. And to effectively meet the electricity needs of the poor, legislative and policy support for mechanisms like the provision of lifeline rates and special functions like missionary electrification needs to be put in place. (Sihag, Misra and Sharma, 2003).

Debajit Palit in his paper on “Ensuring Development of North East India through Rural Electrification” observed that the grim situation of electrification in rural North East has many tell tale since only a quarter households are electrified, poor irrigation facilities leading to poor yields, limited entrepreneurial activities due to unavailability of power and many more. The article emphasizes upon giving top priority to electrification of rural areas of North East in order to achieve a respectable growth rate and create sustainable employment opportunities there. He accentuated that for achieving it would require meticulous planning followed by an action plan based on socio economic characteristics of the region and a determination to execute in right spirit (Palit, 2005).

Hisaya Oda and Yuko Tsujita, in their paper on "The Determinants of Rural Electrification in Bihar, India" have taken up the issue of intra-state disparity in access to electricity. They examine the determinants of electrification at the village level using Bihar, one of the undeveloped states in India, as a case study. The data from the field survey of 80 villages in five districts conducted in 2008-09 showed that 48 villages were electrified. The data noted that a little over 40% of these were electrified in recent years. Difference in terms of the number of household connections and the available hours of electricity were clear across the districts, villages and seasons. The econometric analysis demonstrated that the location of a village is the most important determinant of electricity connection and concluded that villages in remote areas tend to have less access to electricity. Another important finding of their study is that due to the rapid progress of rural electrification under RGGVY and the tendency to connect the villages which are easily accessible, the collective bargain power of the village, which used to significantly affect the process of electrification, has lost its influence (Oda and Tsujita, 2010).

Massimo Filippini and Shonali Pachauri in their paper on "Elasticities of Electricity Demand in Urban Indian Households" have observed that energy demand, and in particular electric energy demand in India has been growing at a very rapid rate over the last decade. Given, current trends in population growth, industrialization, urbanization, modernization and income growth, electricity consumption is expected to increase substantially in the coming decades as well. Tariff reforms could play a potentially important role as a demand side management tool in India. However, the effects of any price revisions on consumption will depend on the price elasticity of demand for electricity. In the past, electricity demand studies for India published in international journals have been based on aggregate macro data at the country or sub-national/state level. In this paper, price and income elasticities of electricity demand in the residential sector of all urban areas of India are estimated for the first time using disaggregate level survey data for over thirty thousand households. Three electricity demand functions have been estimated using monthly data for the following seasons: winter, monsoon and summer. The results show electricity demand is income and price inelastic in all three seasons, and that household, demographic and geographical variables are important in determining electricity demand, something that is not possible to determine using aggregate macro models alone (Filippini and Pachauri, 2002).

Vijay Modi, in his paper on “Improving Electricity Services in Rural India: An Initial Assessment of Recent Initiatives and some Recommendations” has examined the status of the rural electricity sector in India and provided recommendations on possible reforms with a focus of two states: Uttar Pradesh and Madhya Pradesh. He observed that the current state of electricity services across India can be said to be acute, if not in a crisis mode, impeding both economic and social development. The immediate manifestations of this crisis are severe shortcomings in access to electricity for rural and urban poor, shortfalls in generation capacity and poor reliability of supply. To improve the present electricity services, the author suggested that foremost, a climate of confidence must be fostered in the electricity sector that reflects a sustained commitment to a long term plan and stresses the importance of adherence to policies. A move toward greater cost recovery must be accompanied by reliable service that meets the specific needs of agriculture, while curtailing waste of energy and water services. Life-line rates should be instated for residential users, with higher cost-recovery rates for greater consumption, to allow for provision of basic electricity services to all rural households. Information technology should be adapted to lower costs of bill collection and for accurate metering. Supply chains for products and parts should be developed by working closely with industrial partners to fulfill demand created by rural electrification schemes. These reforms, combined with a focus on capacity building within and modernization of electricity infrastructure, provide a roadmap to reinvigorating India's energy sector (Modi, 2005).

S. C. Bhattacharyya, in his paper on "Universal Electrification: Will the New Electrification Programme Succeed in India?" undertook a brief analysis of the potential of the RGGVY programme shortly after the introduction of the programme. He identified a set of areas of concern: organizational issues, regulatory issues, financial concerns, supply shortage, reliance on grid expansion, political patronage and governance issues. The focus of the paper was on the potential for the success of the programme at the national level and although there was acknowledgement of the different challenges faced by the states, the aim was not to examine the capabilities of individual states. Further, Bhattacharyya did not, given the early stage of the programme at the time of writing, provide a detailed analysis of implementation details or capacity support (Bhattacharyya, 2006).

B. Kilangla Jamir, in her article on "Status of Infrastructure in Nagaland: Strategies to strengthen infrastructures for economic development" dealt with the development of key infrastructure in Nagaland viz., transport, communication, power (physical infrastructure) and education, health and drinking water supply (Social infrastructure). She observed that power bottleneck has been one of the major obstacles for industrial development. The state lacks behind other states in the country in terms of industrial energy consumption and per capita energy consumption; which reveals the poor economic condition of the state. To strengthen power infrastructure in Nagaland, she suggested utilization of the existing power plant to its fullest capacity by rectifying the technical problem, to develop all the potential sites without delay so as to attain power sufficiency in the state, to provide financial and technical assistance to private entrepreneurs to develop economically viable non-conventional power projects and to provide on job training to the personnel of the Department of Power (Jamir, 2006).

N. Martina solo, in her research study on “A Study of Governmental role in Industrial Development of Nagaland – A Policy Assessment Approach” has remarked that power is one of the most important infrastructural factors for industrial development in Nagaland. She observed that the infrastructure in the state is inadequate for industrial development and that the development of infrastructural facilities in the state requires effective planning and monitoring system, particularly for power, roads and railways networks. The author also remarked that the regular power supply at subsidized rate should be provided to the industrial units. To improve the power supply in the state for industrial development, she suggested that the operation of the Power Department has to be reviewed. Its organizational pattern including manpower requirements, tariff structure etc. needs to be changed. The reforms in the power should be initiated. And she further suggested that the ongoing hydro projects should be completed without much delay (Solo, 2001).

Like the Department of Power, Nagaland State Transport (NST) is also one of the largest service sectors in Nagaland and it is also a revenue generating department. A pioneering study on road transport in Nagaland was undertaken by Gautam Patikar. In his research study on “Performance Evaluation of state owned Road transport in Nagaland” has evaluated both physical and financial performance of NST during fifteen years period w.e.f 1987-88 to 2001-2002. He found that the operational efficiency of the NST has been poor both in terms of physical and financial parameters during the study period. However, the author remarked that NST being a public utility, it is applauded for its social consideration despite of making losses year after year. Some of the important suggestions provided in his study to improve the overall performance of the NST are to adopt human resource accounting, to introduce new commercial venture, to use proper financial measures and proper investment decisions, corporatization of NST, prompt break-down service, provide more spacious leg room, introduction of additional inter-state bus service, better maintenance etc. (Patikar, 2005).

SIGNIFICANCE AND SCOPE OF THE STUDY

Power generation and energy consumption are crucial to economic development and has a pervasive impact on social welfare. Electrical power is indispensable for households, firms, and government to function. The availability of affordable and quality power largely determines the standard of living and environmental condition of a country. It can be appropriately termed as the barometer of economic development.

The equitable growth of infrastructure facility is very much needed for the welfare of the people and for rapid industrialization. Regional imbalance in the growth of it will lead the state towards a handicapped economy. A good network of power system helps in quick and equitable growth of activities in the economy of a nation.

The main objective of any service sector is to increase social welfare and to uplift the standard of living. The power sector is one of largest service sectors in Nagaland and one of the crucial ingredients of socio-economic development. Hence, a great responsibility has been entrusted to the Power Department and their responsibility should be discharged effectively and efficiently. The study of its technical and financial performance is therefore, highly essential for its development.

Thus, the present study is to evaluate the overall performance of the power sector in the state and to offer suggestions. It will be helpful for the Department in policy making, decision making and implementation of better programme in the near future. The study will cover the financial as well as non-financial aspects which are the crucial elements of the Department for its desired goals to be achieved.

OBJECTIVES OF THE STUDY

The main objectives of the study are:

1. To analyze the workings and overall performance of the Department of Power, Nagaland
2. To examine the organizational and management patterns of the Department.
3. To study the status of the rural electrification in the state.
4. To study its realization of energy security for industrial growth in the state.
5. To identify problems faced by the Department in generation, transmission and distribution of power in the state.
6. To evaluate the effect of Communitisation of electricity management in the management of electrical revenue.
7. To study the potential sources of power generation in the state.
8. To offer practical suggestion based on the findings for future policy formulation.

HYPOTHESES

The study aims to test the following hypotheses:-

1. The state power Department generates, transmits as well as distributes power at an uneconomical rate.
2. Self sufficiency in power generation would contribute significantly to increase the Government revenue.
3. The Communitisation system of management of power and scheme of rural electrification has yielded good results since implementation.

METHODOLOGY

The study is both descriptive and analytical in character. The performance of power sector in Nagaland is analyzed with the help of selected non-financial and financial indicators. Non financial indicators are per capita energy consumption, consumption per capita, installed capacity, gross generation, power purchase, sales, T&D Losses, number of consumers. Financial indicators are total cost and revenue, net deficit/surplus and operating deficit/surplus, average cost and tariff, cost recovery ratio, operating ratio, net profit ratio, operating profit ratio, return on investment and return on capital employed. A comparative study of the performance of Department of Power, Nagaland and the Department of Power Arunachal Pradesh has also been done.

It has been tried to make the data available till date of submission of the report of the study. The periodicity of the study is 20 years, starting from 1990-91 to 2009-10; although in the title of thesis the period is mentioned from 1990 to 2006.

Data Collection: The data for the study were collected from both the primary and secondary sources. However, secondary source has been a major source from which major portion of the required data are collected.

a. Primary data were collected by observations and from the responses of informal discussions and structured interviews with the officials of the Department. Primary data were also collected through structured questionnaires which were administered to the Village Electricity Management Boards and to officials of the Department in-charge of Communitisation to take the view on Communitisation of electricity management in rural areas.

b. The secondary data were collected mainly from the Assessment of Financial Resource for Annual Plan prepared by the DoP; Annual Administrative Report of DoP; Statistical Handbook of Nagaland published by Government of Nagaland; Annual Report of Ministry of Power, Government of India; and Annual Report on Working of State Electricity Boards and Electrical Departments published by Planning Commission, Government of India. Besides, the required data (which is not furnished in the reports mentioned above) were also collected from the official records of the Department. The published data were also obtained from various books, journals, publications and periodicals on power and energy. The secondary source materials are listed in the bibliography.

II. Data Analysis: With a view to analyze and evaluate, the data so collected were classified and tabulated. Statistical tools and techniques like Charts, Averages, Annual Compound Growth Rate (ACGR), Multiple Linear Regression Analysis and Ratio Analysis were employed. Data were entered into the computer to create charts and to compute averages and percentages. For computing ACGR and for the purpose of Multiple Linear Regression Analysis, data were analyzed using Excel- Data Analysis package.

III. Sample Design: In order to assess the effectiveness of Communitisation of electricity management in rural areas of Nagaland, a field survey was carried out. In this survey, the sample size comprises of VEMBs of 90 villages and 30 officials (in-charge of Communitisation) of the Department. The sample VEMBs (or villages) were selected randomly from 5 Electrical Divisions of the Department. Sample size of VEMBs of 90 villages was drawn out from total of 802 Communitised villages (VEMBs). And the 30 officials are the official in-charge of

Communitisation in directorate and under all the electrical divisions of the Department.

LIMITATIONS OF THE STUDY

The present study suffers from following limitations:

1. Non adherence to uniformity in data collection with regard to the period due to unsystematic maintenance of official records by the Department. A consistent time series data on some financial aspects was not available therefore, in few tables given in the thesis, base year of data are not uniform.

2. For the inter-state comparative performance analysis of DoP, Nagaland and Arunachal Pradesh, the period of study was limited to 15 years due to inadequate and non- availability of data.

3. Some of the areas like the potential sources of energy and energy security for industrial growth in the state could not be covered in detail because of non availability of proper information.

CHAPTERIZATION

The study is presented in six chapters.

Chapter 1 – Introduction

This chapter gives the overview of the study. Sources of electric energy, Power Sector in India: evolution and growth, socio-economic background of Nagaland, review of literature, significance of the study, objectives, hypotheses, methodology and limitations of the study has been given in this chapter.

Chapter II - Management and Organizational Pattern of the Department of Power

This chapter presents the Organizational set-up of power sector. Geographical divisions and organizational structure of Department of Power, duties and functions of officials, staffing position, and human resource development has been discussed in detail in this chapter.

Chapter III - Power Cost, Tariff Policy and Conditionality of Supply

An attempt has been made in this chapter to analyze the different elements of cost with the objective of ascertaining and analyzing the operating cost and revenue of the Department. Further, it may be noted that the financial performance of the Department is influence directly and/or indirectly by its physical performance. Hence, both physical and financial performance of the Department has been evaluated in this chapter.

This chapter has been divided into four sections. Section I deals with the physical performance and in Section II financial performance has been evaluated. In Section III, an attempt has been made to evaluate the overall performance of the Department and an inter-department comparative study of the Department of Power, Nagaland and Arunachal Department of Power has also been done in this section of the chapter. Section IV gives a brief review of the conditionality of supply of power in Nagaland.

Chapter IV - Implementation of Rural Electrification Scheme - An Evaluative Study

An attempt has been made in this chapter to evaluate the implementation of the new rural electrification scheme: Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). The target outlined and achievement made by the Department of Power, Nagaland under this scheme has been assessed. The achievement made under this scheme in all Indian states has also been examined. And a comparative study of the achievements of the Department of Power, Nagaland and the Department of Power, Arunachal Pradesh has also been done in this chapter. Progress and status of rural electrification in Nagaland has also been included in this chapter.

Chapter V - The State Owned Power Sector of Nagaland-The Case of Reform

An attempt has been made in this chapter to evaluate the effectiveness of Communitisation of electricity management in rural areas and also to review the process and status of corporatization and restructuring of power sector in Nagaland. Status of power sector reforms in India has also been incorporated in this chapter. This chapter has been divided into two sections; Section I gives an evaluation of Communitisation of electricity management in rural areas and Section II gives a brief review of Power Sector Reforms and Restructuring process and status in Nagaland.

Chapter 6 - Conclusion, Findings and Suggestions

This chapter presents the major findings of the study and suggestions for future policy formulation.

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CHAPTER II

MANAGEMENT AND ORGANIZATIONAL PATTERN OF THE DEPARTMENT OF POWER

The choice of a suitable form of organization is an important decision in the management of an organization. Organizations are social units deliberately constructed and reconstructed to seek specific goals (Hall, 1997). A number of organizations exist in the society to create and deliver goods and services. They may be of profit making or non-trading or not profit making organizations. But in every organizations an important business strategy used in the process of decision making is the organizational structure.

An organizational structure is mainly a hierarchical concept of subordination of entities that collaborate and contribute to serve one common aim. Organizational structure refers to the way in which an organization's activities are divided, grouped and coordinated into relationships between managers and employees, manager and managers and employees and employees. Organizational structure can also be defined as the establishment of formal relationships among various components like people and their activities in the organization. An organization can be structured in many different ways and styles, depending on the objectives and ambiance of the organization. The structure of an organization will determine the modes in which it operates and performs. Organizational structure allows the articulated allocation of responsibilities for different functions and processes to different entities such as the branch, department, workgroup and individual.

An electricity supply undertakings is a public utility and public utilities are by and large owned and managed by the government with a view to maximize social welfare and uphold the public interest. These utilities provide basic services essential to the daily life of man, such as electricity, water, transport, telecommunication etc. Largely because of technical indivisibilities, public utilities are natural monopolies and they have fiscal and welfare objectives.

Electric utility is unique in that its product is non-storable and must be generated and supplied the moment it is demanded. This technical characteristic in turn makes the industry essentially a vertically integrated monopoly with the co-ordination of all the three basic functional processes of generation (production), transmission (transportation to markets) and distribution (supply to final users) for reaping the full advantages of an integrated network system. This in turn gives rise to economies of scale and the resultant natural monopoly status (Kannan and Pillai, 2001).

The organization of power sector in India is determined by the country's federal structure. In India, the subject of electricity is covered under the Concurrent List in the Constitution of India, implying that both the central government and state governments have the power to make legislation for the sector. As a result, all major issues affecting the power sector require concurrent action by the central government and state governments.

THE POWER SECTOR SET-UP

Under the Indian Constitution, List III of the Seventh Schedule of the Constitution of India, electricity is considered a concurrent subject; implying that both the Parliament of India and state legislatures have jurisdiction over the power sector and legislate on the subject. As a result, all major issues affecting the power sector require concurrent action by the central government and state governments. The legislative authority is formally divided in the Electricity Supply Act of 1948. The Act provides for the establishment of the Central Electricity Authority (CEA) and of State Electricity Boards (SEBs) which are the main agencies for supplying power throughout India.

The Central Government, through the Ministry of Power, is primarily responsible for the development of electrical energy throughout India and for formulating and evolving Indian policy in respect of energy. The Ministry of Power provides overall guidance to the sector through the Central Electricity Authority (CEA). However, each State has the power to legislate in respect of matters relating to the generation, transmission and distribution of electricity within its territorial domain.

MINISTRY OF POWER (MoP)

The Ministry of Power, Government of India is the apex body responsible for the development of electrical energy in India. This ministry started functioning independently from 2 July 1992; earlier, it was known as the Ministry of Energy. The Ministry of Power is primarily responsible for the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decisions, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

The minister of power is at the top of the organization who is assisted by a Secretary to the power ministry. In all technical and economic matters, Ministry of Power is assisted by the Central Electricity Authority (CEA), constituted under section 3(1) of the Electricity (Supply) Act, 1948 which has now been replaced by Electricity Act, 2003. The CEA advises the Ministry of Power on all technical and economic matters.

There is a Principal Accounts Office headed by the Controller of Accounts who in turn reports to the Financial Adviser in the Ministry of Power. Matters relating to reservations for SC/ST, Physically Handicapped and Ex-Servicemen in the Ministry including PSUs under its administrative control are dealt with by the Deputy Secretary (Admn.), who is also the Liaison Officer for SC/ST and there is separate Liaison officer for OBCs. Power Sports Control Board deals matters relating to recreation activities.

The ministry has five joint Secretaries, including the finance Advisor. The allocation of work among the five Joint Secretaries in the Ministry of Power is as under:

i) Thermal, Operation Monitoring, Energy Conservation, Training & Research and Official Language.

ii) Transmission, PTC, International Cooperation, Reforms & Restructuring and Coordination.

iii) Hydro, IPC, Policy & Planning and Vigilance & Security.

iv) Financial matters.

v) Rural Electrification, Distribution, Power Finance Corporation, Information Technology and Administration.

The ministry of power evolves and frames all the general policy in the field of energy. These policies are relating to:

- General Policy in the electric power sector and issues relating to energy policy and coordination thereof. (Details of short, medium and long-term policies in terms of formulation, acceptance, implementation and review of such policies, cutting across sectors, fuels, regions and intra-country and inter-country flows).

- All matters relating to hydro-electric power (except small/mini/micro hydel projects of and below 25 MW installed capacity) and thermal power and transmission & distribution system network.

- Research, development and technical assistance relating to hydro-electric and thermal power, transmission system network and distribution systems in the States/UTs; Administration of the Electricity Act, 2003, (36 of 2003), the Energy Conservation Act, 2001 (52 of 2001), the Damodar Valley Corporation Act, 1948 (14 of 1948) and Bhakra Beas Management Board as provided in the Punjab Reorganization Act, 1966 (31 of 1966).

- All matters relating to Central Electricity Authority, Central Electricity Board and Central Electricity Regulatory Commission.

- Rural Electrification.

- Power schemes and issues relating to power supply/development schemes/programmes/ decentralized and distributed generation in the States and Union Territories.

- Matters relating to the following Undertakings / Organizations:-
  a) Damodar Valley Corporation;
  b) Bhakra Beas Management Board (except matters relating to irrigation);
  c) National Thermal Power Corporation Limited;
  d) National Hydro-electric Power Corporation Limited;
  e) Rural Electrification Corporation Limited;
  f) North Eastern Electric Power Corporation Limited;
  g) Power Grid Corporation of India Limited;
  h) Power Finance Corporation Limited;

i) Tehri Hydro Development Corporation;

j) Satluj Jal Vidyut Nigam Limited;

k) Central Power Research Institute;

l) National Power Training Institute;

m) Bureau of Energy Efficiency;

- All matters concerning energy conservation and energy efficiency pertaining to Power Sector.

Organizations under the Ministry of Power

1. **Central Electricity Authority (CEA):** The Central Electricity Authority (CEA) is a statutory organization originally constituted under Section 3(1) of the repealed Electricity (Supply) Act, 1948 since substituted by Section 70 of the Electricity Act, 2003. It was established as a part-time body in the year 1951 and made a full- time body in the year 1975.

   The CEA promote the integrated operations of the regional power grids and the evolution of a national grid. The CEA facilitates exchange of power within the country from surplus to deficit regions and with neighboring countries for mutual benefits. The CEA advises central government, state governments and regulatory commissions on all technical matters relating to generation, transmission and distribution of electricity. It also advises state governments, licensees or generating companies on matters which enable them to operate and maintain the electricity system under their ownership or control in an improved manner.

2. **National Hydro Power Corporation Ltd (NHPC):** NHPC was incorporated in November 1975 as a central government enterprise to undertake all activities from design to commissioning of hydro projects. NHPC included wind and tidal power among its projects in 1998 and geo-thermal and gas power in 1999 and is also preparing to take up mini/micro hydro projects. Since its inception in 1975, NHPC has grown to become one of the largest organizations in the field of hydro power development in the country

3. **National Thermal Power Corporation of India Ltd. (NTPC)**: In 1975 National Thermal Power Corporation Ltd. was set up by the Government of India with the mandate for planning, promoting and organizing integrated development of thermal power (including Associated Transmission Systems) in the country. The Corporation has rapidly grown to become the largest thermal generating company in India. The company is the sixth-largest thermal power producer in the world and India's largest power producer. The total installed capacity of the company is 36,014 MW (including JVs) with 15 coal based and 7 gas based stations, located across the country.

4. **North Eastern Electric Power Corporation Ltd (NEEPCO):** NEEPCO was incorporated on 2 April 1976 as a wholly-owned Government of India enterprise to generate, transmit, operate, maintain and develop power stations in the entire North Eastern Region.

5. **Neyveli Lignite Corporation Ltd (NLC):** NLC Registered as a company in November 1956, NLC Ltd exploits lignite deposits and generates lignite-based power. Its main units are lignite mines, thermal power stations, 110 – ANNEX fertilizer plant and briquetting & carbonization plants. Mine-I (6.5 million tones of lignite per annum) feeds Thermal Power Station-I (600 MW), Briquetting & Carbonization

Plant (262,000 tones of coke-achievable capacity) and the Process Steam Plant. Mine-II (10.5 MT of lignite per annum) feeds its captive Thermal Power Station-II (7 ~ 210 MW). The power generated from TPS-I is fed into the TNEB grid, which is the sole beneficiary. Power generated from TPS-II is shared by southern states (Tamil Nadu, Kerala, Karnataka, Andhra Pradesh and the Union Territory of Pondicherry).

6. **Power Grid Corporation of India Ltd. (PGCIL):** In 1981 the Government of India took the policy decision to form a national power grid which would pave the way for the integrated operation of the central and regional transmission systems. Pursuant to this decision to form a national power grid, PowerGrid was incorporated on October 23, 1989 under the companies Act, 1956 as the National Power Transmission Corporation Limited, with the responsibility of planning, executing, owning, operating and maintaining the high voltage transmission systems in the country. The name of the Company was changed to Power Grid Corporation of India in 1992. POWERGRID has enhanced the inter-regional capacity of National Grid to 22,400 MW.

   India is divided into 5 Regions - Northern Region (NR), Eastern Region(ER), Western Region (WR), Southern Region (SR) and North-East Region(NER). Out of all these Regions the NR, ER, WR and NER are synchronized which is known as NEW Grid. When PGCIL was formed the responsibility of Regional Load Dispatch Centers (RLDCs) was handed over to POWERGRID by Central Electricity Authority (CEA). On 25th February, 2009 the National Load Dispatch Center (NLDC) was inaugurated. Now these Regional Load Dispatch Centers (RLDCs) and National Load Dispatch Center (NLDC) is a separate Organization named POSOCO (Power system Operation Corporation), a wholly owned subsidiary of POWERGRID.

7. The Government also owns financing institutions devoted solely to power sector lending such as the Power Finance Corporation Limited (PFCL) and the Rural Electrification Corporation (REC). Programmes of rural electrification are provided financial assistance by the Rural Electrification Corporation (REC) under the Ministry of Power. The Power Finance Corporation (PFC) provides term-finance to projects in power sector.

8. Power Trading Corporation (PTC) was also set up in 1999, to be responsible for power trading among states and between states and central power utilities. PTC catalyzes development of mega power projects, as well as vibrant power market and to promote exchange of power with neighboring countries.

9. The recently established Central Electricity Regulatory Commission is empowered to regulate the central power utilities in accordance with the Electricity Regulatory Commission Act, 1998.

10. Badarpur Management Contract Cell (BMCC), a subordinate office of this Ministry, is responsible for administering the Badarpur Thermal Power Station (BTPS) Management Contract between the Government of India and NTPC.

11. Two Joint Venture Power Corporations namely, Satluj Jal Vidyut Nigam (SJVN) and Tehri Hydro Development Corporation (THDC) are responsible for the execution of the Satluj Jal Vidyut Nigam (SJVN) in Himachal Pradesh and projects of the Tehri Hydro Power Complex in Uttaranchal respectively.

12. Statutory bodies i.e., Damodar Valley Corporation (DVC) and Bhakra Beas Management Board (BBMB) are also under the administrative control of the Ministry of Power.

13. Further, the Autonomous Bodies (Societies) i.e. Central Power Research Institute (CPRI), the National Power Training Institute (NPTI) and the Bureau of Energy Efficiency (BEE) are also under the administrative control of the Ministry of Power.

DEPARTMENT OF POWER NAGALAND

The Department of Power (DoP), Nagaland was established in 1964 to provide power in the state. The Department of Power, Nagaland is responsible for generation, transmission and distribution of power in the state in most efficient and economic manner. The Department of Power unlike other Government establishment is revenue earning organization and all business enterprises. The Department of Power Nagaland is a state owned organization and it is a departmental form of organization.

DEPARTMENTAL FORM OF ORGANIZATION

The oldest form of managing Government enterprises is the departmental form. It is the oldest method of organizing and operating the state enterprises in India. Since the Department of Power, Nagaland is a public utility and a state enterprise; it is a departmental form of organization. This form of organization is commonly employed when main purpose of the enterprise is to provide revenue to the government. This type of undertaking contributes directly to the exchequer and thus increases the resource of the government. It is a three tier system involving the cabinet minister, the civil servant and the treasury. The minister is at the top of the organization. He is accountable to the cabinet and to the parliament. The ministerial delegates power of authority to senior civil servants for the general administration of the enterprises. The government treasury also plays its role vise-a-vise the enterprise. It exercises the financial control over them.

The DoP, Nagaland exists as a department of government ministry headed by the minister and manned by civil servant. And the Department is financed by Annual Appropriation from the treasury and is subject to strict parliamentary and budgetary control. The Department has been generally at the mercy of the political parties and ministers controlling the Department. Their decisions and actions are mainly influenced by the ideology of the ruling political parties. Thus, a change in the government influences the policies of the Department. Moreover, the policies of Department suffer from instability because of the uncertainty attached to the tenure of the ministers and the political parties.

Another important factor worth mentioning is that the management of this Department is entrusted to the civil servants who may be efficient administrators, but they lack business acumen as they are not trained to take risk, so essential for proper management. The ministers concerned are also not capable of undertaking the problems of managing a business or industry. Moreover, the Department has no autonomy for initiative and the minutest details its working are subject to parliamentary control. Authority under this form of organization is centralized in the hands of the minister concerned. This often results in difficulties in taking action expeditiously.

Quite often departmental undertakings become synonymous with red tape, delays, inadequate service and insensitive to consumer needs. It is generally described as bureaucracy in management and control. Under this type of functioning, business considerations are more often over-shadowed by political and other consideration. Decisions are taken more on political ground rather than on business ground.

Since management personnel consists of civil servants, they are often transferred from one job to another according to the usual government practice and the policy is counter to the continuous and long term policy of the enterprise. Since, the Department is a public utility having social obligation, its main motive have been to provide service in the state and its earnings has not been the main criterion or index of success. Although in public enterprises, profit may not be the only or even the most important criterion, yet, profitability is a sound index of efficiency in all normal situations and must be included as a criterion index of efficient management of a commercial enterprise.

GEOGRAPHICAL DIVISIONS/ OPERATIONAL SEGMENTS

Due to vast territory over which the Department has to operate the services; it has been found expedient to divide the organization into circles, divisions, and a number of sub-divisions where the nature of operation is comparatively uniform. The directorate is the main office of the state power Department and is situated in Kohima; and it controls the overall operation of works relating to power all through the state.

The operational jurisdiction is diffused over the length and breadth of the state. The Field Setup consists of 3 operational circles, 10 electrical divisions, 3 transmission divisions, 3 civil divisions and 36 Sub-Divisions under the 3 circles. The number of Electrical division, Sub-Divisions, Transmission Divisions and Civil Divisions under the 3 circles is given in Table 2.1.

Table 2.1

Operational Segments of the Department

Circle	Electrical Divisions	Sub-Divisions (Electrical)	Transmission Divisions	Sub-Divisions (Transmission)
Dimapur	1. Kohima	SDO(E) – I SDO (E) – II SDO (E) – III	Kohima	SDO (T) Kohima SDO (T) Kiphire
	2. Dimapur	SDO(E) – I SDO (E) – II SDO (E) – III		
	3. Wokha	SDO (E) Wokha SDO (E) Sanis	Dimapur	SDO (T) Dimapur
	4. Phek	SDO (E) Phek SDO (E) Pfutsero		
	5.Chumukedima	SDO (E) Chumu. SDO (E) Jalukie SDO (E) Medzephema		
Mokokchung	1. Mokokchung	SDO (E) Mokokchung SDO (E) Longnak	Mokokchung	SDO (T) Mokokchung
	2. Tuensang	SDO (E) – I SDO (E) – II SDO (E) Kiphire		
	3. Mon	SDO (E) Mon SDO (E) Naginimora		
	4. Zunheboto	SDO (E) zunheboto SDO (E) Akuluto		
	5. Changtongya	SDO (E) Changtongya SDO (E) Tuli SDO (E) Yimsenyong		
Civil Circle	1. Hydel (Investigation)	SDO (C) – I & II (Kohima) SDO (Hydel) Zunheboto		
	2. Hydro (Construction)	SDO Hydro (Kma) SDO Hydro (Tue) SDO Hydro (Mkg)		
	3. Likimro(Civil)	SDO (C) Likimro		

Source: Annual Administrative Report. DoP, Nagaland, 2008, 2010.

The operational jurisdiction of the Department of Power is divided into three main circles namely: Dimapur Circle, Mokokchung Circle and Civil Circle Kohima.

Under these three operational circles, there are 10 electrical divisions; which are responsible for all the power projects within the respective divisions.

Under Dimapur Circle there are 5 electrical Divisions, 2 transmission divisions, 13 electrical sub-divisions and 3 transmission sub-divisions. Under Mokokchung Circle there are 5 electrical divisions, 1 transmission division, 12 electrical sub-divisions and 1 transmission sub-division. Hydel investigation division, hydro construction division and Likimro civil division are under the civil circle. Under these three divisions there are 8 sub-divisions under civil circle.

Besides, the above mentioned divisions, there are two divisions which are under the control of Chief Engineer (Power) namely the Generation Divisions and Electrical Store Divisions. Under Generation Division there are two sub-divisions one in Kohima and the other in Likimro. The electrical store division is located in Dimapur.

ORGANIZATIONAL STRUCTURE OF DOP, NAGALAND

The Department is functioning under the Secretariat (Power) and Directorate (Power). The organizational Structure of the DoP, Nagaland is shown by Exhibit 2.1.

Secretariat (Power)

At civil secretariat, the minister of power, is assisted by Commissioner & Secretary (C&S); who with 2 (Two) Deputy Secretaries and other ministerial staff comprise the Administrative Department of Power. The Commissioner & Secretary is the overall administrative head of the Department. In order to carry out the works in field the Department is run by a Chief Engineer in the directorate (Power) with centrally located Head Quarter at Kohima.

Directorate (Power)

At directorate, the Department is functioning with two offices; namely the Chief Engineer's Office and the Chief Inspectorate. The Chief Engineer's Office is headed by the Chief Engineer (Power) and the Chief Inspectorate is headed by the Chief Inspector in the rank of Chief Engineer. Both the chief Engineers exercise the same power in their respective offices and are directly accountable to the Commissioner & Secretary.

Functional Branches and Circles of the Department of Power

For administrative convenience the directorate of DoP is divided into functional branches and circles. All such branches and circles functions under the executive control of the Chief Engineer (power).

The directorate of power Department is divided into two major functional branches:

1. Technical Branch
2. Non-technical Branch

Technical Branch

This is the largest branch. The core functions of power Department are carried out in this branch. The technical branch is headed by two additional Chief Engineers. This branch is divided into:

a) Generation and Transmission circle
b) Distribution and Revenue circle:

Non-Technical Branch

The non technical branch is headed by a Registrar, who is the head of the ministerial staff, and this branch is divided into 8 sub-branches as follows:

The branches of the Department are as follows:

1. General Branch: The General branch deals with the pension of the personnel/staff of the Department. The General Branch is headed by a Superintendent who is assisted by the account Officers deputed to the Department from the Treasuries and Account, Finance Department Government of Nagaland, to assist in maintenance of the pension Accounts of the staff of the Department. This branch also deals with the allotment of the staff quarters.

2. Account Branch: This branch is headed by two Divisional Account Officers. This branch deals with all the accounting and recording works of the Department.

3. Establishment Branch I: This branch deals with transfer, posting and appointment of the staff.

4. Establishment Branch II: This branch maintains service book and reconstruction of service book; deals with leave, increment, house rent etc.

5. Confidential Branch: This branch deals with the staff Annual Confidential Report.

6. Programming and Planning Branch: All the planning of the power projects is prepared in this branch.

7. Rural Electrification Branch: This branch deals with all the projects relating to rural electrification and implementation of all the centrally sponsored rural electrification schemes in the state.

8. Revenue Branch: This branch deals with all the matters relating to revenue. This branch maintains the record of revenue collection from all the electrical divisions.

Duties and Functions of the Officials

At Secretariat Level

1. **Minister of Power Nagaland:** The Minister of Power is the member of Council of Minister and over all in-charge of the power Department. He takes decision in all matters as per powers vested in him. Being a member of the Cabinet, he is collectively responsible to the legislature.

2. **Commissioner and Secretary**: Presently the Administrative Department is headed by an officer of an IAS cadre designated as Commissioner & Secretary (C&S) to Govt. of Nagaland having its independent Secretariat with allied officers and concomitant staff. At

present there is one Commissioner & Secretary at the civil secretariat (Power), who assists the cabinet minister power of the state. The C&S is the overall in charge and the administrative head of the Department.

The main function of the commissioner and secretary is to Supervise Department as the Administrative Head in directing the Department in execution of all the power projects and in implementations of all the policies framed by the government time to time giving right direction to the Department. The C&S frame plan and policy in relation to the Department under the cabinet Minister of the Department. The C&S is directly accountable to the cabinet minister. He is the Chief Executive Officer of the Department. All the cases relating to administrative & financial are routed through him and sent to the Power Minister for taking financial decision/approval as per standing orders of the Govt. He is responsible for overall functioning of the Department.

3. **Deputy Secretary**: The deputy secretary assists the commissioner and secretary in running the administrative Department and in supervising the branch. The deputy secretary assists the C&S in all the administrative works of the Department. At present there are two deputy secretaries working under the C&S.

At Directorate Level

1. **Chief Engineer**: Chief Engineer is the executive head of the Department and exercises full technical & financial power conferred by the delegation of Financial & Cognate Power Rules 1964 amended from time to time and Nagaland Public Works Department (NPWD) code. Under the directorate level, all the works are executed by the Department after obtaining Administrative sanction from the Commissioner & Secretary.

The Chief Engineer is the overall executive head of the Department and is responsible for the efficient administration and direction of the overall establishment and works within its jurisdiction. He exercises full technical and supervisory control over the Officers and staff in the Department. He is also the responsible professional adviser of Government in all matters relating to his charge or on which his advice may be desired. He is required to bring clearly and faithfully before Government all subjects reserved for its decision or for that of the Central Government.

2. **Chief Inspector**: The chief Inspector in the rank of Chief Engineer is the head of the Electrical Inspectorate who is responsible to discharge all the functions of the Office. The functions of the Electrical Inspectorate are:

    a. Administration of the provisions of Indian Electricity Rules, 1956.
    b. Administration of the provisions of Licensing Board (Electrical) Regulations.
    c. Administration of the provisions of the Energy Conservation Acts, 2001.
    d. Prevention/Investigation of electrical accidents and examination of causes leading to such accidents.

3. **Superintendent Engineer (SE)**: There are two Electrical and one Civil circle headed by Superintending Engineers. Superintending Engineer is responsible for supervision of various works under divisions under his circle as per the NPWD code.

The SE is responsible to the Chief Engineer for the administration and general professional control of power works in charge of officers of the Department within his Circle. It is the duty of the Superintending Engineer to inspect the state of the various works within his Circle, and to satisfy himself that the system of management prevailing is efficient and economical that the different articles in stock are duly verified according to the rules laid down, and that there is no accumulation of stock in any division beyond its requirements. He is also responsible that no delay is allowed to occur in the submission of Completion Reports (or completion statements) where necessary. The Superintending Engineer is required to ascertain and report on the efficiency of the subordinate office and petty establishments, and to see that the staff employed in each Division is actually necessary and adequate for its management. He will inspect each Divisional Office in his Circle at least once a year to examine initial accounts, accounts of stock, tools and plant and stock manufacture, registers of work and other divisional books, mode of preparation of estimates, contract agreements, contractors accounts, system of recording plans and papers, and office work generally.

The two SE (Electrical) are also the designated Chief Executive Officers for works taken up under Accelerated Power Development Reforms Programme (APDRP) under their respective circles. His Administrative & Financial powers are as per NPWD code and Delegation Financial & Cognate Power Rules 1964 amended from time to time.

4. **Executive Engineer (EE)**: The Executive Engineers in the Divisions are the executive unit of the Department and are responsible and accountable for the efficient execution and measurement of all works within their divisions. EE can appoint and dismiss work charged employees subject to the powers delegated to him. He is responsible for

supervision of various works under the sub-divisions under his division and he is also the Drawing and Disbursing Officer for all works and disbursement of salaries and wages of all employees under his division. He is also responsible for overall operation & maintenance of Transmission, Distribution and Revenue Management within his division. Superintending Engineer: There are Two Electrical circle and One Civil Circle headed by Superintending Engineers. Superintending Engineer is responsible for supervision of various works under divisions under his circle as per the NPWD code. The two SEs (E) are also the designated Chief Executive Officers for works taken up under Accelerated Power Development Reforms Programme (APDRP) under their respective circles. The Administrative & Financial powers of EE are as per NPWD code and Delegation Financial & Cognate Power Rules 1964 amended from time to time.

A Divisional Accounts is posted by the Treasuries & Accounts to assist the Divisional Officer in all accounts matters as per NPWD & Account code.

5. **Sub Divisional Officers** (SDO): The Sub-Divisional Officers are responsible to the Executive Engineer for all management and execution of works within his sub-division. A sub-division is constituted by a number of sections, for which a Junior Engineer (JE) is posted to assist the Sub-Divisional Officer. The SDO (Elect) are responsible and accountable for billing, collection and accounting of Electricity Bills within his sub-division. Activities like new service connection, disconnection & Reconnection of supply, consumer servicing, operation & maintenance of lines and sub-stations are enforced by the SDO (Elect) under the direction & supervision of the Executive Engineer.

Grade – III Staff:

1. **Registrar**: The Registrar is Head of the Establishment branches/sections of the Directorate. All Files except technical matters are routed through him to all the office superintendents of different branches under his control. He is responsible for enforcing discipline, punctuality and regular attendance of all staff under his administrative control. The Registrar oversees the staff of the Department. He is accountable directly to the Chief Engineer (Power).

2. **Superintendent**: All the branches of the office have a superintendent as the head of the Establishment of that concerned branch in the directorate.

3. **Head Assistant**: Head Assistant is the head of the Establishment branch in the division office/ sub-division office. All the corresponding files of the office are routed through him/her from the directorate. He is also responsible for enforcing discipline, punctuality and regular attendance of all staff under his administrative control. He reports and is accountable directly to the Executive Engineer/Sub-Divisional Officer.

Ministerial Staff:

4. **Upper Divisional Assistant/Lower Divisional Assistant (UDA/LDA)**: UDA/LDA are responsible to Compile and record all the official correspondence as endorsed/assigned by the office superintendent or Divisional Head Assistant /Sub-Divisional Head Assistant.

5. **Meter Reader**: Meter readers are responsible for taking meter reading of the consumer and distribution of electricity Bills to the consumers for payment of Electricity Bills.

6. **Bill Assistant**: Bill assistant keeps the records of meter Reading, posting of bills and payment of Electricity Bill details in the consumers' ledger.

Field Staff:

7. **Lineman/Asst Lineman/Electrician**: the duties of the lineman/asst. lineman/electrician are to carry out the new electrification works, new service connections, disconnection & reconnection of line and Fuse call duties. They are also responsible to oversee the Operation & Maintenance of overhead HT/LT lines and sub-stations.

Staffing Position of the Department

The power Department is a technical as well as revenue earning organization, its staffing pattern composed of both technical and non-technical. Hence, the personnel employed in the power Department can be broadly classified as Technical and Non-Technical manpower. Technical manpower comprises of technical officers, engineers, electrical inspector, store keeping officers, information technology personnel, system analyst, technicians, electricians, lineman, etc.

Non-technical manpower comprises of administrative staff, secretary, financial/accounts officers, section officers, legal adviser, superintendent, stenographers, secretarial assistant, cashiers, telex/teleprinter operators, receptionist, meters reader, duftry, peon, watchman, etc.

The number of staff, technical and non-technical of the last 20 years is shown in Table 2.2.

Table 2.2

Number of Technical and Non-technical Staff

Year	No. of Employees	No. of Technical Staff	No. of Non - Technical Staff
1990-91	3184	2629	555
1991-92	3184	2629	555
1992-93	3184	2629	555
1993-94	3424	2869	555
1994-95	3425	2869	556
1995-96	3425	2869	556
1996-97	3683	2869	814
1997-98	3683	2869	814
1998-99	3814	3000	814
1999-00	3814	3000	814
2000-01	3814	3000	814
2001-02	3814	3000	814
2002-03	4026	3212	814
2003-04	4026	3212	814
2004-05	4026	3212	814
2005-06	4044	3230	814
2006-07	4044	3230	814
2007-08	4044	3230	814
2008-09	4044	3230	814
2009-10	4380	3230	1150

Source: Assessment of Financial Resources for the Annual Plan, DoP, Nagaland. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

The Department being relatively a technical organization, number of technical staff is more than the non-technical staff. The percentage share of technical staff is 73.74 per cent out of 4380 employees as on 31st March 2010. From Table 2.2 it is also observed that the number of employees was 3184 in 1990-91. It rose to 4380 in 2009-10; representing an increase of 37.56 per cent.

The strength of non-technical staff of 2629 in 1990-91 was increased to 3000 in 1998-99 and it further rose to 3212 in 2002-03 and to 3230 in 2005-06. There was no recruitment of technical staffs during 2006-07 to 2009-10.

The number of non-technical staff of 555 in 1990-91 rose to 556 in 1995-96; indicating that only one staff was recruited during the first five years under study. In 1996-97, 258 non-technical staffs were recruited and the strength of non-technical staff rose to 814. There was no addition in the strength of the non-technical staff during 1999-00 till 2008-09. The number of non-technical staff remained constant till 2008-09. However, an additional number of 336 non-technical staffs were recruited in 2009-10. Currently, the number of non-technical staff is 1150.

HUMAN RESOURCE DEVELOPMENT

The technical knowledge acquired from engineering colleges, polytechnics, industrial training institutes and other technical institutions provides the basic foundations but needs to be supplemented with the applied engineering skills required for professional success in particular specialty. All these skills are to be regularly updated to cope with the ever progressing and rapidly advancing technologies being introduced in the power sector where the speed of obsolescence often overtakes the acquisition of particular skill and knowledge.

Various training facilities are made available by the Government of India for training up the staff of the power sector. The objective of various trainings is to enable civil servants to acquire the knowledge, skills, abilities and attitudes necessary to enable them to improve their performance. Such trainings are required when fresh personnel are being inducted, to catch up with the change in technology/operating procedures/environment, for improvement of Performance/ Skill/ attitude etc., and refreshing knowledge/skill.

EXISTING TRAINING FACILITIES IN THE POWER SECTOR

Training is basically needed for imparting requisite skills to fresh recruits and to update the knowledge and skills of serving personnel from time to time to absorb the latest technologies and innovations. As per Section 73 of the Electricity Act, 2003, CEA is responsible for promoting measures for advancing the skill of persons engaged in the electricity industry. In pursuance of the above provision in the Act and to ensure the required standard of training, CEA had issued guidelines and norms for setting up of training institutes and procedural requirements of getting recognition from CEA. Accordingly, CEA has been regularly inspecting training institutes established in the state/central/private sector Power Utilities. The following are the important training institutions at national level:

1. **National Power Training Institute (NPTI):** National Power Training Institute (NPTI) is the National Apex body for Training and Human Resources Development in Power Sector with its Corporate Office at Faridabad. NPTI operates on an all India basis through its nine (9) Units in different power zones of the country located at Faridabad, Neyveli (established 1965), Durgapur (established 1968), Badarpur (established 1974), Nagpur (established 1975), Centre for Advanced Management and Power Studies (CAMPS), Faridabad (established 2000), Hydro Power Training Institute (HPTI), Faridabad (established 2002), Power System Training Institute (PSTI) (established 1972), Bangalore and Hotline Training Centre also at Bangalore (established 1974).

2. **The Power Management Institute (PMI):** The Power Management Institute (PMI) was set up by NTPC in Noida, UP in recognition of the vital role that management development has to play, in the context of the challenges associated with the growth of the Indian Power Sector. The Institute is involved in the training and development of middle and

senior level personnel not only from the power sector but from organizations outside the sector also. The Power Management Institute is committed to be a leading institute in developing world-class competencies by providing a state-of-the-art training, which responds to and proactively meets the needs of the power professionals.

STATE LINEMAN TRAINING CENTRE (LMTC)

LMTC is a state training centre located in Dimapur Nagaland which is the sole training centre maintain by the Department. Intensive training is provided to the linemen in this training center. This is an important institute of power sector in Nagaland for human resource development; however in this training centre, trainings are provided only to the linemen. The training facility is provided to both the new recruits as well as the existing lineman. The trainings are provided to linemen of the Department annually. Number of linemen trained in LMTC during the last 10 years has been shown in Table 2.3.

Table 2.3

Number of Linemen Trained in LMTC

Year	Number of Linemen Trained
2000-01	30
2001-02	25
2002-03	21
2003-04	17
2004-05	16
2005-06	20
2006-07	18
2008-09	16
2009-10	18

Source: Departmental Data, DoP, Nagaland.

In LMTC Dimapur, the trainees are provided with basic electrical knowledge relating to technical aspects, materials, construction, testing of meters, operation and maintenance and safety. Each year 15 to 30 linemen are trained in the LMTC. In 2000-01, 30 linemen were trained. The number of trainees was reduced to 20 in 2005-06 and it further reduced to 18 in 2009-10.

Besides LMTC, there is no other training institute of the Department for the manpower development. The administrative staffs are trained at Administrative Training Institute, Kohima, Nagaland, after the recruitment which is only one time training. Technical staffs of the Department also do not get proper training. The Department due to financial constraints cannot send the personnel regularly to national training institutes.

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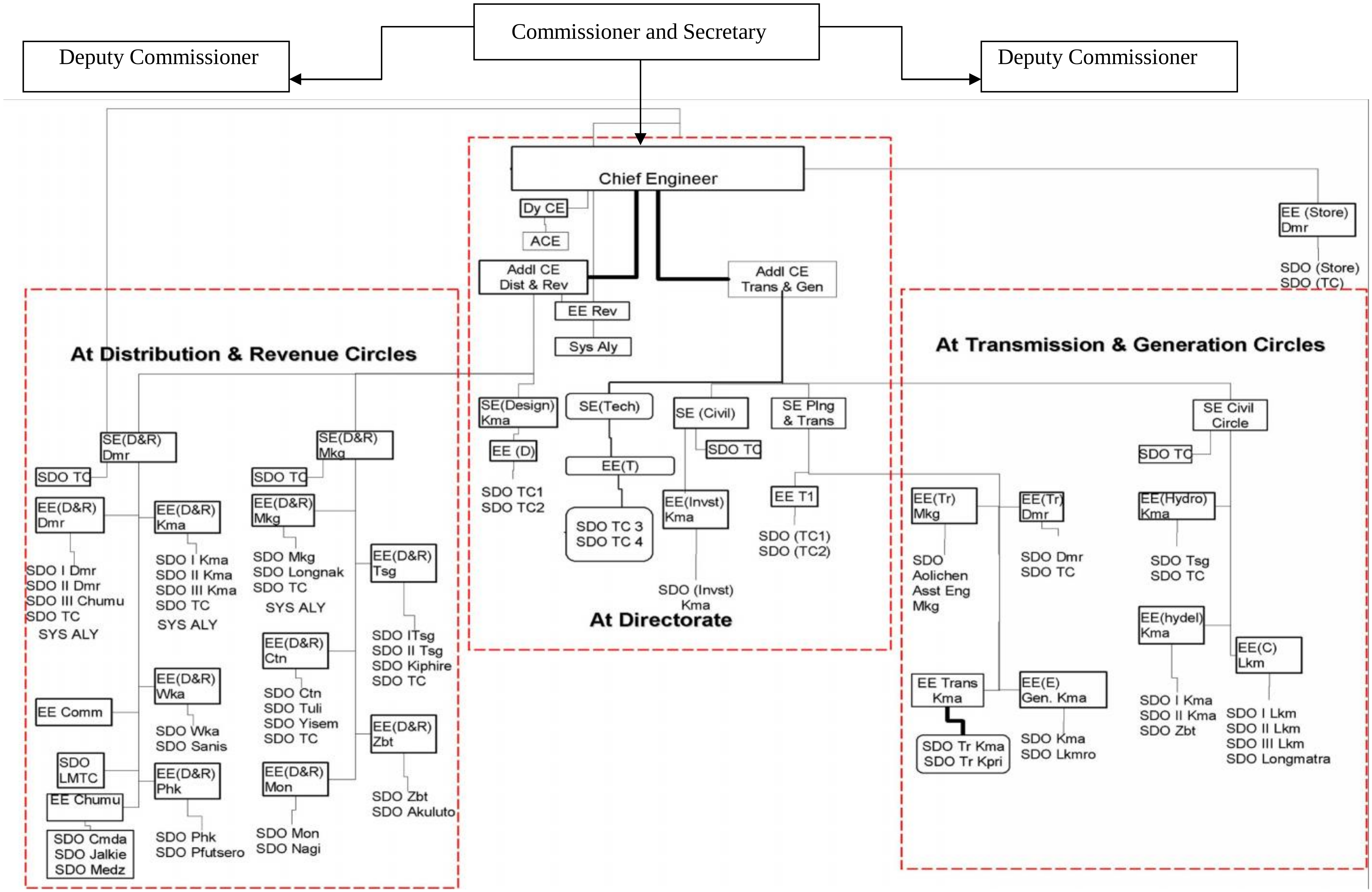
Exhibit 2.1

Organizational Structure of Department of Power



Source: Department of Power, Nagaland.

CHAPTER III

POWER COST, TARIFF POLICY AND CONDITIONALITY OF SUPPLY

The result of operations in monetary term and the profitability of an organization depend upon the amount of revenue earned and the cost incurred to earn that revenue. Cost, revenue, tariff and sales are the four important factors which influence the quantum of profit. Out of these, not even a single factor is independent of the others. Each one of these determinants is influenced by one or more of the other influencing factors. As the volume of sales changes, there is bound to be a change in the total operating cost of the Department as well. The revenue of the Department also depends upon the volume of sales and the tariff structure. And the tariff structure is prepared taking into account the cost factor. Thus these four influencing factors are interdependent and depend on one another.

Therefore, an attempt has been made in this chapter to analyze the different elements of cost with the objective of ascertaining and analyzing the operating cost and revenue of the Department. Further, it may be noted that the financial performance of the Department is influenced directly and/or indirectly by its physical performance. Hence, both physical and financial performance of the Department have been evaluated in this chapter.

PARAMETERS USED FOR EVALUATION

The parameters selected and used for the purpose of assessing the performance of the Department are:

1. **Physical Parameters (Non Financial Parameters)**

    a. Trends in the growth of per capita consumption (energy consumption divided by total population of the state), consumption per capita (energy consumption divided by total power consumers in the state) and number of power consumers.
    b. Trends in the growth of installed capacity, generation of power, purchase of power and sales.
    c. Employment per kWh of energy sold and employment per 1000 consumers.

2. **Financial Parameters**

    a. Total cost and revenue
    b. Net deficit/surplus and operating deficit/surplus
    c. Average cost and tariff
    d. Recovery Ratio
    e. Operating Ratio
    f. Net profit Ratio
    g. Operating Profit Ratio
    h. Return on Investment and
    i. Return on Capital Employed

In order to have a meaningful analysis of the performance of the Department, the evaluation of both the non financial as well as financial parameters is discussed at length in four sections of this chapter. Section I deals with the physical performance and in Section II financial performance has been evaluated. In Section III, an attempt has been made to evaluate the overall performance of the Department and an inter-department comparative study of the Department of Power, Nagaland and Department of Power, Arunachal

Pradesh has also been done in this section of the chapter. Section IV gives a brief review of the conditionality of supply of power in Nagaland.

SECTION 1

PHYSICAL PERFORMANCE

An attempt has been made in this section of the chapter to evaluate the physical performance of the power system of Nagaland. The physical performance of the Department can be evaluated in terms of changes in power system variables such as:

- Demand side variables: Per Capita Consumption, Consumption Per Capita, and Power Consumers.
- Supply side variables: Installed Capacity, Generation, Sales, Level of Transmission and Distribution Losses.

Employees per MkWh of energy sold and employees per 1000 consumers have also been examined to measure the effective utilization of human resources.

POWER SYSTEM VARIABLES (DEMAND SIDE)

Factors like number of per capita consumption and consumption per capita and power consumers influence the demand side of the power system (i.e. the generation, transmission and distribution network).

Trends in the growth of per-capita consumption, consumption per capita and power consumers in the state is shown in Table 3.1.

Table 3.1

Trends in the Growth of Per-capita Consumption, Consumption Per-capita and Power Consumers

Year	Per-Capita Consumption (kWh)	Consumption Per-Capita (kWh)	No. of Power Consumers
1990-91	65.40	846.14	102654
1991-92	66.74	761.10	102654
1992-93	65.31	846.06	105264
1993-94	74.77	963.89	97905
1994-95	95.29	1000.00	99654
1995-96	95.96	984.41	111833
1996-97	105.29	1102.90	115477
1997-98	108.46	1126.92	117035
1998-99	106.89	998.17	129525
1999-00	120.49	1145.88	120606
2000-01	118.00	1371.98	120606
2001-02	120.00	757.10	137500
2002-03	103.00	903.72	140000
2003-04	100.00	981.06	149634
2004-05	92.00	929.94	149634
2005-06	125.00	952.10	152085
2006-07	125.00	888.91	176059
2007-08	142.70	1011.75	180597
2008-09	182.03	1049.43	183881
2009-10	218.03	1350.13	185049
***ACGR (%)**	**6.21**	**2.36**	**2.99**

Note: Per capita consumption = Total Annual Energy Consumption ÷ Total Population of the State and Consumption per capita = Total Annual Energy Consumption ÷ Total Power Consumers.
*Annual Compound Growth Rate.

Source:

1. Assessment of Financial Resources for the Annual Plan. DoP, Nagaland, 1997, 1999, 2003, 2005, 2007, 2008 & 2010.
2. Statistical Handbook of Nagaland. Various Issues.

Per-capita Power Consumption

The per capita power consumption is one of the key variables of economic growth. Per capita power consumption is the total annual power/energy consumption divided by total population in the state.

It is observed from Table 3.1 that the per-capita power consumption was 65.40 kWh in 1990-91, which rose to 218.03 kWh in 2009-10, showing an increase of 190.71 per cent. The trends in the growth of per-capita power consumption in the state has steadily increased from 1990-91 to 2001-02. During this period the per-capita power consumption in the state ranged from 65.31 kWh to 120.00 kWh. From a per-capita power consumption of 120.00 kWh in 2001-02 declined to 103.00 kWh in 2002-03, it further declined to 92.00 kWh in 2004-05. However, in 2005-06 it remarkably increased to 125.00 kWh from 92.00 kWh in 2004-05, marking an increase of 35.87 per cent. The per-capita power consumption in the state further increased to 218.03 kWh in 2009-10, but it is still very low as compared to the per capita consumption of all India at 778 kWh in 2009-10. The per-capita power consumption in the state would have increased significantly if a sufficient quantity of power were available in the state.

Consumption Per-capita

Consumption per-capita is the actual energy consumption per power consumer in the state. It is calculated by dividing the actual power consumption in a year by the number of power consumers in the state. From Table 3.1, it can be seen that the trends in the growth of consumption per-capita has been fluctuating. The consumption per-capita rose from 846.14 kWh in 1990-91 to 1000.00 kWh in 1994-95 and it declined to 984.41 kWh in 1998-99. The consumption per-capita increased to 1371.98 kWh in 2000-01, marking the highest during the study period. In 2002-03, the consumption per-capita in the state declined to 751.10 kWh, which is the lowest during the period under study. However, from 2003-04, the consumption per-capita in the state has increased steadily.

Power Consumers

From Table 3.1, it can be noted that power consumers in the state remained at 1.02 lakh during the first two years of the study period and it has increased to 1.05 lakh in 1992-93. The power consumers in the state declined to 0.97 lakh in 1993-94. Nevertheless, the number of power consumers in the state has been steadily increasing from 1994-95 till 2009-10. In 2009-10 it has increased to 1.85 lakh from 1.02 lakh in 1990-91, showing an increase of 86.26 per cent. It is further observed that the consumption per-capita increased from 846.14 MkWh per power consumer in 1990-91 to 1759.26 in 2009-10, representing a 59.56 per cent; whereas the total number of consumers increased by 80.26 per cent. This shows that even though the demand of power has increased the supply of power remain low.

However, the trends in the growth of all the three variables are on the increasing side, which implies that the demand and consumption of power in the state has increased substantially. The increase in the power consumption is partially due to increase in the index of standard of living in the state; which induced the consumers to use more electrical equipments and electronic gadgets. The ACGR of per-capita consumption, actual consumption per-capita and consumers are 6.21 per cent, 2.36 per cent and 2.99 per cent respectively; the highest growth rate being the per capita consumption.

POWER SYSTEM VARIABLE (SUPPLY SIDE)

The trends in the growth of installed capacity, generation and the magnitude of energy sold by the power Department and the level of transmission and distribution losses influence the supply side of the power system. The growth in all these factors in the state during the study period has been given in Table 3.2.

Table 3.2
Trends in the Growth in Installed Capacity (IC), Generation, Sales and T&D Losses

(MkWh)

Year	IC (MW)	Gross Generation	Net Generation	Power Purchase	Free Power from DHEP	Net Availa-bility	T&D Losses	Sales
1990-91	6.00	2.39	2.26	128.52	-	130.78	43.92	86.86
1991-92	6.00	2.00	1.88	116.31	-	118.19	40.06	78.13
1992-93	5.50	3.80	3.54	128.25	-	131.79	42.73	89.06
1993-94	4.50	1.59	1.46	136.40	-	137.86	43.49	94.37
1994-95	5.26	2.43	2.33	141.61	-	143.94	44.29	99.65
1995-96	5.26	2.46	2.33	156.14	-	158.47	47.57	110.09
1996-97	5.50	2.22	2.09	178.95	-	181.04	53.68	127.36
1997-98	5.50	2.27	2.14	184.93	-	187.07	55.18	131.89
1998-99	5.50	2.42	2.29	179.81	-	182.10	52.80	129.29
1999-00	5.00	2.80	2.67	190.61	-	193.28	55.08	138.20
2000-01	5.00	3.21	3.05	220.00	10.00	233.05	67.58	165.47
2001-02	29.20	8.06	5.86	210.00	32.00	247.86	143.76	104.10
2002-03	29.80	23.65	21.15	250.00	10.00	281.15	154.63	126.52
2003-04	29.80	3.50	3.24	268.75	12.44	284.43	148.87	135.56
2004-05	29.34	3.50	3.24	337.78	30.37	371.39	135.43	235.96
2005-06	29.34	3.53	3.27	348.91	21.17	373.35	133.55	239.80
2006-07	29.34	33.58	31.20	284.24	14.23	329.67	134.98	194.69
2007-08	28.30	79.58	73.95	326.90	29.67	430.52	146.71	283.81
2008-09	28.30	81.16	75.51	423.26	27.36	526.13	163.16	362.97
2009-10	28.30	78.81	73.36	421.33	17.67	512.36	186.81	325.55
ACGR (%)	**8.06**	**19.10**	**19.01**	**6.12**	**----**	**7.07**	**7.51**	**6.83**

Note:
1. Net Generation is gross generation less auxiliary consumption.
2. Total availability is net generation plus total purchase power.
3. Total sale is net availability less T&D losses. (Total sales is the total energy sold within the state plus sales through inter-state trading)

Source:
1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000, 2002.

Installed Capacity (IC)

It is evident from Table 3.2 that the installed capacity remained almost constant during the first decade of the study period. There was no capacity addition to the power system during the first 10 years under the study period. With the commissioning of Likimro HEP in 2001, the installed capacity rose to 29.20 MW from 6 MW in 1990-91, marking an increase of 387 per cent. From 2002-03 to 2009-10 there was no addition in the installed capacity, since all the HEPs of the state were under progress and not a single HEP was set up since 2001 in the state. The capacity addition in the power system was only 24 MW during the last 2 decades. At present the installed capacity of the state is 28.34 MW which generates 78.81 MkWh of energy.

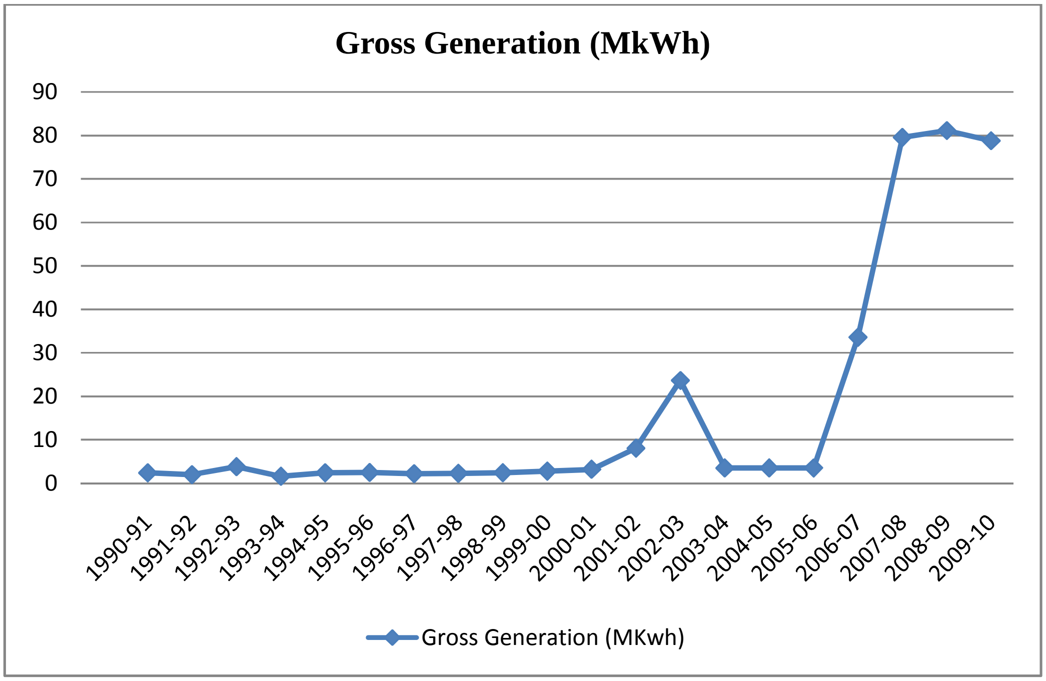
Though installed capacity is the basic determinants of power generation; its growth rate is not impressive during the last 20 years under review. Low capacity addition is the chief reason for the insufficient generation of power in the state and high level of power purchase. To supply adequate power on a sustained basis, the installed capacity has to increase in proportion with the increase in energy requirement.

Power Generation

Though, the gross power generation increase at an ACGR of over 19.10 per cent during the last two decades; supply of electricity in the state has not been able to keep up with increasing demand. The state generally generates hydro electric power which is very meager for the huge demand of the power in the state. Power generation depends on various factors, and the most crucial factor of all is the installed capacity. Since there was no addition in the installed capacity during the first decade under the study period, consequently there was no improvement in generation of power as well.

A Graphical presentation of the gross generation during 1990-91 to 2009-10 is also shown by Exhibit 3.1.

Exhibit 3.1



Source: As in Table 3.2

From Table 3.2 and Exhibit 3.1 it can be seen that the power generation stayed at a very low level ranging from 1.59 MkWh to 3.80 MkWh annually during 1990-91 to 2000-01. However, the 24MW Likimro HEP, which was completed and commissioned on 2nd of December 2001, generated 4.60 MkWh in 2001. As a result of this capacity addition to the power system, in 2000-01 the power generation increased to 8.06 MkWh from 3.21 MkWh in 1990-91. It was further increased significantly to 23.65 MkWh in 2002-03 from 5.86 MkWh in 2001-02. But within a short span of time after commissioning, the Likimro HEP suffered from several problems including technical breakdown and was not able to restore till the financial year 2005-06. As a result the power generation was very low during 2003-04 till 2005-06. The power generation was recorded highest in 2008-09 of gross generation 81.16 MkWh and net generation 75.51MkWh.

In addition to this technical inadequacy in power generation is the high level of auxiliary consumption at generation end that eats into the energy available for transmission. It is significant to note that there has been a vast gap between the gross and net generation in all the years under study. The gap is because of the high rate of auxiliary consumption. It is benchmarked for every hydro generating station to maintain the auxiliary consumption at a level of 5 per cent in the country but in Nagaland the auxiliary consumption has been nearing to 7 per cent throughout the study period.

Power Purchase

Power generation being very negligible in the state the Department has to purchase energy from outside sources mainly from the central sector agencies such as North Eastern Electric Power Corporation (NEEPCO) and National Hydro Power Corporation Ltd (NHPC). Detailed analysis and highlights of total purchase from Central Sector and other sources are summarized in Table 3.3.

As Table 3.3 shows, an average proportion of 92.84 per cent of total availability of power is purchase from central sector and other states mainly from Assam Electricity Board (ASEB) and Meghalaya State Electricity Board (MSEB). The purchase of power as a proportion of total availability of electricity has decrease from a level of 98.27 per cent in 1990-91 to 94.40 per cent in 2000-01 and further to 82.23 per cent in 2009-10. This is because the state benefited 10 MkWh and 17.67 MkWh in 2000-02 and 2009-10 respectively from the 75 MW Doyang Hydro Electric Project under NEEPCO by way of free power of 12 per cent of its generation, which was technically commissioned in July 2000 in the state.

The percentage of power purchase to total availability is recorded lowest of 84.93 per cent in 2001-02 and 82.23 per cent in 2009-10 due to increase in power generation and also because of the 12 per cent of power generated free benefit from Doyang HEP. The percentage of purchase to total availability was recorded highest in 1993-94; during this financial year the state purchased 98.94 per cent of total power available for sale.

Table 3.3
Details of Purchase of Power

Year	Total Purchase (MkWh)	Purchase from Central Sector (MkWh)	Others (MkWh)	Total Power Available for Sale (MkWh)	Total Purchase as % of Availab-lity	Purchase from Central Sector as % of	
						total purchase	total availability
1990-91	128.52	128.52	---	130.78	98.27	100	98.27
1991-92	116.31	116.31	---	118.19	98.41	100	98.41
1992-93	128.25	128.25	---	131.79	97.31	100	97.31
1993-94	136.40	136.40	---	137.86	98.94	100	98.94
1994-95	141.61	125.60	16.01	143.94	98.38	88.69	87.26
1995-96	156.14	136.40	19.74	158.47	98.53	87.36	86.07
1996-97	178.95	156.14	22.81	181.04	98.85	87.25	86.25
1997-98	184.93	161.66	23.27	187.07	98.86	87.42	86.42
1998-99	179.81	179.81	---	182.10	98.74	100	98.74
1999-00	190.61	190.61	---	193.28	98.62	100	98.62
2000-01	220.00	220.00	---	233.05	94.40	100	94.40
2001-02	210.00	210.00	---	247.86	84.73	100	84.73
2002-03	250.00	250.00	---	281.15	88.92	100	88.92
2003-04	268.75	268.75	---	284.43	94.49	100	94.49
2004-05	337.78	337.78	---	371.39	90.95	100	90.95
2005-06	348.91	348.91	---	373.35	93.45	100	93.45
2006-07	284.24	284.24	---	329.67	86.22	100	86.22
2007-08	326.90	326.90	---	430.52	75.93	100	75.93
2008-09	423.26	423.26	---	526.13	80.45	100	80.45
2009-10	421.33	421.33	---	512.36	82.23	100	82.23

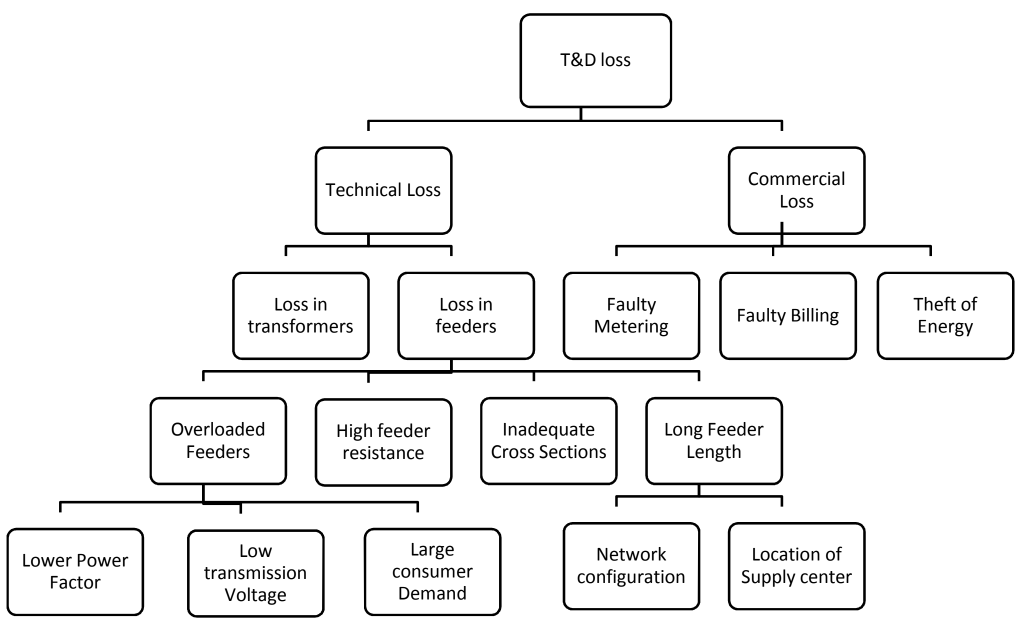
Source:
1. Annual Report on Working of SEBs & EDs. Planning commission, GOI,2002.
2. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
3. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

Transmission and Distribution (T&D) Losses

The technical and economic performance of a power system can also be measured in terms of the transmission and distribution network developed and maintained by it. An important factor that affects the technical efficiency of transmission and distribution network of the power system is the T&D losses. The loss of energy due to poor T&D network has an ultimate impact on the economic efficiency of the power system as well. T&D loss, in term of energy, is the difference of energy between the energy available at the source and the energy supplied to the consumers over a period of time. This loss is usually expressed as a percentage of the input energy. These T&D losses include non-technical as well as technical losses. A chart of T&D losses is shown by Exhibit 3.2.

Exhibit 3.2

Chart of T&D Loss



As a result of the losses shown by Exhibit 3.2, the Department is deprived of much needed revenue. These operational deficiencies have adversely affected the financial position of the Department. The transmission and Distribution losses of the state power system for the last 20 years in unit and as percentage to total availability of power have been shown in Table 3.4.

Table 3.4

Transmission and Distribution Losses

Year	**T&D Loses in MkWh**	**T&D losses as % of Total Availability of power**
1990-91	43.92	33.58
1991-92	40.06	33.89
1992-93	42.73	32.42
1993-94	43.49	31.55
1994-95	44.29	30.77
1995-96	47.57	30.02
1996-97	53.68	29.65
1997-98	55.18	29.50
1998-99	52.80	29.00
1999-00	55.08	28.50
2000-01	67.58	29.00
2001-02	143.76	58.00
2002-03	154.63	55.00
2003-04	148.87	52.34
2004-05	135.43	36.47
2005-06	133.55	35.77
2006-07	134.98	40.94
2007-08	146.71	34.08
2008-09	163.16	31.01
2009-10	186.81	36.46
ACGR (%)	**7.51**	----

Source:

1. Assessment of Financial Resources for the Annual Plan. DoP. 1997,1999, 2003, 2005, 2007, 2008 & 2010.
2. Annual Administrative Report. DOP, Nagaland (1990 to 2010).

Against the norm of 15.5 per cent of the transmission and distribution (T&D) losses as prescribed by the Central Electricity Authority (CEA), T&D losses during the period from 1990-91 to 2009-10 ranged from 28 per cent to 58 per cent of the total power available for sale. In addition, it is the requirement of the CEA that every state should reduce the T&D losses by 5 per cent every year. It is disheartening to note that no significant reduction has been witnessed in its proportion throughout the 20 years period ending 2009-10. In fact, it may be observed that the aggregate T&D loss, throughout the decade remain at the very high level and find no improvement in the aggregate energy saving, representing an ACGR of 7.51 per cent.

Though, the level of T&D losses in the state remained at very high level throughout the period under study, it can be noted that the Department has put its effort to reduce the losses during the first decade under study. A declining trend in the level of losses has been noticed in the first decade of the study period. The level of losses shot up to a level of 58 per cent in 2001-02, representing the highest during the period under review. From 2002-03, the trend in the level of losses has been fluctuating at a level far above the CEA prescribed norm.

Modern and efficient technologies and equipments used by the developed countries are rarely used in Nagaland in curbing T&D losses. The T&D loss in the state is also double of the gross power generation (Table 3.2) in the state throughout the study period; which means that the energy loss in the state is more than its own generation. This reflects poor maintenance of T&D network in the state.

As shown in Table 3.4 the T&D losses in 2009-10 is 186.81 MkWh; on this figure if the power system of Nagaland can reduce the T&D losses at least by 1 per cent, there will be an additional availability of 1.87

MkWh of energy to the system. T&D losses accounts for an average of 40 per cent out of the total power available for sales in the state.

It is also discouraging to note that the T&D losses of the power system of Nagaland have been more than its own gross generation in all the years during the study period. In 2009-10 the gross generation was 78.81MkWh and the T&D losses were 186.81 MkWh (Table 3.2); the T&D losses were more than the double of the gross generation. This indicates that the energy losses through efficient transmission and distribution network in Nagaland are far more above the power it generates.

In addition, it is also a matter of concern that the T&D losses in Nagaland are above all India average of 25.6 per cent. At the present condition it may be difficult to achieve the required norms of the CEA; but it is definitely, considered necessary that the present high proportion of losses should be brought down at least those that occur on account of theft.

Energy Sales

All the units generated by the system do not come for distribution. The power generating stations themselves consume energy for various purposes. This is known as auxiliary consumption. Thus the Net Generation is Gross Generation minus the auxiliary consumption. The power sale in the economy is the Net generation in the state plus power purchase minus energy loss. (Sales = Generated power + power purchase – energy loses). Energy loss is the Transmission and distribution losses.

It is observed from Table 3.2 that out of the total electricity generated, virtually an average of 7 per cent is used for auxiliary consumption (i.e. for supplement generation) and an average of 40 per cent is lost in the Transmission and Distribution from the 1990-91 to 2009-10.

Total energy sold in the state was 86.86 MkWh in 1990-91. It rose to 325 MkWh in 2009-10 representing an ACGR of 6.83 per cent. The trends in the growth of energy sales have increased steadily during the first decade under study. It declined to 104.10 MkWh in 2001-02; however, it increased to 126.52 MkWh in 2002-03 and further increased significantly to 235.96 MkWh in 2004-05. But the energy sales again declined to 194.61 MkWh in 2006-07. Nevertheless, the energy sales went up to 283.81 MkWh in 2007-08 and further to 325.55 MkWh in 2009-10. The reason for this increase is chiefly due to increase in demand of power in the state mainly from domestic consumers. The energy sales recorded highest in 2008-09 of 362.97 MkWh and lowest in 1991-92 of 78.13 MkWh.

Number of Employees per MkWh and per 1000 Consumers

Employees per MkWh of energy sold (within the state) and employees per 1000 consumers are the two important indicators of effective utilization of human resources in power sector. Number of employees per MkWh is calculated by dividing the number of employees by total energy sales (MkWh). The ratio of employee to MkWh of energy indicates the average employment per MkWh of energy sold. In other words it is an indicator of wage cost productivity or labor productivity in the Department. A declining ratio of employee per MkWh is the indicative of better performance.

The ratio of employees to 1000 consumers is calculated as:

$$\text{Employees per 1000 consumers} = \frac{\text{Number of Employees}}{\text{Number of Consumers}} \times 1000$$

The number of employees per MkWh and also per 1000 consumers from 1990-91 to 2009-10 has been calculated and is given in Table 3.5.

Table 3.5

No. of Employees per MkWh and per 1000 Consumers

Year	No. of Employees	No. of Employees per MkWh of Electricity Sold	No. of Employees per 1000 Consumers
1990-91	3184	42.02	31.01
1991-92	3184	42.02	31.01
1992-93	3184	38.40	40.80
1993-94	3424	31.82	38.10
1994-95	3425	34.40	36.00
1995-96	3425	31.10	34.30
1996-97	3683	28.92	34.83
1997-98	3683	27.92	32.01
1998-99	3814	29.60	33.15
1999-00	3814	27.60	31.78
2000-01	3814	23.05	27.24
2001-02	3814	36.63	27.76
2002-03	4026	31.82	28.75
2003-04	4026	27.42	28.75
2004-05	4026	14.66	26.91
2005-06	4044	14.46	26.47
2006-07	4044	12.27	22.97
2007-08	4044	9.39	22.39
2008-09	4044	7.69	21.99
2009-10	4380	8.55	23.71
ACGR (%)	**1.61**	**-7.65**	**-1.33**

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 2000 and 2002.
2. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
3. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

Judicious deployment and utilization of human resource contribute to the success of an organization. It can be seen from Table 3.5 that the number of employees per MkWh was very high during 1990-91 till 2002-03. It declined drastically in 2004-05 and subsequently it has been declining gradually; which indicates an increase of labor productivity. The number of employees per MkWh was 42.02 in 1990

The numbers of employees per 1000 consumer over the years have been declining. This shows that the gap between the number of consumers and employees has been increasing. The number of consumers and the number of employees has increased at an ACGR of 2.99 per cent and 1.61 per cent. This difference in the growth rate of consumers and employees signifies shortage of manpower in the Department to provide efficient service to the consumers.

Power Department is by virtue a public utility and its main motive is to provide service to public. However, it is observed that the number of employees per 1000 has been very low throughout the study period. Low ratio of employees per thousand consumers in the state results in huge standing line queue for payment of bills and to file complaints; and long duration taken to take action against grievances petitions by the consumers and giving new connection. This indicates poor service efficiency of employees of the Department.

The goal of the Department is to generate electricity of right quality and quantity at an economic cost and supply to the consumers efficiently, whenever and wherever required. To accomplish this task, trained manpower is required at every stage of design, planning engineering, procurement, handling and storing, construction, commissioning and operation and maintenance of power plants and associated transmission and distribution system, energy sales and collection of revenue, management of personnel and finance etc.

SECTION II

FINANCIAL PERFORMANCE

COST ANALYSIS

The term cost in this study implies power cost. Power cost represents the cost incurred by the Department to supply electricity to the ultimate consumers. Hence, power cost is also known as cost of power supply or cost of supply of electricity. The major components of cost of supply of power are:

1. The revenue expenditure which includes;
   a. expenditure on fuel,
   b. cost of power purchase,
   c. operations & maintenance (O&M) expenses,
   d. establishment & administration expenses comprising mainly the wages and salaries of staff, and
   e. other miscellaneous expenditure.

2. Fixed cost mainly comprises of depreciation and interest payable to financial institutions and the concerned State Governments.

All the components of cost mentioned above have been taken into account in the determination of the cost of supply. The summary of all the components of power cost (both total and unit cost) for the last 10 year periods under study can vividly be presented in the form of a statement called power cost sheet which is shown in Table 3.6 and Table 3.7.

Table 3.6

Power Cost, Total

(Rs. in crore)

Year	Fuel	Power Purchase	O&M	Estd & Admn	Misc. Exp.	Interest	Depre-ciation	Total
1990-91	0.01	8.11	2.23	4.03	0.33	NA	NA	14.71
1991-92	0.01	7.65	3.55	4.20	0.36	NA	NA	15.76
1992-93	0.01	8.26	3.62	4.29	0.36	NA	NA	16.54
1993-94	0.02	11.10	6.03	6.06	0.33	NA	NA	23.54
1994-95	0.02	11.77	7.11	8.16	0.36	NA	NA	27.42
1995-96	0.02	19.16	8.29	11.20	0.53	NA	NA	39.20
1996-97	0.03	24.18	9.59	10.49	0.58	NA	NA	44.87
1997-98	0.03	24.59	9.72	10.83	0.58	NA	NA	45.75
1998-99	0.03	27.17	9.85	13.14	0.65	NA	NA	50.84
1999-00	0.04	28.51	8.61	14.19	0.58	15.31	NA	67.24
2000-01	0.05	33.83	8.88	15.13	0.58	16.25	NA	74.72
2001-02	0.06	38.20	8.65	13.75	0.33	18.60	NA	79.59
2002-03	0.06	42.00	8.67	14.24	0.36	22.76	24.24	112.33
2003-04	0.06	54.81	4.30	20.17	0.33	18.47	26.00	124.14
2004-05	0.06	64.73	2.72	20.47	0.33	24.01	27.85	140.17
2005-06	0.08	62.15	2.75	24.92	0.33	22.89	16.13	129.25
2006-07	0.08	51.38	9.81	25.88	0.33	14.97	16.57	119.02
2007-08	0.08	78.46	15.04	28.72	0.33	16.25	16.97	155.85
2008-09	0.08	100.85	15.75	30.33	0.43	15.72	17.58	180.74
2009-10	0.08	116.27	16.23	34.03	0.85	18.08	16.83	202.37
ACGR (%)	**10.96**	**14.24**	**10.43**	**11.26**	**4.84**	**1.52**	**-4.46**	**14.01**

Source:
1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP, 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

It is evident from Table 3.6 that the total cost has been increasing continuously year after year during the two decades under review; representing an ACGR 14.01 per cent. The increase in total cost of power is mainly due to the increase in the volume of sales. It could also be due to increase in power purchase rates and the inefficiencies in cost control. The total cost of supply increased from Rs. 15.76 crore in 1990-91 to Rs. 67.24 in 1990-00 and further increased to Rs. 202.37 crore in 2009-10; indicating a decadal growth rate of 16.41 per cent and 10.48 per cent respectively. This shows that the growth rate has been higher during the first decade and it slowed down by 6 per cent during the second decade under study. This shows that the Department could able to lower the magnitude of cost during 1999-00 to 2009-10.

The data in Table 3.6 also shows an increasing trend in all the components of cost except depreciation. The expenditure on power purchase in 1990-91 was Rs. 8.11 crore. It rose to Rs. 116.27 crore in 2009-10. The CERC introduced Availability Based Tariff (ABT) in northeast region with effect from 1st November 2003 and that has also pushed up the cost of power purchase in the state. The cost of power has been increasing at an ACGR of 14.24 per cent which is even higher than the growth rate of the overall power cost of 14.01 per cent.

It is also observed that the establishment and administration cost also increased dramatically from Rs. 4.03 crore in 1990-91 to Rs. 34.03 crore in 2009-10, representing an ACGR of 11.26 per cent. The expenditure on operation and maintenance also increased from Rs. 2.23 crore in 1990-91 to Rs. 16.23 in 2009-10, showing an ACGR of 10.43 per cent. The fuel cost has been insignificant throughout the study period and stayed at a very low level ranging from Rs. 0.01 crore to Rs. 0.08 crore. The expenditure on fuel has been the lowest of all the components of power cost. For non availability of data the ACGR of interest has been calculated from 1999-00 and depreciation has been calculated from 2002-03 onwards only. The interest has been increasing at an ACGR of 1.52 per cent; the payment of interest which was Rs. 15.31 crore in 1999-00, rose to 18.08 crore. However, the depreciation has been declining at an ACGR of 4.46 per cent.

Power cost sheet has also been prepared on paise per kWh of sale of power basis as presented in Table 3.7.

Table 3.7

Unit Cost of Power

(Paise/kWh)

Year	**Fuel**	**Power Purchase**	**O&M**	**Estd & Admn**	**Misc. exp.**	**Depre-ciation**	**Interest**	**Total Unit Cost**
1990-91	0.12	93.37	25.67	46.4	3.80	NA	NA	169.34
1991-92	0.13	97.91	45.44	53.76	4.61	NA	NA	201.72
1992-93	0.11	92.75	40.65	48.17	4.04	NA	NA	185.72
1993-94	0.21	117.62	63.9	64.22	3.50	NA	NA	249.44
1994-95	0.20	118.11	71.35	81.89	3.61	NA	NA	275.16
1995-96	0.18	174.04	75.3	101.73	4.81	NA	NA	356.07
1996-97	0.24	189.87	75.38	86.93	4.55	NA	NA	352.31
1997-98	0.23	186.44	73.70	82.11	4.40	NA	NA	346.88
1998-99	0.23	210.15	76.19	101.63	5.03	NA	NA	393.22
1999-00	0.29	206.22	62.23	112.81	4.20	NA	NA	486.54
2000-01	0.30	204.49	53.66	91.44	3.50	NA	98.21	451.59
2001-02	0.58	366.95	83.09	132.08	3.17	NA	178.67	764.55
2002-03	0.47	331.96	68.53	112.55	2.85	191.59	179.89	887.84
2003-04	0.44	404.32	31.72	148.79	2.43	191.80	136.25	845.64
2004-05	0.43	465.18	19.55	147.11	2.37	200.14	172.55	1007.33
2005-06	0.55	429.21	18.99	172.10	2.28	111.40	158.08	892.61
2006-07	0.51	328.33	62.63	165.37	2.11	105.89	95.66	760.51
2007-08	0.44	429.38	82.31	157.18	1.81	92.87	88.92	852.94
2008-09	0.42	522.62	81.62	157.17	2.23	91.10	81.46	936.62
2009-10	0.32	465.38	64.96	136.20	3.40	67.36	72.37	809.99

Note: Power cost (Paise per kWh) = Total cost ÷ Total units (kWh) of energy sold within the state (ie. excluding the sale of energy through trading).

Source:

1. Assessment of Financial Resources for the Annual Plan. DoP, Nagaland. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.
2. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000, 2002.
3. Annual Administrative Report. DOP, Nagaland (1990 to 2010).

The unit cost of power supply is the cost incurred by the Department per kWh energy sold within the state in a year. It has been calculated in paise per kWh of sale of power or electric energy. It is evident from Table 3.7 that the single largest cost component of the Department is the cost of power purchase. Cost of power purchase constitutes the largest of the total cost of power followed by the establishment and administration expenses. These two elements account for 74 per cent of the total cost. Other items take the remaining 26 per cent share.

The average cost of power purchase 93. 37 paise per kWh to 206.22 paise per kWh in 1999-00, it was further increased to 465.38 paise per kWh in 2009-10. Establishment and Administration cost also remained very high throughout the 2 decades; the average cost of 46.4 paise per kWh in 1990-91 was increased to 136.20 paise per kWh. Establishment and administration charges comprise mainly the wages and salaries of staff and pension payments. This cost constitute the second largest component of power cost even though the ratio of number of employees per 1000 consumer has remained very low which indicates shortage of man power in the Department.

The O&M cost is comparatively lower, which accounts for only 8 per cent of total cost. This indicates that less importance has been given to maintenance of operating assets of the Department. The state depends heavily on purchase of power from outside source mainly from central sector; hence the cost of fuel is negligibly low. This is also one of the reasons for the considerably high cost of power purchase which alone accounts for 57 per cent in the total cost. Fixed costs; interest and depreciation also accounts for 9 per cent in the total cost. The miscellaneous expenditure remained at a level of 1.81 paise per kWh to 5.03 paise per kWh throughout the years under study period. It is also significant to note that the level of total unit/average cost of 809.99 paise per kWh in 2009-10 is almost the double of all India average of 478.00 paise per kWh.

TARIFF POLICY

The economic efficiency and profitability is determined essentially by revenue and cost factors. Revenue in turn is determined by the level of tariff, extent of subsidies and the degree of buoyancy in the collection of sales revenue.

Revenue receipts of the Department depend mainly on tariff policy. Pricing policy has a very important bearing on generation and consumption of electricity, as well as investment in this sector. Though the primary objective of the public utilities like Power Department is not to maximize profit, they are asked by the Statutes to operate on business principle. The tariff fixed and/or revised and charged should, therefore, ensure adequate amount of revenue not only to recover the total cost but also to earn profit. Hence, the tariff fixation exercise plays a prominent role in the success of an organization.

Section 61 of the Electricity Act, 2003, lays down the broad principles, which guide the determination of retail tariff. As per these principles the tariff should “Progressively reflect cost of supply” and also reduce cross subsidies “within the period to be specified by the Commission”. The Act lays special emphasis on safeguarding consumer interests and also requires that the costs should be recovered in a reasonable manner. The Act mandates that the tariff determination shall be guided by the factors, which encourage competition, efficiency, economical use of resources, good performance and optimum investment.

In compliance with section 3 of the Electricity Act 2003 the Central Government notified in January 2006, the National Tariff policy in continuation of the National Electricity Policy. The National Tariff Policy provides comprehensive guidelines for determination of tariff and also in working out the revenue requirement of power utilities. The tariff policy was evolved in consultation with the State Governments and the Central Electricity Authority (CEA) and keeping in view the advice of the Central Electricity Regulatory Commission and suggestions of various stakeholders.

The objectives of the Tariff Policy are to:

1. Ensure availability of electricity to consumers at reasonable and competitive rates;

2. Ensure financial viability of the sector and attract investments;

3. Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimize perceptions of regulatory risks;

4. Promote competition, efficiency in operations and improvement in quality of supply.

In Nagaland, traditionally the power tariff was determined and fixed by the state Government. However, in exercise of the powers conferred by the Electricity Act, 2003, the State Government of Nagaland constituted Nagaland Electricity Regulatory Commission (NERC) in 2008. Therefore, at present the tariff is fixed by the commission. Fixation of the retail supply tariff is guided by the provisions of the Electricity Act, 2003, National Tariff Policy (NTP), Regulations on Terms and Conditions of Tariff issued by the Central Electricity Regulatory Commission (CERC) and Regulations on Terms and Conditions of Tariff notified by the NERC.

The power consumers have been categorized into: Domestic, Industrial, Commercial, bulk, street lighting, Agriculture, and inter-state. Tariff is fixed at different rates for all consumer categories. Furthermore, the tariff is charged on slab basis. For instance, tariff charged for category ‘A’ consumer, for consumption of:

- 0 to 30 kWh is @ Rs. 2.65/kWh
- 31 to 100 kWh is @ Rs. 3.60/kWh
- 101 to 250 kWh as @ Rs. 4.15/kWh
- > 250 kWh is @ Rs. 4.75/kWh.

By convention tariff is determined basing on cost in the state. Consumer Electricity Tariff is fixed basing on reasonable costs determined by the Commission after prudent check in respect of the following components: Power Purchase Cost, Operations & Maintenance Expenses-Employee Expenses- Repair & Maintenance expenses-Administration & General Expenses.

The Commission determines the Tariff for various consumer categories based upon its Tariff Regulations, guidelines contained in the Electricity Act, 2003 and the National Tariff Policy, 2006. The Commission undertakes extensive public consultation with all stakeholders including consumers before finalizing the Tariff.

Table 3.8 gives the retail tariff fixed per unit for 20 years period under study.

It can be noted from Table 3.8 that the state government has revised the tariff only 2 times during the 10 years period. The tariff has been revised every five years. It is also observed from Table 3.8 that the tariff has been highest for commercial consumers, and lowest for domestic consumers.

Table 3.8

Category-wise Consumer Tariff Schedule in the State

Category		2001 to 2005 Rs./kWh	2006 to 2010 Rs./kWh	2011 Rs./kWh
1	CATEGORY 'A' DOMESTIC			
	(a) 0 to 30 kwh	2.00	2.30	2.65
	(b) 31 to 100 kwh	2.50	2.90	3.60
	(c) 101 to 250 kwh	2.80	3.20	4.15
	(d) > 250 kwh	3.00	3.50	4.75
2	CATEGORY 'B' INDUSTRIAL			
	(a) < 500 kwh	2.30	2.60	3.15
	(b) 501 to 5000 kwh	2.50	2.90	3.60
	(c) > 5000 kwh	2.75	3.15	4.10
3	CATEGORY 'C' BULK	2.70	3.10	3.85
4	CATEGORY 'D' COMMERCIAL			
	(a) < 60 kwh	3.00	3.50	4.35
	(b) 61 to 240 kwh	2.50	4.00	5.20
	(c) > 240 kwh	2.75	4.40	5.95
5	CATEGORY 'E' P.W.W.	2.80	3.20	3.85
6	CATEGORY 'F' Public Light	2.30	2.75	To be recovered from consumers*
7	CATEGORY 'G'AGRICULTURE	1.50	1.50	2.0
8	CATEGORY 'H' TEMPORARY CONNECTION	100/day/kW load or part thereof	Metered Rs.4/kWh Unmetered Rs. 100/day/kW load or part thereof	DLF 6.00 Others 8.00
9	Kutir Jyoti (point)	Same as Domestic Category	Same as Domestic Category	Same as DL
10	SINGLE POINT METERED RURAL	2.00	2.30	2.50
11	SINGLE POINT METERED URBAN	-		2.75

* Charges for public lighting have to be recovered from the Consumers. Domestic @ Rs. 10 per connection / month, Commercial @ Rs. 15 per connection / month, Industrial @ Rs. 20 per connection / month, Bulk Supply @ Rs. 25 per connection / month.

TARIFF AND REVENUE REALIZATION

The total revenue earned (Rs. in crore) and average revenue (paise/kWh) during 1990-91 to 2009-10 has been presented in Table 3.9.

Table 3.9

Total Revenue and Average Revenue or Tariff

Year	Total Revenue (Rs. in crore)	Average Revenue (Paise/kWh)
1990-91	6.99	79.78
1991-92	6.93	87.93
1992-93	7.06	78.60
1993-94	12.44	131.19
1994-95	13.24	132.26
1995-96	17.60	159.14
1996-97	24.41	191.03
1997-98	25.15	190.08
1998-99	24.64	190.12
1999-00	26.27	189.51
2000-01	31.49	189.82
2001-02	26.85	257.16
2002-03	32.61	257.11
2003-04	36.63	260.03
2004-05	47.97	202.20
2005-06	48.57	199.71
2006-07	51.26	260.36
2007-08	80.64	282.72
2008-09	121.13	332.62
2009-10	90.97	278.21
ACGR (%)	**13.69**	**6.44**

Note:

1. Total Revenue=Revenue receipts from sale of power+misc. revenue receipts.
2. Average revenue=Total revenue from sales of power ÷ Total unit of energy sold (Kwh)

Source:

1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

The tariff represents the price charged by the Department to the ultimate consumers. Average tariff is the revenue earned by the Department per kWh of total unit of energy sold. It has also been calculated in paise per kWh of sale of power. Average revenue is considered as average tariff as well, since revenue of the power system is earned by way of the sale of energy units.

Table 3.9 shows increasing trends in total revenue during the last two decades. The revenue collection in absolute terms has been increasing at an ACGR of 13.69 per cent; however the average revenue (Total revenue ÷ total units sold) has been increasing only at an ACGR of 6.44 per cent. The total revenue includes; receipts from sales of energy and miscellaneous receipts. The total revenue collection is Rs. 6.99 crore in 1990-91; it rose to Rs. 90.97 crore in 2009-10. The total revenue collection is recorded highest in 2008-09 of Rs. 121.13 crore. The revenue collection is recorded lowest in 1992-93 of Rs. 6.93 crore.

There has been a steady increase in average tariff in the state during the entire period under study. Average revenue of 79.78 paise per kWh in 1990-91, rose to 278.21 paise per kWh in 2009-10. A sharp increase in the average tariff has been observed, particularly, in the year 2001-02. The average tariff reached a level of 257.16 paise/ kWh in 2001-02. This is mainly because of the revision in tariff structure in 2001. The tariff was revised again with effect from June 2006; however, it is observed that there has been no substantial impact of this revision on the average tariff realized.

It can be pointed out that since the tariff fixation method followed in the state is irrational and unscientific the revision in tariff structure have less effect on revenue collection. Moreover the state heavily subsidize tariff particularly to domestic consumer which also leads to scanty collection of revenue. The average tariff is lowest in 2005-06 of 199. 77 paise per kWh, this is mainly due to inter-state trading; the Department sold its share of available energy from SLDC to the other states at a rate lower than the purchase rate.

Consumer Category-wise Average Tariff

Consumer category-wise average tariff is shown in Table 3.10 and the graphical presentation of the same by Exhibit 3.3.

Table 3.10

Consumer Category-wise Average Tariff/Revenue

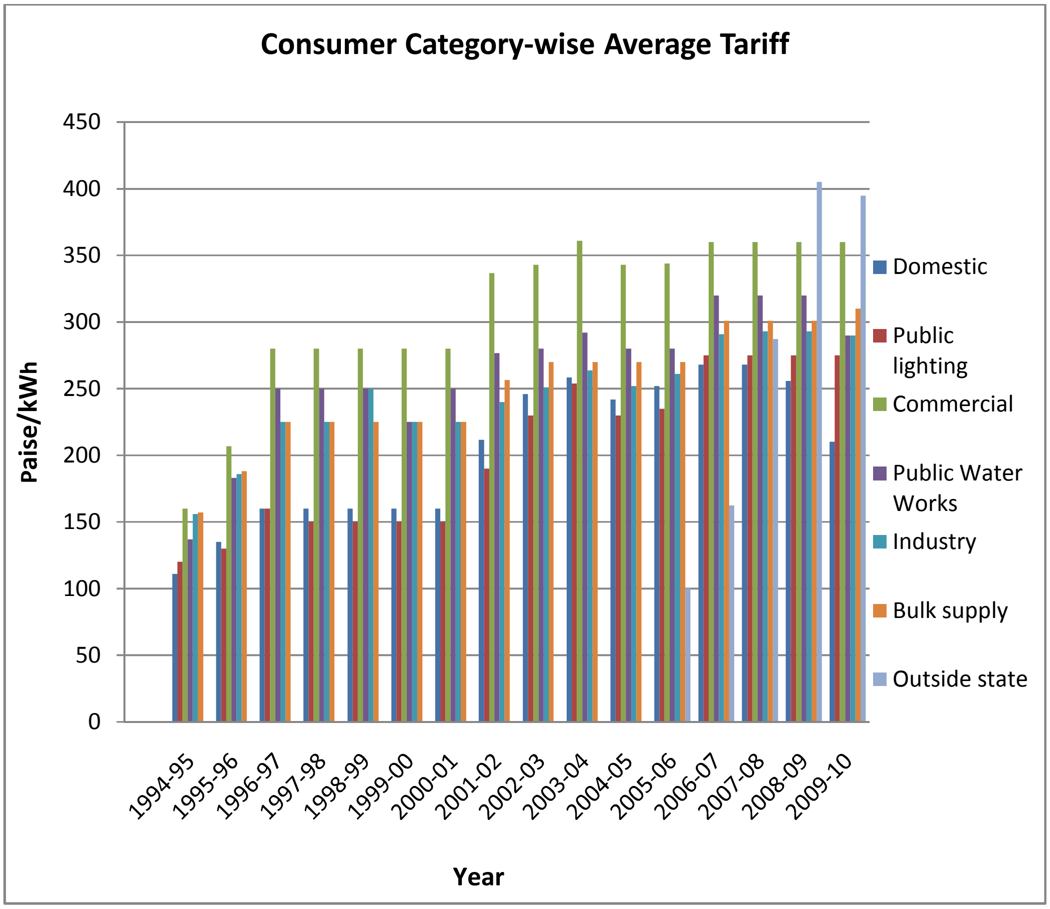
(Paise/kWh)

Year	Domes-tic	Public lightin-g	Com-merci-al	Public Water Works	Indust-ry	Bulk Supply	*Outsi-de State	Total
1990-91	NA	NA	NA	NA	NA	NA	-	79.78
1991-92	NA	NA	NA	NA	NA	NA	-	87.93
1992-93	NA	NA	NA	NA	NA	NA	-	78.60
1993-94	111.00	120.00	160.00	NA	NA	NA	-	131.19
1994-95	111.00	120.00	160.00	137.00	156.00	157.00	-	132.26
1995-96	135.00	130.00	207.00	183.00	186.00	188.00	-	159.14
1996-97	160.00	160.00	280.00	250.00	225.00	225.00	-	191.03
1997-98	160.00	150.00	280.00	250.00	225.00	225.00	-	190.08
1998-99	160.00	150.00	280.00	250.00	250.00	225.00	-	190.12
1999-00	160.00	150.00	280.00	225.00	225.00	225.00	-	189.51
2000-01	160.00	150.00	280.00	250.00	225.00	225.00	-	189.82
2001-02	211.74	190.00	336.76	276.70	239.95	256.65	-	257.16
2002-03	246.00	230.00	343.00	280.00	251.00	270.00	-	257.11
2003-04	258.47	253.80	360.84	291.95	263.83	270.00	-	260.03
2004-05	242.00	230.00	343.00	280.00	252.00	270.00	-	202.20
2005-06	252.00	235.00	344.00	280.00	261.10	270.00	100.11	199.71
2006-07	268.00	275.00	360.00	320.00	291.00	301.00	162.60	260.36
2007-08	268.00	275.00	360.00	320.00	293.00	301.00	287.30	282.72
2008-09	256.00	275.00	360.00	320.00	293.00	301.00	405.00	332.62
2009-10	210.00	275.00	360.00	290.00	290.00	310.00	395.00	278.21

Note: * Sales through inter-state trading.

Source: Assessment of Financial Resources for the Annual Plan2003, 2005, 2007, 2008 & 2010, DOP, Nagaland.

Exhibit 3.3



Note: For non availability of data the chart have been prepared only from 1994-95 to 2009-10.
Source: As in Table 3.10

Revenue realized from commercial sector is significantly higher as compared to the average unit revenue realized from all other categories of consumers. This is because a higher rate of tariff has been charged to the commercial in the state. The average revenue realized from commercial consumers rose from 160 paise per kWh in 1990-91 to 360 paise per kWh in 2009-10, showing an increase of 125 per cent.

Average unit realized from domestic consumers is lowest, even though the number of domestic consumers is considerably higher and has been increasing over the years. The Department has been supplying electricity to the domestic consumers at a subsidized rate. This could be the main reason for low tariff realization from domestic consumers. The average revenue realization for all the consumer categories has increased, though at varying rates.

COST-REVENUE COMPARISON

To find out the operating result of the Department, it is necessary to establish the relationship between the costs and the revenue. The cost-revenue relation can be taken as an indicator of the financial efficiency of the power system.

COST AND REVENUE

The Cost is the total cost of power supply and it includes both revenue expenditure and fixed cost. Total revenue includes operating revenue and miscellaneous revenue receipts.

Table 3.11 gives the total cost and revenue for the period under study and the difference thereof as net surplus/deficit have also been worked out and presented in the table.

It is observed from Table 3.11 that both total cost and revenue has been increasing, though at varying rate. Total cost and revenue has been increasing at an ACGR of 14.01 per cent and 13.69 per cent respectively. The increase in revenue collection has not been proportionate to increase in cost of supply of power. Consequently, there has been vast net deficit or loss throughout the period under study. The Department has been incurring huge net deficit in each year. However, the year 1996-97, 2006-07 and 2008-09 shows a slight improvement in the trends in growth of net deficit. The net deficit of Rs. 7.72 crore in 1990-91, rose to Rs. 111.4 crore in 2009-10, marking an increase of Rs. 103.68 crore. The substantial amount of net deficit implicates a serious operational inefficiency of the Department of Power; which leads to deterioration of its profitability.

Table 3.11

Cost and Revenue

(Rs. in crore)

Year	Total Cost	Total Revenue	Surplus/Deficit (Net)
1990-91	14.71	6.99	-7.72
1991-92	15.76	6.93	-8.83
1992-93	16.54	7.06	-9.48
1993-94	23.54	12.44	-11.1
1994-95	27.42	13.24	-14.18
1995-96	39.20	17.60	-21.6
1996-97	44.87	24.41	-20.46
1997-98	45.75	25.15	-20.6
1998-99	50.84	24.64	-26.2
1999-00	67.24	26.27	-40.97
2000-01	74.72	31.49	-43.23
2001-02	79.59	26.85	-52.74
2002-03	112.33	32.61	-79.72
2003-04	124.14	36.63	-87.51
2004-05	140.17	47.97	-92.2
2005-06	129.25	48.57	-80.68
2006-07	119.02	51.26	-67.76
2007-08	155.85	80.64	-75.21
2008-09	180.74	121.13	-59.61
2009-10	202.37	90.97	-111.4
ACGR (%)	**14.01**	**13.69**	**--**

Source:

1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

OPERATING COST AND REVENUE

Operating cost, operating revenue and operating deficit has also been worked out and presented in Table 3.12.

Table 3.12

Gross Operating Deficit/Surplus

(Rs. in crore)

Year	Operating Revenue	Operating Cost	Operating Deficit	Increase/ Decrease (%)
1990-91	6.93	10.91	-3.98	-
1991-92	6.87	11.15	-4.28	7.54
1992-93	7.00	12.5	-5.50	28.5
1993-94	12.38	20.04	-7.66	39.27
1994-95	13.18	23.81	-10.63	38.77
1995-96	17.52	34.39	-16.87	58.7
1996-97	24.33	40.32	-15.99	-5.22
1997-98	25.07	41.35	-16.28	1.81
1998-99	24.58	45.81	-21.23	30.41
1999-00	26.19	63.04	-36.85	73.58
2000-01	31.41	54.97	-23.56	-36.07
2001-02	26.77	57.82	-31.05	31.79
2002-03	32.53	62.48	-29.95	-3.54
2003-04	35.25	77.24	-41.99	40.2
2004-05	47.71	85.94	-38.23	-8.95
2005-06	47.89	87.95	-40.06	4.79
2006-07	50.69	85.37	-34.68	-13.43
2007-08	80.24	120.82	-40.58	17.01
2008-09	120.73	145.21	-24.48	-39.67
2009-10	90.57	164.06	-73.49	200.2
ACGR(%)	**13.71**	**12.93**	**12.16**	**----**

Source:

1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

Operating revenue is total revenue minus miscellaneous receipts and operating cost is total cost minus miscellaneous cost, depreciation and interest. The operating surplus/deficit is defined as the gap between the revenue receipts from sales of energy and revenue expenditure.

It is observed from Table 3.12 that the financial position of the state power sector has worsened over the years even though its physical performance has improved over the years. Table 3.12 shows a fluctuating trend of the gross operating deficit since 1990-91 and shows no improvement in the gross operating deficit. This may be because of many operating deficiencies of the Department.

The study also reveals that one of the reasons for the huge amount of operating deficit is also the huge accumulation of arrears of revenue for non-payment of electricity bills particularly by Government (institutions and department) consumers and non-payment of bills by the disconnected consumers. Furthermore, collection of bills is also inadequate because the Department does not have sufficient payment counters in all the vital division. The operating deficit increased steadily during the first 6 years period; it declined slightly in 1996-97. The deficit reached to a level of Rs. -73.44 crore in 2009-10 from Rs. -3.93 crore in 1990-91. It is inferred from the data in Table 3.12 that the operating deficit has been increasing at an ACGR of 12.16 per cent.

COST AND REVENUE PER KWH AND COST RECOVERY RATIO

In order to have a meaningful analysis of cost and revenue, the cost and revenue per kWh and the difference thereon have been worked out in Table 3.13. The cost and revenue per kWh is also known as average cost and revenue.

Table 3.13

Average Cost-Revenue and Cost Recovery Ratio

(Paise per kWh)

Year	Average Cost (Paise/kWh)	Average Revenue (Paise/kWh)	Difference (Paise/kWh)	Cost Recovery Ratio (%)
1990-91	169.35	79.78	89.57	47.11
1991-92	201.72	87.93	113.79	43.59
1992-93	185.72	78.60	107.12	42.32
1993-94	249.44	131.19	118.25	52.59
1994-95	275.16	132.26	142.90	48.07
1995-96	356.07	159.14	196.93	44.69
1996-97	352.31	191.03	161.28	54.22
1997-98	346.88	190.08	156.80	54.80
1998-99	393.22	190.12	203.10	48.35
1999-00	486.54	189.51	297.03	38.95
2000-01	451.59	189.82	261.77	42.03
2001-02	764.55	257.16	507.39	33.64
2002-03	887.84	257.11	630.73	28.96
2003-04	845.64	260.03	585.61	30.75
2004-05	1007.33	202.20	805.13	20.07
2005-06	892.61	199.71	692.90	22.37
2006-07	760.51	260.36	500.15	34.23
2007-08	852.94	282.72	570.22	33.15
2008-09	936.62	332.62	604.00	35.51
2009-10	809.99	278.21	531.78	34.35
ACGR (%)	**8.24**	**6.44**	**--**	**-1.57**

Source:

1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

To measure the ability of the Department to recover the cost from revenue, cost recovery ratio have also been calculated for the two decades under study and presented in the same table (Table 3.13). Cost recovery ratio is defined in terms of revenue realized as percentage of cost of power supply. Cost Recovery ratio measure the ability of the Department to recover the cost from revenue. Cost Recovery ratio can be defined as:

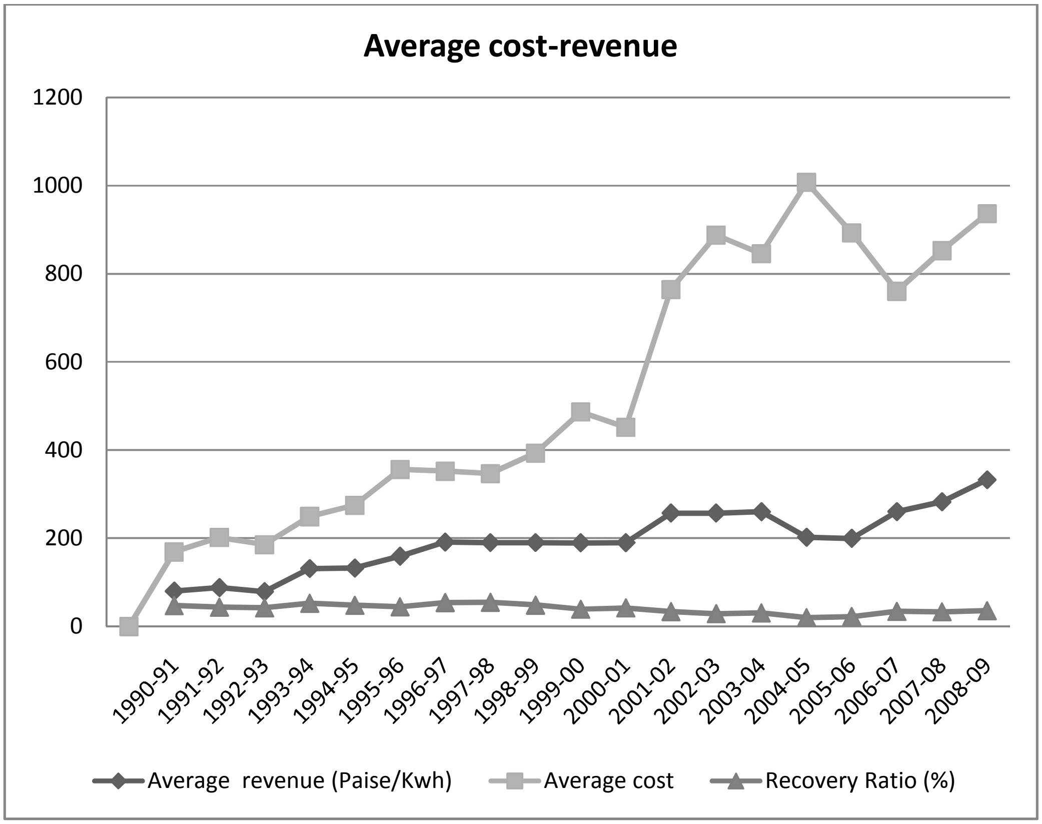
$$= \frac{\text{Total Revenue}}{\text{Total Cost}} \times 100$$

Table 3.13 shows that the average revenue remained well below average cost during the 20 years period under review. The cost-revenue differences have remained at an alarming high rate throughout the years under review in the state. The average revenue has been increasing at an ACGR of 6.44 per cent while the average cost at 8.24 per cent. This explains the high increasing trend in the differences over the years. This shows a serious economic inefficiency of the Department. To slow down the increasing trend in the cost-revenue difference the Department has to revamp the tariff structure and in every possible ways should curtail the cost of supply as well.

The figures presented in Table 3.13 are self-explanatory narrating the very poor financial performance of the Department. Though the average tariff has increased considerably during the last decade, the rise has not been commensurate with the increase in the cost of supply. As a result, the gap between the cost of supply and average tariff has been widening over the years. The gap has increased from a level of 261.73 paise per kWh in 2000-01 to about 567.11 paise per kWh in 2009-10. The level of recovery, therefore, has declined from 47.11 per cent in 2000-01 to 34.35 per cent in 2009-10.

The gap between the average tariff and costs incurred also becomes very clear from the graphical presentation by Exhibit 3.4.

Exhibit 3.4



Source: As in Table 3.13.

One of the reasons for the insufficient average tariff realization has been due to the exclusive reliance on purchase of power from outside source and meager generation from the state owned hydro generating stations. In addition, the T&D losses have also been very high which contribute to low level of average tariff. Energy metered is normally subject to revenue realization. But there are large quantities of energy, which cannot be metered due to faulty energy meters and errors in meter connections. For these units, revenue cannot be released and thus is also a revenue loss to the Department.

Consequently, the level of recovery has remained at a very low level throughout the decades under review, though the numbers of consumers and the quantum of sales have increased in this period. The increase in consumers has been mainly in the domestic category who are getting power supplies at subsidized rates. This could be also one of the reasons for the widening gap between average cost of supply and average tariff. On an average the Department could recover only 39.49 per cent of power cost each year through revenue during the period under study. The revenue collection from sale of power not only falls short of total power cost of supply, it cannot even meet the expenditure on purchase of power. It may be pointed out that non-realization of the average tariff has serious implications for the financial performance of the Department.

MEASUREMENT OF PROFITABILITY

While the profit is an absolute measure of earnings, the profitability is the relative measure of earning capacity. In fact, earning capacity is properly reflected in profitability and not in actual profit. The profitability analysis comprises of the analysis of revenue, operating profit, gross profit margin on revenue, capital turnover, return on investment, etc. The ratios used in this study to analyze the profitability of the Department are: Operating ratio, Net Profit Ratio, Operating Profit Ratio and Return on Capital Employed or Investment. Along with these profitability ratios Capital Turnover ratio has also been calculated to measure the ability of the Department to generate sales per rupee of capital employed.

OPERATING RATIO

Operating ratio is a ratio of working expenses to revenue. It is an important index for measuring the financial performance of the Department. From these ratios the operating efficiency of the Department can also be inferred. The operating ratio is defined as:

$$= \frac{\text{Operating Cost}}{\text{Operating Revenue}} \times 100$$

The operating ratios of the Department from 1990-91 to 2009-10 have been worked out in Table 3.14.

Table 3.14

Operating Ratio

Year	Revenue Rs. in crore	Cost Rs. in crore	Operating ratio (%)
1990-91	6.93	10.91	157.43
1991-92	6.87	11.15	162.30
1992-93	7.00	12.50	178.57
1993-94	12.38	20.04	161.87
1994-95	13.18	23.81	180.65
1995-96	17.52	34.39	196.29
1996-97	24.33	40.32	165.72
1997-98	25.07	41.35	164.94
1998-99	24.58	45.81	186.37
1999-00	26.19	63.04	240.70
2000-01	31.41	54.97	175.01
2001-02	26.77	57.82	215.99
2002-03	32.53	62.48	192.07
2003-04	35.25	77.24	219.12
2004-05	47.71	85.94	180.13
2005-06	47.89	87.95	183.65
2006-07	50.69	85.37	168.42
2007-08	80.24	120.82	150.57
2008-09	120.73	145.21	120.28
2009-10	90.57	164.06	181.14

Source:

1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

The lower the operating ratios better the performance of the utility. This ratio indicates an average operating cost incurred on sales of energy worth Rs. 100. In case of power Department, the operating ratio is very high and it has remained above 100 in all the years under study as shown in Table 3.14. This shows that the Department could not able to earn adequate amount of revenue from sales of energy to cover the operating expense. The operating ratio is more than the double of the operating revenue of Rs. 100 in 1990-00, 2001-02 and 2003-04. This also shows that the Department is incurring operating cost more than the double of revenue generated from sales of energy. The operating ratio of 157.43 per cent in 1990-91 increased to 181.14 per cent in 2009-10. The operating revenue remained far below the operating cost throughout the period under study indicating the Department's operational inefficiency.

NET PROFIT RATIO AND OPERATING PROFIT RATIO

Net Profit Ratio

It is also called net profit to revenue ratio. It measures the relationship between the net profit and the gross revenue, and this ratio expresses net profit as a percentage of total revenue. This can be worked out as shown below:

$$\text{Net Profit Ratio} = \frac{\text{Net Profit/Surplus}}{\text{Revenue}} \times 100$$

Operating Profit Ratio

This ratio establishes the relationship between the total operating profit and the operating revenue. This can be calculated with the help of the following formula:

$$\text{Operating Profit Ratio} = \frac{\text{Operating Profit/Surplus}}{\text{Operating Revenue}} \times 100$$

The net profit ratios and operating profit ratios of the Department of Power, Nagaland for the period under study have been calculated and presented in Table 3.15.

Table 3.15

Net Profit Ratio and Operating Profit Ratio

Year	Net Profit Ratio (%)	Operating Profit Ratio (%)
1990-91	-110.44	-57.43
1991-92	-127.42	-62.30
1992-93	-134.28	-78.57
1993-94	-89.23	-61.87
1994-95	-107.10	-80.65
1995-96	-122.73	-96.29
1996-97	-83.82	-65.72
1997-98	-81.91	-64.94
1998-99	-106.33	-86.37
1999-00	-155.96	-140.70
2000-01	-137.28	-75.01
2001-02	-196.42	-115.99
2002-03	-244.46	-92.07
2003-04	-238.90	-119.12
2004-05	-192.20	-80.13
2005-06	-166.11	-83.65
2006-07	-132.19	-68.42
2007-08	-93.27	-50.57
2008-09	-49.21	-20.28
2009-10	-122.46	-81.14

Source:
1. Annual Administrative Report. DOP, Nagaland (1990 to 2010).
2. Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

As far as the profit to revenue ratios are concerned, the financial performance of the Department is neither impressive nor satisfactory. This is evident from net profit ratio and operating profit ratio; wherein the ratios are negative for all the years under study. Furthermore, no improvement has been observed in both the ratios throughout the study period. The net profit ratio increased from -110.44 per cent in 1990-91 to -122.46 per cent in 2009-10, marking an increase of 11 per cent. And the operating ratio of -57.43 per cent in 1990-91 rose to -81.14 per cent in 2009-10, representing an increase of 41 per cent. Net profit ratio and operating profit ratio recorded highest of -244.46 per cent and -199.12 per cent in 2002-03 and 2003-04 respectively. And both the ratios recorded lowest of -49.21 per cent (Net profit ratio) and -20.28 per cent (operating ratio) in 2008-09.

RETURN ON INVESTMENT OR CAPITAL EMPLOYED

Though the profit to revenue ratios used earlier reflects the profitability of the Department; all of them establish the relationship between the profit and the revenue. But there may be situation wherein profit in terms of sales may be adequate but sales with regard to capital employed may be inadequate resulting in inadequate profit to capital employed. Hence, it is necessary to relate the profit to investment as well. Return on capital employed or investment is the percentage ratio of net profit (before interest and tax) on capital employed. The ratio shows relationship between the size of profit and the capital employed. Higher the ratios are indicators of better profitability on the capital employed. The capability of the Department to pay interest out of profit earned can be judged with the help of this ratio.

This ratio can be calculated with the help of following formula:

$$\text{Return on Capital employed or Investment} = \frac{\text{Profit}}{\text{Average Capital Employed}}$$

Return on capital Employed or Investment for the years under study have been computed and presented in Table 3.16.

Table 3.16

Return on Capital Employed

Year	Capital Employed at the end of the year (Rs. in crore)	Average Capital Employed (Rs. in crore)	Profit Before Interest and Tax (Rs. in crore)*	Return on Capital Employed (%)*
1990-91	NA	-	-	-
1991-92	NA	-	-	-
1992-93	NA	-	-	-
1993-94	178.23	-	-	-
1994-95	201.28	189.76	-	-
1995-96	215.24	208.26	-	-
1996-97	270.56	242.90	-	-
1997-98	290.33	280.46	-	-
1998-99	350.89	320.61	-	-
1999-00	367.46	359.16	-25.66	-7.14
2000-01	408.80	388.13	-26.98	-6.95
2001-02	463.15	435.98	-34.14	-7.83
2002-03	575.36	519.26	-56.96	-10.97
2003-04	629.02	602.19	-69.04	-11.46
2004-05	667.11	648.07	-68.19	-10.52
2005-06	745.12	706.12	-57.79	-8.18
2006-07	731.41	738.27	-52.79	-7.15
2007-08	777.60	754.51	-58.96	-7.81
2008-09	903.03	840.32	-43.89	-5.22
2009-10	1072.10	987.57	-93.32	-9.45

Note: *For non availability of data rate of return on capital employed has been calculated from 1999-00 onwards only.

Source: Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

It is observed from the Table 3.16 that the rate of return is negative in all the years during the last decade under study. It is also noted from the table that even though there has been a continuous increase in the average investment there has been no improvement in huge masses of loss. The negative rate of return has been fluctuating at a range between 5.22 per cent and 11.46 per cent. The rate of return on capital employed of -7.4 per cent in 1994-95 increased to -9.45 per cent in 2009-10.

CAPITAL TURNOVER RATIO

Capital turnover ratio is an activity ratio. This ratio sheds light on the extent of utilization of capital invested to generate revenue which is one of the most important determinants of profit and return on capital employed. This ratio, therefore, helps to establish the relationship between the amount of revenue earned and the amount of capital employed by the Department. By using this ratio, the amount of revenue earned per rupee of capital employed can be computed.

This can be worked out as shown below:

$$\text{Capital Turnover ratio:} \quad = \quad \frac{\text{Total Revenue}}{\text{Average Capital Employed}}$$

Capital turnover ratios of the Department of Power, Nagaland have been computed and are presented in Table 3.17.

From Table 3.17, it is evident that there has been a continuous increase in the amount of total revenue as well as the average investment. Even though there has been an increase in revenue earned, the capital turnover ratio remained at a very low level. In 1994-95 the Department could earn Rs. 0.069 per rupee invested. It rose to Rs. 0.092 per rupee invested in 2009-10, representing an increased of Rs. 0.023 per rupee invested. The highest turnover ratio of 0.144 recorded in 2008-09 and lowest of 0.061 in 2001-02.On an average the Department could earn only Rs. 0.082 per rupee of capital employed during 1994-95 to 2009-10.

Table 3.17

Capital Turnover Ratio

Year	**Total Revenue Receipts from Sales (Rs. in Crore)**	**Average Capital Employed (Rs. in Crore)**	**Capital Turnover Ratio (Times)***
1990-91	6.93	-	-
1991-92	6.87	-	-
1992-93	7.00	-	-
1993-94	12.38	-	-
1994-95	13.18	189.76	0.069
1995-96	17.52	208.26	0.084
1996-97	24.33	242.90	0.100
1997-98	25.07	280.46	0.089
1998-99	24.58	320.61	0.077
1999-00	26.19	359.18	0.073
2000-01	31.41	388.13	0.081
2001-02	26.77	435.98	0.061
2002-03	32.53	519.26	0.063
2003-04	35.25	602.19	0.059
2004-05	47.71	648.07	0.074
2005-06	47.89	706.16	0.068
2006-07	50.69	738.27	0.069
2007-08	80.24	754.51	0.106
2008-09	120.73	840.32	0.144
2009-10	90.57	987.57	0.092
ACGR (%)	**13.69**	**10.86**	**--**

Note: *For non availability of data the capital turnover ratio have been calculated from 1994-95 onwards only.

Source: Assessment of Financial Resources for the Annual Plan. DoP. 1997, 1999, 2003, 2005, 2007, 2008 & 2010.

SECTION III

OVERALL PERFORMANCE ANALYSIS

An attempt has been made in this section of the chapter to analyze the overall performance of the Department of power. Overall performance is the aggregate performance of the various indicators of physical and financial character of the power system. The performance of these indicators can be measured by its growth. The trends in the growth of selected performance indicators, both physical and financial parameters, from 1990-91 to 2009-10 has been summarized and presented in a tabular format in Table 3.18. The following indicators have been taken for the study:

1. Installed Capacity (MW)
2. Gross Generation (MkWh)
3. Power Purchase
4. Sales (MkWh)
5. T&D Losses (MkWh)
6. Number of Consumers
7. Net deficit (Rs. in cr.)
8. Operating Deficit (Rs. in cr.)
9. Total Cost (Rs. in cr.)
10. Total Revenue (Rs. in cr.)
11. Recovery Ratio (%)
12. Operating Ratio (%)

Out of the selected twelve performance indicators mentioned above, the first six indicators are of physical nature and the last six indicators are of financial nature. All these indicators are inter-dependent. The performance of an indicator is influenced by corresponding performance of the other and vice-versa.

It is observed from the summary table (Table 3.18) of the trend s in the growth of physical and financial parameters that the operational efficiency of the Department both in physical as well as financial terms have been poor throughout the study period; particularly the financial performance. The Department has been supplying electrical energy at a very uneconomical rate; consequently there has been huge gap between the cost and revenue. Low installed capacity and meager generation in the state has led to excessive dependence on purchase of power from central sector. It can be seen from the Table 3.18 that the capacity addition in the power system was only 24 MW during the last 2 decades. As a result of this capacity addition to the power system, there was a dramatic increase in power generation in 2002-03 and 2006-07.Though the installed Capacity and gross generation have been increasing at an ACGR of 8.26 per cent and 19.10 per cent respectively, the generation has not been sufficient for the huge demand of the power in the state.

Increase in number of consumers has also led to an increase in power purchase, subsequently, an increase in sales as well. It can also be inferred from Table 3.18 that there is also a positive correlation between sales and total cost. Furthermore, since revenue generation depends directly on the growth of sales, it is observed that the total revenue also increased with an increase in the volume of sales. The number of power consumers, sales and power purchase has been increasing at an ACGR of 2.99 per cent, 6.83 per cent and 6.12 per cent respectively.

It can also be stated that the growth in financial indicators is awfully discouraging even though there has been a slight improvement in the growth of physical parameters. The net deficit has been increasing at an ACGR of 14.28 per cent and the recovery ratio has been growing at an ACGR of -1.57 per cent. This shows a deteriorating financial performance of the department.

Total cost and total revenue has been increasing at an ACGR of 14.01 per cent and 13.69 per cent respectively over the 20 years period under review. The rate of growth of total cost has been higher than the rate of growth of revenue; this difference contributed to huge amassing deficit. T&D losses are also one of the affecting factors of operational efficiency, Table 3.18 shows that there has been no improvement in the T&D losses and it has been increasing at an ACGR of 7.51 per cent. These losses contribute to revenue loss as well as loss of energy in units (kWh).

MULTIPLE LINEAR REGRESSION ANALYSIS

To analyze the quantitative inter-relationship between the performance parameters given in Table 3.19, a multiple linear regression analysis has been used. For this analysis 'net deficit' has been taken as dependent variable and the following selected independent variables are considered for this purpose:

1. Total Cost (Rs. in crore)
2. Total Revenue (Rs. in crore)
3. Operating Ratio (per cent)
4. Gross Generation (MkWh)
5. Power Purchase (MkWh)
6. Sales (MkWh)
7. No. of Consumers
8. T&D Losses (MkWh)

The results of Regression Analysis and ANOVA (Analysis of Variance) have been given in Table 3.19 and Table 3.20 respectively. The result of Regression Analysis shows that the value of multiple R, R Square and Adjusted R Square is statistically significant, making it valid for interpretation. The R Square value of 1 indicates that the dependent variable net deficit is explained fairly well by the above mentioned independent variables. This means that the linear model used for the analysis is a good fit. The Independent variables included in the regression model explained 100 per cent of variation in the dependent variable.

Table 3.19

Result of Regression Analysis

Variance	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	-1.3E-13	6.6E-14	-1.91431	0.08194
Total Cost (Rs. in crore)	1	5.49E-16	1.82E+15	1.7E-163
Total Revenue(Rs. in crore)	-1	5.77E-16	-1.7E+15	3E-163
Operating Ratio (per cent)	1.65E-16	1.93E-16	0.853618	0.41152
Gross Generation (MkWh)	1.11E-16	5.26E-16	0.210812	0.836889
Power Purchase (MkWh)	7.07E-17	5.76E-16	0.122697	0.90456
Sales (MkWh)	6.23E-17	4.91E-16	0.126976	0.901251
No. of Consumers	6.6E-19	3.77E-19	1.751309	0.107689
T&D loses in MkWh	-1.4E-16	4.26E-16	-0.32022	0.754803

Multiple R = 1

R Square = 1

Adjusted R Square = 1

Standard Error = 1.25E-14

Observations = 20 years

The significance of F, which is given as 7.8E-170, is the P-value of F-test carried out in ANOVA. Since, this value is less than 0.05; the overall regression is statistically significant at 5 per cent level of significance. Here, the overall regression is significant which means that the relationship of the dependent variable and the independent variables in this model is not an occurrence of chance.

Table 3.20

ANOVA (Analysis of Variance)

	Degree of freedom	*Sums of Square*	*Multiple Square*	*F-test*	*Significance F*
Regression	8	20754.56	2594.319	1.66E+31	7.8E-170
Residual	11	1.72E-27	1.56E-28		
Total	19	20754.56			

It can also be seen that almost all the explanatory variables except of total revenue and T&D Losses have positive relationship with the net deficit. The regression coefficient of these individual independent variables is however not statistically significant except of total cost and revenue; even though the overall regression is significant.

It is significant to note that the total cost of power has been the largest single factor that has a telling impact on Net Deficit. The regression coefficient also shows that the total cost has positive contribution to net deficit. The regression coefficient of cost is 1; this means that if the cost is increased by 1 then net deficit will also increased by 1 and vice versa.

Significant negative regression coefficient for total revenue establishes its inverse correlation to net deficit. The result of Regression Analysis in Table 3.19 shows that the regression coefficient of total revenue is -1; it can be therefore inferred that if the revenue is increased by 1 there will be corresponding decrease in the net deficit by 1 and vice versa.

COMPARATIVE PERFORMANCE ANALYSIS

In order to make a more meaningful analysis of the performance of the Department of Power, Nagaland; a comparative analysis of the performance of Department of Power Nagaland and Arunachal Pradesh has been carried out in terms of some selected physical and financial parameters, which influence the overall performance of the power system.

Department of Power, Arunachal Pradesh, is a State Government Department, assigned to carry out all the activities of Power Sector. The Department of Power implements various Power Projects sanctioned and sponsored by the State and Central Governments and co-ordinates all the power utilities and stake holders operating in the state and advice the State Government on all matters relating to Power (DoP, Arunachal Pradesh, 2010).

Due to non-availability of data relating to some parameters for both the Departments from 1990-91 to 1994-95, the data for the analysis has been taken from 1995-96 onwards only. Therefore, an attempt has been made to analyze the comparative performance of the Departments for the last 15 years from 1995-96 to 2009-10. For such inter-department comparison, both the Department should have some common characteristics and should be of similar nature of utility. For the Comparative study Department of power, Arunachal Pradesh has been selected because of the following reasons:

1. Geographical factor: both the states are situated in North Eastern Region of India with similar topography and environment
2. Organizational characteristic: both the utilities are the departmental form of organization.

For the purpose of comparing the performance of DoP, Nagaland with the DoP, Arunachal Pradesh, the following physical and financial parameters are used:

1. Installed Capacity
2. Gross Generation

3. Purchase of Power
4. Sales of Power
5. Transmission and distribution Losses
6. Total Cost and Revenue
7. Average Cost and Revenue
8. Operating Deficit
9. Cost Recovery Ratio

INSTALLED CAPACITY

The installed capacity and gross generation of both the states from 1995-96 to 2009-10 is shown in Table 3.21.

Table 3.21

Installed Capacity and Gross Generation

Year	Nagaland		Arunachal Pradesh	
	Installed Capacity (MW)	Gross Generation (MkWh)	Installed Capacity (MW)	Gross Generation (MkWh)
1995-96	5.26	2.46	39.40	75.00
2000-01	5.00	3.21	45.43	13.00
2005-06	29.34	3.53	57.66	257.07
2006-07	29.34	33.58	56.66	272.00
2007-08	28.30	79.58	58.72	238.62
2008-09	28.30	81.16	63.00	583.70
2009-10	28.30	78.81	75.00	553.00
ACGR (%)	**11.87**	**26.00**	**4.38**	**14.25**

Source:
1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

Installed capacity is the basic determinants of power generation. To enable a power system to supply sufficient power requirement, the installed capacity of the power system should be in proportion with the demand of energy. In view of the fact that Arunachal Pradesh has more number of hydro generating sets than Nagaland, accordingly the installed capacity of the power system of Arunachal Pradesh is comparatively higher than the Power system of Nagaland. Currently, the installed capacity of Nagaland and Arunachal Pradesh is 28.30 MW and 75.00 MW respectively.

It is observed from Table 3.21 that the installed capacity increased during 1995-96 to 2009-10, at an ACGR of 11.87 per cent and 4.38 per cent in Nagaland and Arunachal Pradesh respectively. The trends in the growth of installed capacity have been comparatively slower in Arunachal Pradesh, the installed capacity of 39.40 MW in 1995-96 rose to 75.00 MW in 2009-10. However, the growth has been steady and continuous throughout the years from 1995-96 to 2009-10.

While in Nagaland the installed capacity of 5.26 MW in 1995-96, rose to 29.34 MW, marking a higher ACGR of 11.87 per cent. Despite the fact that the growth rate being higher in Nagaland, it is observed that Nagaland could add to its power system an additional capacity of only 24 MW, that is also only one HEP during the study period. Thus, the trends in the growth of installed capacity have been very uneven and irregular

POWER GENERATION

Power generation has not been sufficient for the huge demand of power in the both the states, though it is significant to note that both the states have huge hydro electric power potentials, particularly Arunachal Pradesh. Due to the topographical disadvantage of rugged hilly areas in these regions, it has been difficult to tap much of the hydro electric potentials. As Table 3.21 shows the trendss in the growth of the gross generation in both the states has been increasing throughout the reference period. Nevertheless, the own power generation in both the states has not been sufficient for the energy requirement in the state. Therefore, both the states meet a major part of their electric energy requirement by purchasing it from central power generating companies.

In Arunachal Pradesh gross generation of 75 MkWh in 1995-96 rose to 553.00 MkWh, representing an ACGR of 14.25 per cent. The year 2000-01 shows a very scanty generation of 13 MkWh. This high declined in the growth of power generation is due to many technical failures in the generating stations during 1997-98 to 2000-01. However, it rose remarkably to 257.07 MkWh in 2005-06 and since then there has been a steady increase in power generation in the state. While in Nagaland the gross generation of 2.46 MkWh in 1995-96, rose to 78.81 MkWh in 2009-10, marking an ACGR of 26 per cent.

Comparatively, the power generation in Arunachal Pradesh is way higher than Nagaland; in 2009-10 the gross generation of 78.81 MkWh and 553.00 MkWh was recorded in Nagaland and Arunachal Pradesh respectively. This is due to the fact that the installed capacity of Arunachal power system has been higher than Nagaland.

ENERGY SALES

As Table 3.22 shows the energy sales has been fluctuating in both the states. The energy sales have been higher in Arunachal Pradesh throughout the years. In 2009-10, the energy sale of 325.55 MkWh and 449.55 MkWh was recorded for Nagaland and Arunachal respectively. In Arunachal Pradesh energy sales were 75.00 MkWh in 1995-96. It increased to 449.55 MkWh in 2009-10, representing an annual Growth rate of 12.68 per cent. Whereas in Nagaland the energy sales were 110.09 MkWh in 1995-96, it rose to 325.55 in 2009-10, marking an ACGR of 7.48 per cent.

Table 3.22

Total Sales

(MkWh)

Year	Nagaland	Arunachal Pradesh
1995-96	110.09	75.00
2000-01	165.47	102.00
2005-06	239.80	367.85
2006-07	194.69	368.50
2007-08	283.81	386.69
2008-09	362.97	553.45
2009-10	325.55	449.55
ACGR (%)	**7.48**	**12.68**

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

POWER PURCHASES

The trends in the growth of Power purchase for both the states from 1995-96 to 2009-10 is given in Table 3.23.

Both the states depend heavily for the requirement of power on purchase of power from central sector. As Table 3.23 shows power purchase has increased over the years. In Nagaland the power purchase of 156.14 MKwh in 1995-96 increased to 348.91MkWh in 2005-06 and further to 421.33 MkWh in 2009-10. While in Arunachal Pradesh the power purchase of 57.40 MkWh in 1995-96 rose significantly to 470.00 MkWh in 2005-06, it declined to 306.00 MkWh in 2009-10. At present, the power purchase is 421.33 MkWh and 306.00 MkWh in Nagaland and Arunachal Pradesh respectively.

Table 3.23

Power Purchases

(MkWh)

Year	**Nagaland**	**Arunachal Pradesh**
1995-96	156.14 (98.53)	57.40 (76.5)
2000-01	220.00 (94.40)	90.00 (87.90)
2005-06	348.91 (93.45)	470.00 (64.73)
2006-07	284.24 (86.22)	369.63 (57.70)
2007-08	326.90 (75.93)	448.22 (65.30)
2008-09	423.26 (80.45)	481.00 (45.20)
2009-10	421.33 (82.23)	306.00 (35.65)
ACGR (%)	**6.84**	**11.80**

Note: Figure in bracket indicate percentage of power purchase to total availability of power for sale in the state.

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

The Dop, Nagaland has been purchasing power from outside sources at an average of 92.84 per cent of total energy available for sale, whereas the DoP, Arunachal Pradesh has been purchasing at an average of 76.50 per cent throughout the years under study. In 1995-96, Nagaland purchased 98.53 per cent of total energy available for sale, it declined to 82.23 per cent, recording a decrease of 16.5 per cent.

While, the DoP, Arunachal Pradesh purchased 76.50 per cent of total energy available for sale in 1995-96. It declined to 35.65 per cent in 2009-10, marking a decrease of 53.39 per cent. Comparatively, Nagaland has been depending more on central generating companies for its energy requirement than Arunachal Pradesh.

TRANSMISSION AND DISTRIBUTION LOSSES

The T&D losses of Power system of Nagaland and Arunachal Pradesh from 1995-96 to 2009-10 is given in Table 3.24 and T&D losses as percentage of total energy available for sale has been presented by Exhibit 3.5.

Table 3.24

Transmission and Distribution Losses

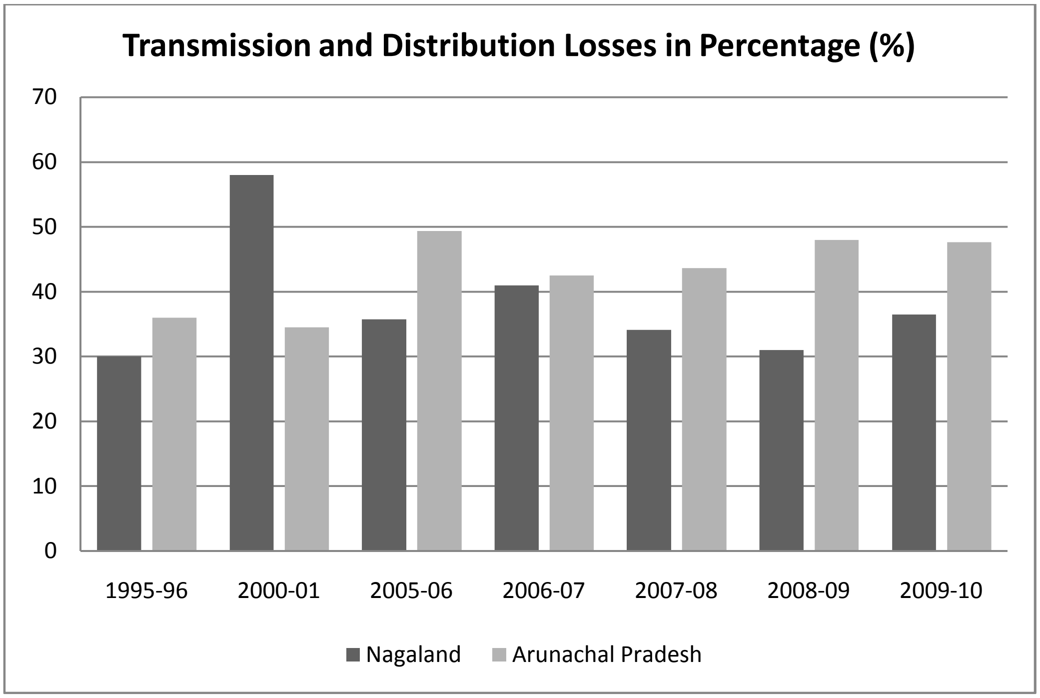
Year	**Nagaland**		**Arunachal Pradesh**	
	T&D Losses (MkWh)	**As % to Total Availability of Power for Sales**	**T&D Losses (MkWh)**	**As % to Total Availability of Power for Sales**
1995-96	47.57	30.02	43.00	36.00
2000-01	67.58	58.00	50.00	34.50
2005-06	133.55	35.77	358.26	49.34
2006-07	134.98	40.94	272.10	42.48
2007-08	146.71	34.08	299.71	43.66
2008-09	163.16	31.01	510.55	47.98
2009-10	186.81	36.46	408.74	47.62
ACGR (%)	**9.55**		**16.20**	

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It is evident from Table 3.24 that there has been a sturdy increase in the trends of T&D losses during the reference period in both the states. The T&D losses have been increasing at an ACGR of 9.55 per cent and 16.20 per cent in Nagaland and Arunachal Pradesh respectively.

Exhibit 3.5



Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

In Nagaland the T&D losses of 47.57 MkWh in 1995-96 rose to 186.81 per cent in 2009-10. While in Arunachal Pradesh the T&D losses of 34.00 MkWh in 1995-96 increased remarkable to 408.74 MkWh in 2009-10.

Furthermore, T&D losses of both the states power system were much higher than the maximum benchmark of 15 per cent (4 per cent as transmission and 11 per cent as distribution losses) determined by the CEA. On an average during the study period the energy loss through transmission and distribution network inefficiency were over 38.04 per cent and 43.08 per cent in Nagaland and Arunachal Pradesh respectively.

EMPLOYEES PER MKWH OF SALES AND THOUSAND CONSUMERS

Table 3.25 gives the employees per MkWh of energy sale and thousand consumers. These ratios show employees productivity and efficiency of the Department in providing services to the consumers.

Table 3.25

Employees per Thousand Consumers and MkWh of Sales

year	Nagaland		Arunachal Pradesh	
	Employees Per MkWh	Employees Per Thousand Consumers	Employees per MkWh	Employees Per Thousand Consumers
1995-96	31.10	34.30	53.30	50.00
2000-01	23.05	27.24	90.86	80.87
2005-06	14.46	26.47	24.15	71.72
2006-07	12.27	22.97	23.88	65.61
2007-08	9.39	22.39	23.14	61.58
2008-09	7.69	21.99	15.81	47.89
2009-10	8.55	23.71	19.13	37.66

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It is evident from Table 3.25 that in both the states the trends in the growth of employees per MkWh as well per thousand consumers have been declining. A Decline in the ratio of employee per MkWh shows an improvement in the productivity of the employees. However, decreasing trends in Employees per thousand employees indicates shortages of manpower to carter the needs of power consumers in the state. In Nagaland the ratio of employees per MkWh and thousand consumers of 31.10 and 34.30 in 1995-96 declined to 8.55 and 23.71 in 2009-10 respectively. The trends has been same in Arunachal Pradesh as well, the ratio of employees per MkWh of 53.30 in 1995-96 has decreased to 19.13 in 2009-10. In respect of employees per thousand consumers, the ratio declined from 50.00 in 1995-96 to 37.66 in 2009-10.

TOTAL COST

Total cost of both the states from 1995-96 to 2005-06 is given in Table 3.26.

Table 3.26

Total Cost

(Rs. in crore)

Year	Nagaland	Arunachal Pradesh
1995-96	39.20	29.83
2000-01	74.72	96.83
2005-06	129.25	183.05
2006-07	119.02	141.69
2007-08	155.85	171.70
2008-09	180.74	195.28
2009-10	202.37	152.60
ACGR (%)	**11.60**	**11.50**

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It can be seen from Table 3.26 that the total cost of both the states has been progressively increasing over the years. The total cost of Nagaland in 1995-96 was Rs. 39.20 crore; it increased to Rs. 202.37 crore in 2009-10, marking an ACGR of 11.60 per cent. In Arunachal Pradesh the total cost of Rs. 29.83 crore in 1995-96 was increased to Rs. 152.60 crore in 2009-10, representing an ACGR of 11.50.

TOTAL REVENUE

The trends in the growth of total revenue from 1995-96 to 2009-10 is given in Table 3.27.

Table 3.27

Total Revenue

(Rs. in crore)

Year	Nagaland	Arunachal Pradesh
1995-96	17.60	11.25
2000-01	31.49	30.60
2005-06	48.57	73.78
2006-07	51.26	80.04
2007-08	80.64	107.12
2008-09	121.13	147.19
2009-10	90.97	146.03
ACGR (%)	**11.57**	**18.64**

Source:
1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It is observed from Table 3.27 that the total revenue collection in both the states has increased steadily from 1995-96 till 2008-09. It has declined in both the states in 2009-10. The total revenue has been increasing at an ACGR of 11.57 per cent and 18.64 per cent in Nagaland and Arunachal Pradesh respectively. In Nagaland the total revenue of Rs. 17.60 crore was increased to Rs. 48.57 crore in 2005-06 and it further increased to Rs. 90.97

crore in 2009-10. A total revenue receipt of Rs. 121.14 Crore was recorded highest in 2008-09 and lowest of Rs. 17.60 was recorded in 1995-96. Whereas in Arunachal Pradesh the total revenue was increased to Rs. 73.78 crore in 2005-06 from Rs. 11.25 crore in 1995-96. It further rose to Rs. 146.03 crore in 2009-10. The total revenue of Rs. 147.19 was recorded highest in 2008-09 and Rs. 11.25 was recorded lowest in 1995-96.

OPERATING DEFICIT/SURPLUS

The operating deficit for both the states from 1995-96 to 2005-06 is presented in Table 3.28.

Table 3.28

Operating Deficit/Surplus

(Rs. in crore)

Year	Nagaland	Arunachal Pradesh
1995-96	-16.87	-10.88
2000-01	-23.56	-42.10
2005-06	-40.06	-109.27
2006-07	-34.68	-61.65
2007-08	-40.58	-64.58
2008-09	-24.48	-31.09
2009-10	-73.49	+10.23

Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It can be seen from Table 3.28 that the operating deficit in Nagaland has been high and fluctuated at a range of Rs. 16.87 crore and Rs. 73.49 crore. The DoP had been incurring deficit in each year during the study period. Whereas, in Arunachal Pradesh operating deficit of Rs. 10.88 core increased significantly to Rs. 109.27 crore in 2005-06. The operating deficit decrease progressively from 2006-07; and it is significant to note that the DoP, Arunachal Pradesh could earn an operating surplus of Rs. 10.23 crore in 2009-10. Thus, from the data presented in Table 3.28, it can be stated that the operational efficiency of the DoP, Nagaland has worsen over the years whereas, the DoP, Arunachal Pradesh has shown a slight improvement over the years.

AVERAGE COST AND TARIFF

Table 3.29 presents the Average cost and tariff of both the states from 1995-96 to 2009-10.

Table 3.29

Average Cost and Tariff

(Paise /kWh)

Year	Nagaland		Arunachal Pradesh	
	Average Tariff	Average Cost	Average Tariff	Average Cost
1995-96	159.14	356.07	150.00	397.70
2000-01	189.82	451.59	300.00	943.30
2005-06	199.71	892.61	210.00	497.62
2006-07	260.36	760.51	225.00	384.50
2007-08	282.72	852.94	270.00	444.02
2008-09	332.62	936.62	265.95	352.84
2009-10	278.21	809.99	324.85	339.45
ACGR (%)	**3.79**	**5.63**	**5.29**	**-1.05**

Source:

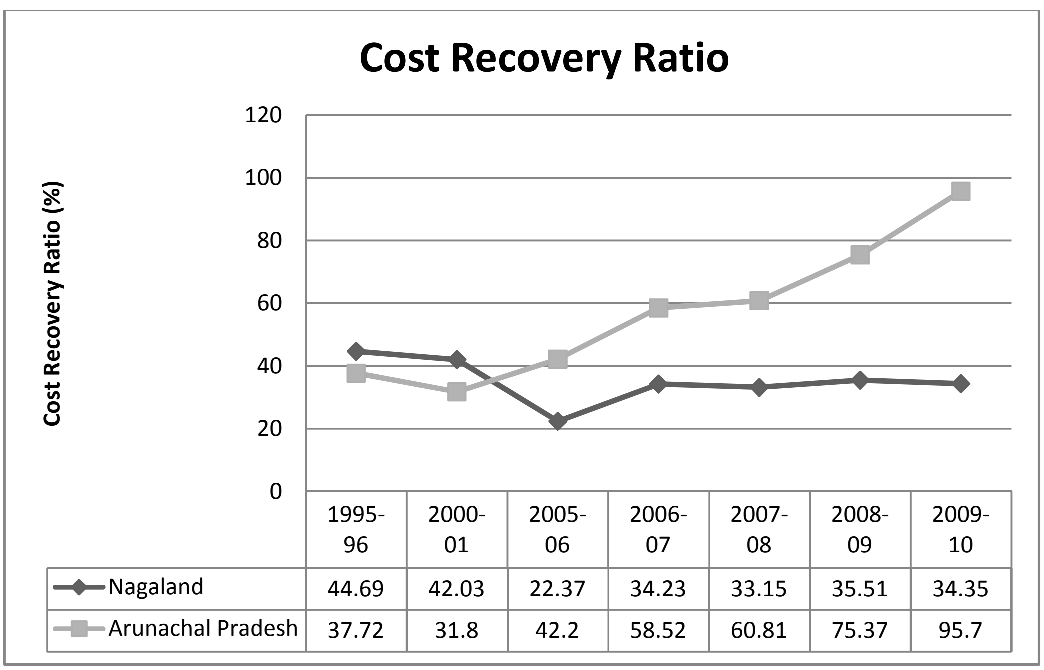
1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

The average cost of 943.30 paise per kWh of Arunachal Pradesh was recorded highest in 2000-01 and lowest of 339.45 paise per kWh was recorded lowest of Arunachal Pradesh in 2009-10. The average cost of Arunachal Pradesh has been declining at an ACGR of 1.05 per cent, whereas the average cost of Nagaland has been increasing at an ACGR of 5.63 per cent. In addition, the growth rate of total revenue of Arunachal Pradesh has also been higher than Nagaland. The total revenue has been increasing at an ACGR of 3.79 per cent and 5.29 per cent respectively. This shows that financial performance of DoP, Arunachal Pradesh has been better than the DoP, Nagaland during the study period.

COST RECOVERY RATIO

The cost recovery ratios of both the states from 1995-96 to 2009-10 have been presented by Exhibit 3.6.

Exhibit 3.6



Source:

1. Annual Report on Working of SEBs & EDs. Planning commission, GOI, 1999, 2000 & 2002.
2. Assessment of Financial Resources for the Annual Plan. DoP. Nagaland and Arunachal Pradesh, various years.

It is evident from Exhibit 3.6 that the trends in the growth of the recovery ratios lines in the graph are in diverse direction. The recovery ratios of Nagaland have been declining steadily and show no improvement in the trends of the growth in the recovery ratio. The recovery ratio was 44.69 per cent in 1995-96; it declined drastically to 22.37 per cent in 2005-06. The recovery ratio was 34.35 per cent in 2009-10. On an average the Department could recovery only 35.19 per cent of cost from its revenue receipts during the reference period of 15 years.

Whereas, the recovery ratios of Arunachal Pradesh has been more impressive; the trends in the growth of the recovery ratios has been increasing progressively during the last decade, i.e., from 2000-01 to 2009-10. The recovery ratio of 37.72 per cent in 1995-96 was increased dramatically to 95.70 per cent in 2009-10, representing an increase of 58 per cent. On an average the Department could recovery 57.45 per cent of power cost from its revenue collection. Comparatively, the Department ability to recovery the power cost from its revenue has been healthier in Arunachal Pradesh during the last 15 years under review. However, both the states fall short to recover the power cost from revenue receipts; total revenue of both the states remained well below the total power cost. This indicates the operational inefficiency of the DoP, Nagaland as well as Arunachal Pradesh.

SECTION IV

CONDITIONALITY OF SUPPLY

The Department of Power is responsible for supply of electric energy to all the categories of consumers in the state. The conditionality of supply of electricity by the Department to its consumers is governed by the ‘General Conditions of Supply, 2007”. A brief review of the terms and conditions of the supply of electricity given in the General Condition of Supply, 2007 has been reviewed in this section.

Subject to the provision of Indian Electrical Act, 2003, the Department shall not be bound to supply energy to the consumers. The Department shall refuse to supply electricity to any intending consumer who has defaulted in payment of dues to the Department irrespective of any other service connection in his name. Any person desiring to have electricity to a premise in respect of which a power supply agreement was terminated due to default in payment of electricity dues irrespective of the earlier service lines and equipment having been dismantled or shall be treated as a fresh consumer and the Department reserves the right to collect the outstanding arrears from such persons before connection is given.

CATEGORIES OF CONSUMERS

The power consumers in the state are categorized as:

1. **Domestic Consumers:** The domestic consumers are the individual households connected with electric supply mainly for lighting purposes.
2. **Commercial:** The following establishments connected with electric supply are categorized as Commercial Consumers:
    a. Hotels and restaurants
    b. Clubs
    c. Banks
    d. Cinema halls
    e. Commercial institutes
    f. Government and private offices
    g. Petrol pumps
    h. Hospital

i. All other commercial places/establishment, shops, chemist, tailors, dye cleaners, meeting halls, drama halls, and water pump which do not come under the purview of Factories Act.

3. **Industries:** The consumer connected with electric supply to such establishments where processing, manufacture of materials, fabrication and finishing process is made, etc. are categorized as industries consumers.
4. **Bulk Supply:** this are the licensees and other consumers who have a minimum demand of 50 KVA and above and also have a single point supply and distribution limited within the premises only.
5. **Public Lightings:** this are the street lights supply for lighting the streets and public places
6. **Agriculture:** Agriculture consumers are those consumers connected with electric supply for irrigation water pumps for agricultural purposes.
7. **Public Water Works:** Electric supply connection for water pumping and water treatment plant which is used for human consumption.
8. **Inter-state Supply:** Supply of electricity to other states (inter-state trading).
9. **One Point Supply:** bulk supply of electricity to L.T having a single consumer
10. **Temporary connection:** This consumer are of temporary nature either metered or unmetered connected with the electric supply for certain purposes such as festival, marriages, building construction, meeting and functions.

CONNECTION OF SERVICE

For the new connections of service and load addition following are the terms and conditions as per the General Condition of Supply, 2007.

1. For load sanction/additional sanction of electrical energy, an application must be made in the prescribed forms, copies of which are obtainable free of cost at any SDO’s (E) Office of the Department.
2. The requisition shall be made by the owner or occupier of the premises for which supply is required and shall give full name and address and also address of the licensed contractor through whom the wiring will be carried out. In case of partnership firm or a company or a Department or a government or public organization, a requisition has to be made by a duly authorized person. An applicant, who is not the owner of the premises for which the electric connection is applied for, shall along with the application submit the consent letter from owner of the premises. The consumer requiring supply of electricity for industrial/commercial purpose shall have to furnish the necessary license or permit from the statutory authority thereof.
3. The consumer must give not less than 2 months notice before the supply and additional supply is required. In case of HT consumer, longer notice which may extend to six months or more may be required to enable the Department to make necessary arrangement for such supply, which will be subject to its availability in the system and sanction load.
4. After obtaining the load sanction from the competent authority and receipt of requisition, an Engineer of the Department will inspect the premises and fix the point or entry of the service line and the position of the service cutouts and meters in consultation with the consumer and/or his licensed Electrical Contractor, prior notice of which will be sent to the consumer.
5. There will be only one service connection to one building, however a building occupied by a number of consumers or tenants, the Department may allow sub-service line at the expenses of the consumer. The energy charges against each sub-service shall be levied as per the tariff notified from time to time.

6. The Department reserves the right to install the meter/metering equipment for measurement of energy supplied to the consumer at the Department's sending end. Department shall provide individual connection to owners of individual flats in the multistoried buildings with separate connections.
7. An intending consumer shall have to pay the cost of service line and equipments including the cost of installation thereof immediately on receipt of the relevant estimate from an authorized office of the Department. The estimate will be valid up to 3 months from the date of issue of the estimate to the consumer unless there is statutory compulsion. Service lines shall be laid by the Department after the receipt of payment for service line charges
8. Depending on the quantum of load, the load sanction for industrial and bulk categories of consumers shall be allotted by the authorized officers of the Department subject to the system availability.

PRESSURE AND SYSTEM OF SUPPLY

The Department's declared pressure of supply is classified as follows:

1. Low pressure supplies 230 volts, altering current, single phase, 50 cycles/sec (Hz)
2. Medium pressure supplies 400 volts, alternating current, three phases, 50 cysle/sec (Hz).
3. High Pressure supplies:
    a. 11,000 volts, alternating current, three phase, 50 cycles/ sec (Hz)
    b. 1,32,000 volts, alternating current, three phase, 50 cycle/sec (Hz).
    c. The supply of electric energy will be alternating current in the area of supply and will be given at the Department's cut-out on the consumer's premises at the following declared pressure.

i. Up to maximum connected load of 5 KVA the supply will be single phase, 2 wires, 230 volts, 50 cycles/sec (Hz) AC.
ii. For connected load of over 5 KVA the supply will be by400 volts, 3 phase, 50 cycle/ sec (Hz) AC
iii. For connected load of above 25 KVA supply shall be made at high voltage or extra high voltage AC 50 cycles/sec (Hz). However, the above limitation will not be applicable for a consumer who desires to supply his own transformer for providing service connection.

4. The load due to consumer's lamps, fans, heater or other appliances must be equally divided to the phases as nearly as possible and an out of balance current shall not exceed 5 %
5. Only 3 pin plugs and sockets of not less than 5 amp capacity and of an approved pattern may be connected to any circuit supplying energy for purposes other than lights and fans. The earth terminals of such 3 pin plug sockets shall be fitted with an efficient earth wire from the body of the apparatus to the earth terminal of the 3 pin plug.

METER READING, BILLING AND PAYMENT OF BILLS

A correct meter is installed, sealed and maintained by the Department at each point of supply on the premises. No supply of electricity is made without meters. Reading of such meters is done by the authorized employees of the Department once in every month or at such periodical interval of time as the Department may determine. And the bill for the consumption of electricity is served to the individual households as per the meters reading. The consumer is charged for the number of units of electricity consumed as shown by the meter in a month. The bill is presented to the consumer every month or at such time periodical interval of time as the Department fixes giving the consumer 15 days of time for the payment of bills. Bill should be paid at the Department's local office or authorized bank within 15 days by cash after the presentation of bill and if paid by local bank cheque and bank draft within 30 days after the presentation of bill.

DISCONNECTION OF SERVICE

The supply of electricity to the consumers shall be disconnected for one or more of the following reasons:

1. For nonpayment of electricity bills
2. For non-production of licenses from the industrial and commercial consumers
3. For violation of Indian Electricity rules and Indian Electricity Act
4. For any malpractices.

The cost of power, tariff and conditionality of supply as well as comparative performance analysis of the performance of DoP of the states like Nagaland and Arunachal Pradesh will focus light on operational efficiency or functioning of DoP of state of Nagaland. The data so presented will facilitate to draw inferences on the working of vital areas of operation of the DoP Government of Nagaland.

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Table 3.18

Summary Table with Selected Performance Indicators

Year	Installed Capacity (MW)	Gross Generation (MkWh)	Power Purchase (MkWh)	Sales (MkWh)	T&D Loses (MkWh)	No. of Consumers	Net Deficit (Rs. in Crore)	Operating Deficit (Rs. in Crore)	Total Cost (Rs. in Crore)	Total Revenue (Rs. in Crore)	Recovery Ratio (%)	Operating Ratio (%)
1990-91	6.00	2.39	128.52	86.86	43.92	102654	7.72	-3.98	14.71	6.99	47.11	157.43
1991-92	6.00	2.00	116.31	78.13	40.06	102654	8.83	-4.28	15.76	6.93	43.59	162.30
1992-93	5.50	3.80	128.25	89.06	42.73	105264	9.48	-5.50	16.54	7.06	42.32	178.57
1993-94	4.50	1.59	136.40	94.37	43.49	97905	11.10	-7.66	23.54	12.44	52.59	161.87
1994-95	5.26	2.43	141.61	99.65	44.29	99654	14.18	-10.63	27.42	13.24	48.07	180.65
1995-96	5.26	2.46	156.14	110.09	47.57	111833	21.60	-16.87	39.2	17.60	44.69	196.29
1996-97	5.50	2.22	178.95	127.36	53.68	115477	20.46	-15.99	44.87	24.41	54.22	165.72
1997-98	5.50	2.27	184.93	131.89	55.18	117035	20.6	-16.28	45.75	25.15	54.80	164.94
1998-99	5.50	2.42	179.81	129.29	52.8	129525	26.2	-21.23	50.84	24.64	48.35	186.37
1999-00	5.00	2.80	190.61	138.20	55.08	120606	40.97	-36.85	67.24	26.27	38.95	240.70
2000-01	5.00	3.21	220.00	165.47	67.58	120606	43.23	-23.56	74.72	31.49	42.03	175.01
2001-02	29.20	8.06	210.00	104.10	143.76	137500	52.74	-31.05	79.59	26.85	33.64	215.99
2002-03	29.80	23.65	250.00	126.52	154.63	140000	79.72	-29.95	112.33	32.61	28.96	192.07
2003-04	29.80	3.50	268.75	135.56	148.87	149634	87.51	-41.99	124.14	36.63	30.75	219.12
2004-05	29.34	3.50	337.78	235.96	135.43	149634	92.2	-38.23	140.17	47.97	20.07	180.13
2005-06	29.34	3.53	348.91	239.80	133.55	152085	80.68	-40.06	129.25	48.57	22.37	183.65
2006-07	29.34	33.58	284.24	194.69	134.98	176059	67.76	-34.68	119.02	51.26	34.23	168.42
2007-08	28.30	79.58	326.90	283.81	146.71	180597	75.21	-40.58	155.85	80.64	33.15	150.57
2008-09	29.34	81.16	423.26	362.97	163.16	183881	59.61	-24.48	180.74	121.13	35.51	120.28
2009-10	29.34	78.81	421.33	325.55	186.81	185049	111.4	-73.49	202.37	90.97	34.35	181.14
ACGR (%)	**8.26**	**19.10**	**6.12**	**6.83**	**7.51**	**2.99**	**14.28**	**12.16**	**14.01**	**13.69**	**-1.57**	**0.70**

Source: Compiled from Table 3.1, 3.2, 3.6, 3.7, 3.9, 3.12, 3.13, and 3.14.

CHAPTER IV

IMPLEMENTATION OF RURAL ELECTRIFICATION SCHEME - AN EVALUATIVE STUDY

Among the basic infrastructural services geared to developmental needs, electricity is a critical input. The use of electricity serves the economic as well as social needs. The economic and social benefit that electricity brings is manifold. In terms of economic benefits, electricity can be used for irrigation pumps, processing agricultural outputs, storing perishable agricultural goods, and so on. It also makes it possible for rural entrepreneurs to start small business. As for the social benefits, electricity allows kids to study at night; it contributes to health as switching from biomass fuels to electricity produces cleaner indoor air (Barnes et al., 1997); it gives rural populations opportunities to access to telecommunications and mass medias (Andreas, 2006). Thus the provision of electricity has positive impacts on the lives of rural populations where poverty remains widespread.

Despite its importance, access to electricity is limited in many developing countries. Access to electricity is especially limited in rural areas, where majority of the population resides. Roughly 22 per cent of the world's population still does not have access to electricity. In 2008, this represented 1.5 billion people, most of whom lived in remote areas often difficult to access and therefore to connect to national or regional grids. The International Energy Agency estimates that roughly 85 per cent of the people without electricity live in rural areas in developing countries, mostly in semi-urban or remote rural areas (IEA, 2009).

In India, rural electrification has been regarded as a vital programme for the development of rural areas in India. It has been an important policy agenda for the centre as well as the state Government. The basic aim of the Rural Electrification policy of the Government of India has been to ensure rapid economic development by providing access of electricity to all the villages and households in order to improve the quality of life in the rural areas by supplying electricity for lighting up of rural homes and hearths, shops, community centers, public places etc., in all villages and also to facilitate the development of productive loads. In early periods, government focus was placed mainly on the electrification of irrigation pumps for raising agricultural productivity (Bhattacharyya, 2006). This was so when the green revolution took off in the late 1960s. However, there has been a change in the direction toward more social purposes as rural electrification has started to assume social roles.

In 1947, only 1500 villages were electrified in India and the per capita consumption was only 14 units. By the end of March 2010, close to 500 thousand villages in India, around 84 per cent of the total, have been electrified (Ministry of Power, 2010). In particular, the number of electrified villages has increased rapidly in recent years due in part to government efforts under the accelerated rural electrification programme and initiatives for “Inclusive Growth”, which aims at both rapid Growth and social justice (Oda and Tsujita, 2011).

For the electrification of rural areas of the country, the Government of India from time-to-time launched many rural electrification schemes such as Rural Electrification under Minimum Needs Programme (MNP), Pradhan Mantri Gramodaya Yojana (PMGY: Prime Minister’s Rural Electrification Programme), Kutir Jyoti Yojana (KJY: Bright Home Programme), Accelerated Rural Electrification Programme (AREP) and Accelerated Electrification of One lakh villages and One crore households.

The Government of India in 2005 launched the new comprehensive Rural Electrification scheme called the "*Rajiv Gandhi Grameen Vidyutikaran Yojana*" (RGGVY: Rajiv Gandhi Rural Electrification Programme). This scheme has taken over the hitherto existing schemes such as the *Kutir Jyoti Yojana* and also adopted some salient features of the earlier electrification programmes and initiatives of the Government such as, the Minimum Needs Programme, the *Pradhan Mantri Gramodaya Yojana*, the Accelerated Rural Electrification Programme and the Accelerated Electrification of 100,000 Villages and One Crore households.

The new Rural Electrification Scheme, RGGVY has been implemented across India since its introduction. An attempt has been, therefore, made in this chapter to evaluate the implementation of the new rural electrification Scheme: RGGVY.

RURAL ELECTRIFICATION SCHEMES INTRODUCED IN INDIA SINCE INDEPENDENCE

PRADHAN MANTRI GRAMODAYA YOJANA (PMGY)

The PMGY launched in 2000-2001 provided additional financial assistance for minimum services by the central government to all states on a 90 per cent loan and 10 per cent grant basis. These included rural health, education, drinking water and rural electrification. The PMGY, with an outlay of about Rs 1600 Crores during the Tenth Five Year Plan period, was being coordinated and monitored by the Rural Development Division of the Planning Commission. More importantly, under PMGY states had the flexibility to decide on the inter-reallocation of funds amongst the 6 basic services. Thus states could enhance allocations to expedite the pace of rural electrification. The scheme has been discontinued from 2005 onwards.

KUTIR JYOTI PROGRAM (KJP)

KJP was initiated in 1988-89 to provide single point light connection (60 W) to all Below Poverty Line (BPL) households in the country. KJP provides 100 per cent grant for one time cost of internal wiring and service connection charges and builds in a proviso for 100 per cent metering for release of grants. Nearly 5.1 million households have been covered under the scheme as on 2004.

The scheme was merged into the 'Accelerated Electrification of One Lakh Villages and One Crore Households' in May 2004 and now into the RGGVY.

MINIMUM NEEDS PROGRAM (MNP)

The MNP, exclusively targeted states with less than 65 per cent rural electrification (by the old definition) provides 100 per cent loans for last mile connectivity. The program resources are drawn from the Central Plan Assistance. Rs. 775 crore was released during 2001-03 for rural electrification under the MNP. The scheme was discontinued in 2004-05 on account of difficulties in implementation.

ACCELERATED RURAL ELECTRIFICATION PROGRAM (AREP)

The AREP, operational since 2002, provides an interest subsidy of 4 per cent to states for RE programs. The AREP covers electrification of un-electrified villages and household electrification and has an approved outlay of Rs. 560 crore under the Tenth Five Year Plan. The interest subsidy is available to state governments and electricity utilities on loans availed from approved financial institutions like the REC (Rural Electrification Corporation), PFC

(Power Finance Corporation) and from NABARD under the Rural Infrastructure Development Fund (RIDF).

RURAL ELECTRICITY SUPPLY TECHNOLOGY MISSION (REST)

The REST was initiated on 11th September 2002. The mission's objective is the electrification of all villages and households progressively by year 2012 through local renewable energy sources and decentralized technologies, along with the conventional grid connection.

REST proposes an integrated approach for rural electrification and aims:

- To identify and adopt technological solutions
- To review the current legal and institutional framework and make changes when necessary
- To promote, fund, finance and facilitate alternative approaches in rural electrification, and
- To coordinate with various ministries, apex institutions and research organizations to facilitate meeting national objectives

Accelerated Electrification of One Lakh Villages and One Crore Households, MNP and Kutir Jyoti have now been merged with the RGGVY, discussed in detail ahead.

RAJIV GANDHI GRAMEEN VIDYUTIKARAN YOJANA (RGGVY)

To speed up rural electrification the Ministry of Power, Government of India, in 2005 launched the new rural electrification scheme: Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) for attainment of the National Common Minimum Programme (NCMP) goal of providing access of electricity to all households in five years. The RGGVY is a major programme of grid extension and reinforcement of the rural electricity infrastructure. The

Ministry of Power subsequently, merged with the RGGVY scheme all other Rural Electrification Programmes of the Ministry i.e. Rural Electrification under Minimum Needs Programme (MNP), Kutir Jyoti Scheme, and Accelerated Electrification of one lakh villages and one crore households.

The Rural Electrification Corporation Limited (REC), which was incorporated as a Company under the Companies Act, 1956 in the year 1969 with the main objective of financing rural electrification schemes in the country, and which was subsequently made a Non-Banking Financial Company (NBFC) under Section 45 IA of the RBI Act, 1934, has been made the nodal agency for the Rajiv Gandhi Grameen Vidyutikaran Yojana.

Targets of RGGVY

By 2009-10 the RGGVY aimed to electrify the 1,25,000 villages still without electricity; to connect all the estimated 23.4 million un-electrified households below the poverty line with a 90 per cent subsidy on connecting costs granted by the Ministry of Power; and finally, to augment the backbone network in all 4,62,000 electrified villages. The 54.6 million households above the poverty line which are currently un-electrified are expected to obtain electricity connection on their own without any subsidy (Planning Commission, 2005). The RGVVY policy therefore aims at:

1. 100 per cent electrification of all villages in the country by 2009 and 100 per cent household electrification by 2012.
2. Free of cost electricity connection to BPL (Below Poverty Line) households. (Ministry of Power, 2008)

For achieving the said objectives, the RGGVY envisions creating a:

1. Rural Electricity Distribution Backbone (REDB) with at least one 33/11 KV (or 66/11 KV) substation in each block

2. Village Electrification Infrastructure (VEI) with at least one distribution transformer in each village/habitation
3. Decentralized Distributed Generation (DDG) systems where the grid is not cost-effective or feasible

However, the electrification programme as envisaged under RGGVY was too slow during the Tenth Five Year plan period. In January 2008, the RGGVY was further extended into the Eleventh Five Year plan period (2007-2012) with the following new conditions for its better implementation:

1. States are to ensure a minimum of 6 to 8 hours of power supply;
2. States are to ensure quality and reliable power supply at reasonable rates;
3. The deployment of franchisees is mandatory for the management of rural distribution;
4. Introduction of the three-tier Quality Monitoring Mechanism to ensure quality of materials and implementation; and
5. States are to notify their rural electrification plans to the Rural Electrification Corporation (REC) within six months.

Franchising and Model of Franchisee under RGGVY

Development of franchisee system for rural distribution is stated to be one of the salient features of the RGGVY. In Nagaland franchisees (VEMBs) were in operation before the introduction of RGGVY scheme.

Under the RGGVY, the management of rural distribution would be through the franchisees who could be Non-Government Organizations (NGOs), Users Associations, Panchayat Institutions, Cooperatives or individual entrepreneurs. Deployment of franchisees by the time villages are electrified under the scheme is stated to be the desired objective. The utility has to ensure this to make it viable proposition by ensuring supply of powers for reasonable number of hours. Franchisees are required to be given proper support by the local administration in detection and prevention of theft of electricity.

Initially a set of six alternative examples or forms were suggested by the Power Ministry based on the arrangements already being followed in various parts of the country. These are (MOP, 2005):

a) The Orissa model based on village contact person approach;
b) The Sunderbans model based on co-operatives for off-grid solutions;
c) The Assam model based on users' association for single point supply;
d) The Karnataka model relying on Gram Vidyut Pratinidhi (Village Electricity Representative);
e) West Bengal model based on NGOs and social organizations;
f) The Nagaland model employing village electricity management boards and
g) The Gujarat model of Jyoti gram (Enlightened Village)

Village Contact Persons (Orissa Model) – This has been pilot tested by two private licensees in Orissa. The idea here is to engage villagers as partners in the programme. A village committee is set up that acts as a Customer Care Centre in the village. It appoints a village contact person who distributes the bills and reads the meters. The Committee is also consulted on issues related to new connections approval, disconnection, regularization of consumers, etc. WESCO and NESCO in Orissa, two private licensees, have employed this approach with the assistance of Xavier Institute of Management, Bhubaneswar. This approach is now covering 4900 villages in the state (Gokak report, MOP, 2003).

Sunderbans Model: The organizational arrangement used in providing de-centralized local grid based electricity in the Sunderbans is referred to as the

Sunderbans model. The remote villages and hamlets of the delta are provided with electricity from local resources through a mini grid. The consumers formed a co-operative and members manage the revenue collection and billing activities (Gokak report, MOP, 2003).

Assam Model: Here the utility initiated a single point supply scheme first in 22 villages, which was then extended to more than 800 villages now. The scheme uses a number of different forms of organizations including individuals, user associations and local bodies. The agent or franchisee is allowed a commission of 15 per cent and a distribution loss of 10 per cent is allowed (MOP, 2007).

Village Electricity Representative (Gram Vidyut Pratinidhi) **–** This is used by five distribution licensees in Karnataka. An unemployed youth from the Panchayat is engaged as the agent for billing and revenue collection. A fee linked to the collection performance is paid as remuneration. At present around 3400 representatives are working in the state covering more than 17000 villages (MOP, 2007).

Non Governmental Organizations (NGOs): NGOs and self-help groups are also involved in rural electrification efforts. Organisations like the Ramakrishna Mission have participated in decentralised systems to various parts of the country. Women's groups and others active in poverty alleviation are also participating in a number of states including West Bengal and Uttaranchal.

Village Electricity Management Board: This is the approach used in Nagaland where a village council is used to set up a Village Electricity Management Board. The Board receives electricity on a single point metering basis and pays the utility for the electricity purchased at a rate fixed by the state. It then resells electricity to consumers and collects revenues from them retaining a margin of 20 per cent. The Board has the incentive of reducing unaccounted for losses to increase its earnings and this has resulted in commercial loss reduction and theft of electricity.

Local bodies: The Constitutional Amendment of 1992 allows the state governments to enact legislations endowing local bodies with the required power and authorities to actively participate in economic development programmes and social justice. Although local bodies could be empowered for rural electrification, distribution of electricity and non-conventional energy generation activities, states have not enacted required legislation and accordingly, rarely the district and village level bodies have played any significant role in electrification.

Co-operatives: Rural electricity supply co-operatives (RESCO) are not very common in India, although a few co-operatives existed in Surat and other places (Panda and Mishra 2004). In 1969, India with the technical support of NRECA of USA initiated an experiment for co-operative rural electricity supply. Five co-operative societies were established on a pilot basis. A recent report indicates that 37 RESCOs existed in the country in 1998 (Coelho Committee, 1998) but some of them were merged with the SEBs in 2003 due to poor financial performance (CEA, 2004). While Mathur Committee on Rural Electric Cooperatives (as cited in the Gokak Committee report) found that the performance of the co-operatives was encouraging in terms of load growth, manageable T&D losses, they faced genuine problems related to staff and tariffs.

Gokak Committee Report (MOP, 2003) on the other hand, suggested the following model of franchisee for rural electrification:

Revenue Collection Franchisees (Model 1): These agents read meters, distribute bills, collect revenue and provide any feed-back to the utility on grievances, disputes, etc. Two alternatives are suggested here:

Remuneration linked to collection targets: They receive a certain margin on the collection made and can be offered some incentives/penalties for achieving effective collection. REC does not recommend this model because of limited participation of the agent, particularly in loss reduction activities.

Remuneration linked to input energy: The revenue collection target here is set based on the energy supplied to the franchisee. It is believed that the agents would be partners in the loss reduction process. However, the difference between the two models appears to be minimal.

Electricity Retailing Franchisee (Model 2) - These franchisees actually take over the retail supply function from the utility in their franchised area and would be responsible for buying electricity from the utility and selling to the consumers. All billing and collection activities become their responsibility. Their remuneration comes from the profit they make.

Electricity Distribution and Retailing Franchisee (Model 3): Here the franchisee is responsible for maintaining the distribution network and for providing the supply in the franchised area. It undertakes all the relevant activities of billing, revenue collection, paying utility bills and maintaining the network. Its remuneration comes from the profits made from the sale of electricity.

Rural Electricity Co-operatives (Model 4): These are membership based entities where members are the owners. The co-operatives would carry out all the related activities in the franchised area.

CONCEPTUALIZATION OF RURAL ELECTRIFICATION

Until 1997, a village was considered electrified if ‘electricity was being used within its revenue area for any purpose whatsoever’. In 1997 a new definition was adopted whereby “A village will be deemed to be electrified if electricity is used in the inhabited locality within the revenue boundary of the village for any purpose whatsoever”. Under this definition, in March 2004 a total of 74 per cent of inhabited villages were considered electrified, whereas only 44 per cent of the 138 million rural households (60.2 million) used electricity as a source of lighting (Ministry of Power, 2010). According to this definition, if only one light bulb was kept lit for a nightly hour in the centre of a village or one irrigation pump was powered, the whole village was considered electrified. Realizing this inadequacy and the statistical bias that came with it, the government of India changed its definition for rural electrification in March 2004.

The above two definitions were generally used in Government records and documents but did not have any legal contours to it. The term “Rural Electrification” is mentioned in the Indian Electricity Act of 2003; and it is the first to mention the term in a legislative, which means that no other act which had governed the sector up till 2003 had ever mentioned Rural Electrification. Section 6 of the Electricity Act of 2003 for the first time mandates what is now commonly known as a “Universal Service Obligation” by stating that the Government shall endeavor to supply electricity to all areas including villages and hamlets. Section 5 further mandates the formulation of a “national policy for rural electrification” focusing primarily on management of local distribution networks through local institutions. Section 4 of the Act gives a further boost to stand-alone generation and exempts rural distribution networks from licensing requirements, thereby opening the doors for private investment and promotion of people-centered and managed electricity distribution and generation systems in rural areas.

The “National Rural Electrification Policy” (NREP) which was formulated thereafter also makes more than a mention of this. With the formulation of the new policy, there was a change in the definition of an “Electrified Village” and this new definition which was introduced on February

17 2004, came into immediate effect. It states, that “a village would be declared as electrified, if:

1. Basic infrastructure such as, Distribution Transformer and Distribution lines are provided in the inhabited locality as well as the *Dalit basti* hamlet where it exists.
2. Electricity is provided to public places like Schools, Panchayat Office, Health Centers, Dispensaries, Community centers etc.
3. The number of households electrified should be at least 10 per cent of the total number of households in the village.

As a consequence of this new definition for electrification, many villages that were previously considered electrified cut down by the definition into the un-electrified category.

This definition, though an improvement of earlier known practice of terming a village electrified even if one common village area had an electric pole and a light, it still falls far short of what section 6 of the Electricity act of 2003 mandates, according to which a village can be termed electrified only if there is electricity supply to all hamlets as well. In addition to the 10 per cent household electricity connection criteria, neither the NREP nor the Electricity Act of 2003 have any other criteria such as minimum hours of electricity supply in a day, nor on a minimum number of days of supply in a year.

It also does not define what the minimum quantum of supply would be, whether it would be sufficient for just lighting purposes or be enough to run irrigation pump sets or any heavy duty machinery such as flour mills or enough to even run a dozen or so electric sewing machines under one roof. In most villages, the supply in electrical jargon is “single phase” which is just about enough to power 4-5 lights and 1-2 fans in each of the households and nothing more. Therefore, it can be noted that the current definition of rural electrification does not take into account of quality of electrification.

So in other words, “rural electrification” primarily refers to providing lighting needs, while everything else has to depend on “other sources of energy” such as Kerosene, wood chips and dung cakes for cooking, additional lighting & heating needs and diesel for irrigation pump sets.

GROWTH AND STATUS OF RURAL ELECTRIFICATION

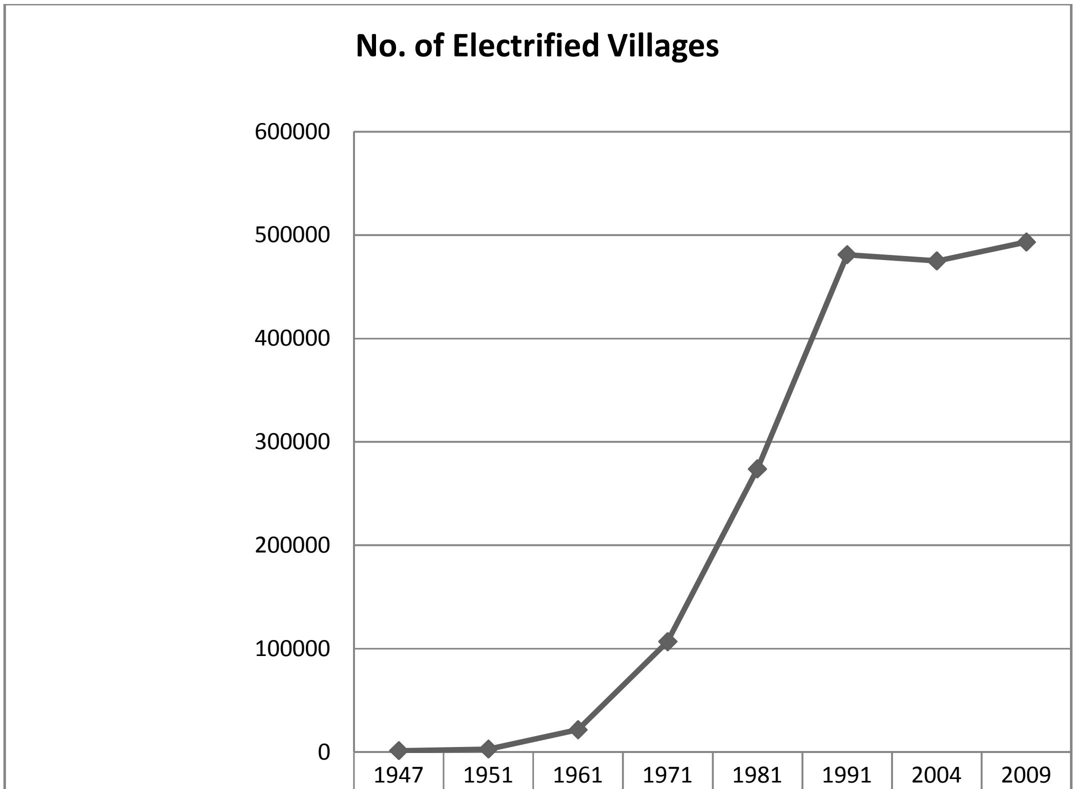
At the time of Indian independence, there were a total of 1500 villages which had electricity. From that position, India has traveled a fairly long distance and achieved electrification of over 493,000 villages by the end of July 2009 (RGGYV Brochure). However, India is yet to achieve 100 per cent electrification; village electrification as well as household electrification. Exhibit 4.1 traces village electrification over the years starting from India’s independence in 1947 till 2009.

The rural electrification programme in India literally took off only in the mid 1950s. With the First Five-year Plan (1951-56), the Indian government recognized the importance of rural electrification for the expansion of agricultural equipments and raising the living standard of the rural population, however it was slow to get started on the problem. Under the Fifth Five-year Plan (1975-79), the Government stepped up electrification with the start of its MNP and later other programmes such as KJY was introduced in the later part of 1980s.

As Exhibit 4.1 shows, a rather steep growth was witnessed in village electrification in the late 1960s, 70s and 80s up till 1990. The three decades between 1960 and 1990 saw close to 450,000 villages being electrified. This puts the average number of villages electrified during that period at 15,000 per annum. It can be stated that the introduction and implementation of various rural electrification schemes during this period has paid off well.

Exhibit 4.1

Village Electrification over the years starting from India's Independence in 1947 till 2009



	1947	1951	1961	1971	1981	1991	2004	2009
No. of electrified villages	1500	3061	21750	106931	273906	481124	474982	493240

Source: RGGVY Brochure

However, the period from 1991 to 2009 saw a huge slump in the speed of rural electrification, with just about 12,116 villages being electrified from a total of 481,124 electrified up till 1990 to 493,240 villages electrified up till December 2009. The average number of villages electrified in this period (1991-2009) was 637 per annum.

In the mid 1990s and early 2000, India saw a wide range of reforms in the electricity sector, starting from unbundling of the various operations in the sector such as, generation, transmission and distribution amongst separate companies, privatizing some of the operations, introducing a regulatory framework both at the central level as well as the state level and in the formulation and promulgation of a new electricity act to replace all the then existing laws governing the electricity sector. The reforms period had its share of teething problems with new organizations initially groping in the dark vis-à-vis their roles and responsibilities given the new framework and therefore, a number of existing projects were put on hold by default, which included the rural electrification sector, thus leading to a slowdown in rural electrification.

Further, the progress of village electrification has not been uniform across India. As on July 2009, only 7 states had achieved 100 per cent village electrification, with five of them being smaller states and two of them being formerly Union Territories. Table 4.1 gives an indication of the number of un-electrified villages in each of the Indian states.

The only two large states which can boast of 100 per cent village electrification are Andhra Pradesh and Tamil Nadu, both of them from the Southern part of India. Some of the larger states such as Bihar, Jharkhand, Uttar Pradesh, Rajasthan, and Orissa are woefully behind in village electrification with the number of un-electrified villages ranging from 10,000 to as much as 25,000.

A total of 11 states of India had un-electrified villages of more than 10 per cent with four states being in the dismal category of having more than 40 per cent un-electrified villages with Jharkhand and Orissa on top of the list at 69 per cent and 44 per cent un-electrified villages, respectively. Jharkhand is a classic example of a state which has shown complete apathy to its village population with just 9000 villages out of a total of 29,000 villages being electrified so far.

Table 4.1

Status of Village Electrification across Indian states as on 30th June, 2009

States	Total Number of Villages (2001 Census)	Electrified Villages	% age of Electrified Villages	Un-electrified Villages	% age of Unelectrified Villages
Andhra Pradesh	26613	26613	100.0	0	0.0
Arunachal Pradesh	3863	2195	56.8	1668	43.2
Assam	25124	19741	78.6	5383	21.4
Bihar	39015	23914	61.3	15101	38.7
Chhattisgarh	19744	18877	95.6	867	4.4
Delhi	158	158	100.0	0	0.0
Goa	347	347	100.0	0	0.0
Gujarat	18066	18015	99.7	51	0.3
Haryana	6764	6764	100.0	0	0.0
Himachal Pradesh	17495	17183	98.2	312	1.8
Jharkhand	29354	9119	31.1	20235	68.9
Jammu & Kashmir	6417	6304	98.2	113	1.8
Karnataka	27481	27458	99.9	23	0.1
Kerala	1364	1364	100.0	0	0.0
Madhya Pradesh	52117	50226	96.4	1891	3.6
Maharashtra	41095	36296	88.3	4799	11.7
Manipur	2315	1984	85.7	331	14.3
Meghalaya	5782	3428	59.3	2354	40.7
Mizoram	707	570	80.6	137	19.4
Nagaland	1278	1173	91.78	105	8.22
Orissa	47529	26535	55.8	20994	44.2
Punjab	12278	12278	100.0	0	0.0
Rajasthan	39753	27506	69.2	12247	30.8
Sikkim	450	425	94.4	25	5.6
Tamil Nadu	15400	15400	100.0	0	0.0
Tripura	858	491	57.2	367	42.8
Uttar Pradesh	97942	86450	88.3	11492	11.7
Uttaranchal	15761	15213	96.5	548	3.5
West Bengal	37945	36934	97.3	1011	2.7

Source: 1. Ministry of Power, Rural Electrification
2. Deaprtmental Data, DoP, Nagaland.

RURAL ELECTRIFICATION IN NAGALAND

Progress in rural electrification (as per 1997 definition of village electrification) in the state has been presented in Table 4.2.

Table 4.2

Progress in Rural Electrification

Year	No. of Village Electrified	Annual Electrification
1990-91	845	0
1991-92	845	0
1992-93	845	0
1993-94	990	145
1994-95	1000	10
1995-96	1009	9
1996-97	1009	0
1997-98	1009	0
1998-99	1153	144
1999-00	1163	10
2000-01	1196	33
2001-02	1212	16
2002-03	1212	0
2003-04	1212	0
2004-05	1212	0
2005-06	1212	0
2006-07	1212	0
2007-08	1216	4
2008-09	1216	0
2009-10	1230	14
ACGR (%)	**1.89**	**-**

Note: The number of villages electrified given in table is as per the 1997 definition of rural electrification; since the department used the old definition for rural electrification till 2009-10. Thus the number of villages electrified includes even the de-electrified villages.

Source: Departmental data, DoP, Nagaland.

The main activities of the Department are centered at providing electricity to all people across the state. In this connection, the State Government have over the years given importance to rural development through electrification. The department has achieved electrification of 100 per cent villages as per 1991 census. However, as per 2011 census there are still some un-electrified villages in the state. Some of these un-electrified villages also include villages which were electrified but de-electrified due to various reasons. Infrastructure for power supply has been set up even in the remotest parts of the state-Molen and Reguri in Phek district. The department is concentrating all its efforts to electrify all those villages uncovered as per 2001 census.

The DoP, had implemented various rural electrification schemes launched from time to time by the Ministry of Power (MoP), Government of India. The department is also undertaking the current scheme for system improvement and augmentation and extensions of the existing system towards providing power to every household, in accordance with the declared policy of the Government of India of POWER TO ALL BY 2012. (DOP, Nagaland).

Currently the department implemented the RGGVY scheme of rural electrification in the state. Many un-/de-villages were electrified under the scheme and various electrification works under the scheme are under progress.

Although the 2004 definition of village electrification has come into effect, the official figures of DoP, Nagaland still use the old definition. As per 2001 census the number of inhabited villages in the state is 1278, out of these inhabited villages in 2009-10 number of villages electrified stands at 1230 (this include the number of villages de-electrified). The number of villages electrified in the state from 845 in 1990-91, rose to 1230 in 2009-10, representing an ACGR of 1.89 per cent.

EVALUATION OF IMPLEMENTATION OF RGGVY IN NAGALAND

RGGVY scheme has been implemented in all the districts of Nagaland. Separate Detail Project Reports (DPRs) were prepared by the DoP for each district in the state and were send to the MoP for the sanction. The scheme was implemented district-wise. The implementation process of RGGVY in Nagaland and the targets and progress made so far under the scheme has been discussed below under various headings.

SELECTION PROCESS OF VILLAGE AND BENEFICIARY

Firstly, rural as well as urban BPL households in all the 11 districts in the state were identified and selected under the scheme. Secondly, three categories of villages: *un-electrified, de-electrified and electrified* in the state were identified, proposed and subsequently covered to receive facilities under RGGVY scheme. These categories have been explained below:

1. **Electrified Villages:** Electrified villages are those where electricity existed however this facility is to be extended to *hamlets/padas*. All these electrified villages that need electrification again (as per new capacity) have been covered under RGGVY with up to 25 Kilo Volt Amperes (KVA) transformer set up in each village.

   Population explosion is the major cause for which electrified villages need electrification again. In some of the Census villages transformers are working at full capacity (i.e. there are more numbers of consumers as compared to the capacity of the transformer installed). This is the result of increase in the number of consumers and creation of new hamlets.

2. **Un-Electrified Villages:** These villages have never been electrified under any other rural electrification schemes. Modernization and globalization necessitates these villages to be covered under the RGGVY scheme to keep pace with the rest of the state and country.

3. **De Electrified:** There are some electrified villages which are now de-electrified. Prior to the scheme, there was electricity connection but now there is no electricity in these villages. The reasons for de-electrification are non availability of electric wire, non availability of electric pole and defunct transformer. And some villages were de-electrified for non-payment of electricity bills continuously for several years.

The DoP, Nagaland collected information about the villages and hamlets to be electrified. After receiving the village list for eligible beneficiaries from different sources, a feasibility survey was conducted by the electricity department after collecting detailed information regarding the infrastructure requirement (transformer, electric pole, wire etc) for the surveyed villages. At the time of survey, BPL households were given priority. However APL households were also eligible to receive electric connection, but they would have to pay for it.

BPL list notified by the Government of Nagaland was used to connect electricity at eligible beneficiary household. In providing free connection to the BPL households the village council of the respective villages assisted in identifying BPL household mentioned in the list. This assisted the efforts of the person in charge of providing connection. As per RGGVY scheme, after households receive electricity connection, the Gram Panchayat needs to certify that the village is electrified. The GP also needs to certify the percentage of beneficiary coverage through the scheme. In Nagaland, the Village Council/Village Electricity Management Boards in every village takes the responsibility of reporting the coverage and other necessary obligations.

Benefit Delivery Mechanism

The objective of the scheme is to provide electricity to the beneficiaries in the stipulated period of time. Under the scheme, turnkey contractors are engaged to complete the project within this time. The contractors have been selected and engaged by the Department of Power. The turnkey contractors engaged sub-contractors for completion of work in a timely manner. As per the agreement with the Department of Power the contractors have to install all the infrastructures in the selected (De-Electrified, Un-electrified and Electrified) villages. The contractors have to purchase all requisite materials as per specifications recommended by Department of Power. Contractors are mandated to cover two major works under the scheme. The first mandate is to create the infrastructure with the supply of materials and erection of works for villages to be included under the scheme. The second mandate is to complete all internal wiring for eligible BPL households.

As per the norms of electricity department, it is seen that infrastructures have been installed by the qualified and experienced persons engaged by the sub-contractors. The Executive Engineers and SDOs have verified and monitored these works at village level. The internal wiring in BPL households has been done by qualified sub-contractors.

Monitoring and Supervision Mechanism

Monitoring and supervision under the scheme is done through three level monitoring system as discussed below:

1. **AT National Level:** The Monitoring Committee constituted by the Ministry of Power under the Chairmanship of Secretary (Power), Government of India sanctions the projects, including revised cost estimates. The committee also monitors and reviews the progress reports on scheme implementation. If required, the committee reviews and improvises necessary guidelines from time to time for effective implementation of the scheme.

2. **AT State Level:** At state level, the Chief Engineer and Superintendent Engineer monitor the work done by Executive Engineers in the districts. The committee reviews and discusses their progress based on reports submitted to them. If any case needs their specific involvement then they visit the area to resolve the issue. The executive engineers look up to the committee for guidance if required.

3. **At District Level:** At district level, the Executive Engineers and SDOs frequently visit to monitor the progress of work specifically ground work for infrastructure and installations. At the time of installation of transformer in the villages, contractors and sub-contractors are advised of the *modus operandi*. During implementation of the scheme, officials usually make trips to ensure that the work is being carried out smoothly and give their suggestions and inputs for better implementation. In blocks, the JEs (Junior Engineers) are involved in monitoring work progress.

Web Based Monitoring System: Web based monitoring system for RGGVY has also been designed at national level. The system has been set up to retrieve progress status for RGGVY implementation in all the states at any time. This website (http://rggvy.gov.in) carries status report of electrification in any state. The information is updated monthly by the DoP, Nagaland after receiving the progress reports from the districts.

Quality Control Mechanism

For the scheme to operate smoothly three tiers of quality control mechanism has been put in place. Although all tiers have the same objective (of enrolling BPL households for free electric connection), each tier has its exclusive responsibility.

1. **First Tier:** Project implementing agency (PIA) and third party inspection agency engaged by the PIA is the first tier of the Quality Control Structure, whose responsibility is to ensure that all the materials to be utilized and the workmanship confirm to the prescribed specifications. This inspection is necessary as it has to synchronize with phased release of funds under RGGVY. Inspection and proof of corrective action are mandatory requirements for subsequent fund release. This inspection covers approximately 100 per cent of villages for each project.

   Project Implementing Agency is responsible for Quality Control Structure in the first tier. Once LOA is received, approved contractors procure materials from recommended companies. The procured items are then inspected by the Project Implementing Agency. Executive Engineers carry out this Inspection known as pre-dispatch inspection. Verification is done by executive engineers again when materials are received at the storage/warehouse. 30 per cent to 40 per cent villages are covered for verification of materials and monitoring contractor activity. If any duplicate materials or wrong items are found then they are returned.

2. **Second Tier:** Rural Electrification Corporation becomes responsible to control quality in the second tier. REC gets inspection of works/materials done through its non-field staff and by outsourcing the

responsibility. REC may outsource the inspection works to retired employees of State Electricity Boards/State Utilities/CPSUs. These individuals appointed to do quality inspections are designated as REC Quality Monitors (RQM). All reports submitted by RQMs are organized and analyzed for further action/corrective action by REC. The inspection will cover quality checks at pre-shipment stage at vendors' outlet for major materials. Usually 10 per cent of villages are selected on random sample basis to carry out inspection works.

On the field, materials are checked by engineers. For this tier of quality control, 10 per cent of the villages covered through the scheme are selected for verification. If any issues are found at this tier they are brought to the notice of REC. During field verification, suggestions are always given to contractors in charge of installations regarding power requirements in the village.

3. **Three Tier:** Independent Evaluators (Individuals/Agency) are engaged by the Ministry of Power for evaluation (from time to time) of supply of materials and erection works. These evaluators are designated as National Quality Monitors (NQM). It is the state’s responsibility to facilitate the inspection of works by the NQM, who shall be given free access to all administrative, technical and financial records. Evaluation usually covers 1 per cent of the villages. NQMs also report on the general functioning of the Quality Control Mechanism in the District. The existing three-tier monitoring system should continue but faster decision making should be ensured. Up to 2 per cent-3 per cent randomly selected sample villages may be visited by independent evaluators.

   The third tier inspection is done from time to time. It is the first and second tier that forms the crux of the quality control mechanism. After speaking with stakeholders it appears that once LOA is received in a district, the works start. However the challenge is always in construction and ground work. As the topography poses a constraint it is often difficult to carry out this work. The officials are however always enthusiastic in fulfilling the objectives of the scheme. There is usually no problem in coordination and cooperation.

For the quality Control Mechanism, a team of five members has been organized for proper monitoring and implementation of the scheme. Project Quality Control Committee (PGCC) has been formed for monitoring activities of the three tiers. In PQCC, Additional Chief Engineer is the chairman and Chief Executive Engineer and Executive Engineers are members. Through monitoring effective quality control is ensured. Major and minor field works are inspected such as procurement of materials, transportation and delivery and verification of items at the time of installation.

Record Keeping

All the records are kept district wise by the DoP, Nagaland. Consolidated figures for the state are maintained as well. The district officials send monthly progress report to the Chief Engineer's Office (Power) regarding physical and financial progress of the work. The number of BPL households covered in electrified, de-electrified and un-electrified villages is reported. The amount spent on electrification at district, block and village level can be tracked through progress report.

Financial Devolution

As RGGVY is a Centrally Sponsored Scheme, to implement it 90 per cent capital subsidy is provided by the MoP, Government of India for the projects under the scheme and 10 per cent Loan by REC. Government of India releases fund to the Chief Account Officer in a separate bank account which on requisition is released the same to the Executive Engineers for payment to the turnkey contractors through RTGS. The entire project cost is released in four phases such as 3:3:3:1.

In the first phase contractors are provided 30 per cent of the project cost. When Utilization Certificate for 80 per cent or more (of the 30 per cent of the total project cost) is submitted to the Executive Engineer, then the contractor is eligible to get the fund release for the second phase. This process continues up to 90 per cent of the fund release; in three phases. Once 90 per cent utilization certificate is received from the turnkey contractor, the final 10 per cent fund is released by the Executive Engineer. This is the usual pattern for project cost realization and utilization of funds set for RGGVY scheme. The sanctioned cost of the projects district wise is shown in Table 4.3.

In 2005 Rs. 662.58 lakh were sanctioned for Phek District and in 2006 another DPR was approved and Rs. 962.58 lakh were sanctioned for the Zunheboto District. In 2007 no DPR was approved by the Ministry of Power. In 2008 during the month of March and April, the ministry of power sanctioned Rs. 1799.16 lakh for Dimapur, Rs. 999.51 lakh for Kohima, Rs. 446.01 for Longleng, Rs. 1246.74 lakh for Mon, Rs. 916.50 for Peren, Rs. 1035.59 lakh for Tuensang, Rs. 1340.91 lakh for Wokha, Rs. 887.66 lakh for Kiphire, and Rs. 819.59 lakh for Mokokchung were sanctioned under the scheme.

Total amount of Rs. 11,116.83 lakh were sanctioned for all districts under the scheme for the electrification of un-electrified, de-electrified villages as well as intensive electrification of already electrified villages and for providing free cost of electricity connection to the households below poverty line (BPL).

Table 4.3

District wise Sanctioned Cost of Projects

Name of the District	Date of Sanction of Projects Under Implementation	Sanctioned Cost of U.I. Projects (Rs. in lakh)
Dimapur	31-03-2008	1799.16
Kiphire	08-04-2008	887.66
Kohima	05-03-2008	999.51
Longleng	31-03-2008	446.01
Mokokchung	08-04-2008	819.59
Mon	31-03-2008	1246.74
Peren	31-03-2008	916.50
Phek	16-12-2005	662.58
Tuensang	31-03-2008	1035.59
Wokha	31-03-2008	1340.91
Zunheboto	13-12-2006	962.58
Total of all districts		**11116.83**

Source: MoP, RGGVY.

TARGETS AND ACHIEVEMENTS UNDER DIFFERENT COMPONENTS OF THE RGGVY SCHEME IN NAGALAND

PHYSICAL TARGET SET BY THE DEPARTMENT OF POWER, NAGALAND

The targets outlined by the DoP, Nagaland under RGGVY to be achieved by 2012 were:

1. No of Projects: 11 Projects covering all districts (A district is regarded as a one project)
2. No of un-/de-electrified villages to be electrified: 105 villages
3. Intensive electrification in already electrified villages: 1173 villages
4. Free cost of connection to BPL Households: 69900 Households (DoP, Nagaland).

Target Villages and BPL Households to be Covered under RGGVY

District wise DPRs were prepared by the DoP, Nagaland giving details of number of un-electrified, de-electrified as well as already electrified villages (requiring intensive electrification) and number of households below poverty line without electricity connection in rural as well as in urban areas to be covered under the scheme.

Number of villages already electrified for Intensive Electrification, Number of Un-/De-Electrified Villages and Number of BPL Households Reported under RGGVY in Nagaland (District-wise) have been shown in Table 4.4.

In Phek district, there was not a single un-electrified as well de-electrified village. However, the number of villages identified as already electrified but requiring intensive electrification was 104 and number of households below poverty line in Phek District was 5799. In Zunheboto district, number of un-electrified villages was 12 and number of villages required intensification were 175. And the number of BPL households was 8491.

In Kohima, Mokokchung and Tuensang district, there were no villages without electricity connection. However, the number of already electrified villages requiring intensification in Kohima, Mokokchung and

Tuensang district were 94, 102 and 122 respectively. Number of BPL households without electricity in Kohima, Mokokchung and Tuensang district were 8618, 4827 and 5274 respectively.

Table 4.4

No. of Villages Already Electrified for Intensive Electrification, No. Un-/De-Electrified Villages and No. of BPL Households Reported under RGGVY in Nagaland (District-wise)

District	No. Of Villages			No. of BPL Households
	Already Electrified	Un - Electrified	De - Electrified	
Dimapur	198	18	0	9289
Kiphire	85	5	1	5462
Kohima	94	0	0	8618
Longleng	23	6	0	5494
Mokokchung	102	0	0	4827
Mon	88	2	12	10038
Peren	70	4	12	4195
Phek	104	0	0	5799
Tuensang	122	0	0	5274
Wokha	91	15	18	2413
Zunheboto	175	12	0	8491
Total of all districts	**1152**	**62**	**43**	**69900**

Note: No of villages already electrified reported for intensive electrification is 1152 (as per old definition). But as per the new definition for electrification, many villages that were previously considered electrified cut down by the definition into the un-electrified category.

Source: MoP, RGGVY.

In Dimapur number of un-electrified villages was 18 and BPL households were 9289. In Peren district number of un-electrified villages was

4, de-electrified villages was 12, already electrified was 70 and BPL households was 4195. In Mon district number of un-electrified was 12 and number of de-electrified villages was 2. Mon district reported the highest BPL households of 10038 without electricity connection. And the Wokha district reported the lowest BPL households of 2413. In Wokha 15 villages were reported un-electrified, 15 villages de-electrified and 91 villages already electrified for intensive electrification.

As per 2001 census the number of inhabited villages is 1278 villages in Nagaland. Out of these villages number of villages electrified was 1173 as on 31st March 2004. Number of villages already electrified reported for intensive electrification is 1152. But as per the new definition for electrification, many villages that were previously considered electrified cut down by the definition into the un-electrified category. Therefore number of electrified villages as per the new definition was 823 as on 31st march 2004. Total number of un-electrified and de-electrified villages was 105. The total number of BPL households without electricity was 69,900.

ACHIEVEMENTS UNDER RGGVY

YEAR-WISE ACHIEVEMENTS

Year-wise Electrification of un-/de-electrified and BPL Households in Nagaland is shown in Table 4.5. The MoP approved one DPR (Phek District) in 2005 and another DPR (Zunheboto district) in 2006. However, the department could not complete even a single project until 2009-10. It is also evident from the Table 4.5 that in 2009-10 out of 105 un-/de-electrified villages, 14 villages were electrified. In the same year 4368 BPL households were provided free cost of connection. In 2010-11, 43 villages were electrified and again in 2011-12, 22 more villages were electrified. Likewise, connection to BPL households were provided; 13434 and 6767 BPL households were provided free cost of connection in 2010-11 and 2011-12 respectively. Number of un-/de-electrified villages still under progress under the scheme on 31st March 2012 was 26 and number of BPL households without electricity in the state remained at 41521 out of 69990.

Table 4.5

Electrification of Un-/De-Electrified Villages and BPL Households in Nagaland (Year-wise Achievements)

Year	Un/De- Electrified		BPL Households	
	Target	Achievement	Target	Achievement
	No. of Villages Un/De-Electrified	Number of Villages Electrified	No. of BPL Households	No. of BPL Households Electrified
2007-08	105	0	69900	0
2008-09	105	0		0
2009-10	105	14		4368
2010-11	91	43		13434
2011-12	48	22		6767
Cumulative Achievements	-	79		28379
Balance no of un/de-electrified villages	-	26		41521

Source: MoP, RGGVY.

DISTRICT WISE ACHIEVEMENTS

District-wise DPRs covering the entire state were approved by the central government. The DoP, Nagaland initiated the project in the entire districts after the receiving the letter of award from the MoP. Details of the target and achievement in electrification of un-/de-electrified villages are given in Table 4.6.

Table 4.6

District-wise Electrification of Un-/de-Electrified Villages

(as on 31st March 2012)

District	**Target**	**Cumulative Achievements**	**Balance no of un/de-electrified villages**
Dimapur	18	17	1
Kiphire	6	6	0
Kohima	0	0	0
Longleng	6	4	4
Mokokchung	0	0	0
Mon	14	12	2
Peren	16	16	0
Phek	0	0	0
Tuensang	0	0	0
Wokha	33	24	9
Zunheboto	12	0	0
Total of all districts	**105**	**79**	**26**

Source: MoP, RGGVY.

In four districts, viz., Kohima, Mokokchung, Phek and Tuensang; there was no un-electrified village. In Dimapur, 18 villages were reported un-electrified. The electrification works in those un-electrified villages in Dimapur were started in the year 2008. During 3 years period all the un-electrified villages under Dimapur district, except one were electrified. During the same period 100 per cent electrification was achieved in Kiphire and Peren district. In Kiphire and Peren district 6 and 16 un-electrified villages were electrified respectively. In Longleng district 4 villages were electrified and 2 villages still under progress. And in Mon district out of 14 un-electrified villages, 12 were electrified and 2 under progress. The highest of 33 un-electrified villages was reported in Wokha district. Out of these un-electrified villages, electrification works were completed in 24 villages; works are still under progress in 9 villages.

Zunheboto district was one of the first DPRs sanctioned by the MoP. It is unexpected to note that no electrification works were completed in any of the identified un-electrified villages in Zunheboto district. In Zunheboto district, 12 villages were reported un-electrified and the electrification in all these villages is still under progress.

CUMULATIVE ACHIEVEMENTS OF RGGVY IN NAGALAND

The **c**umulative achievements of RGGVY in Nagaland since implementation have been shown in Table 4.7.

Table 4.7

Cumulative Achievements of RGGVY in Nagaland

(as on 31st March 2012)

Particulars	Target	Achievement
Electrification of Un-/De-Electrified Villages	105	79 (75.2%)
Intensive Electrification of Electrified Villages	1152	718 (62.3%)
No. of Connections to Rural Households including BPL	142992	38065 (26.6%)
No. of Connections to BPL Households	69900	28379 (40.6%)

Source: MoP, RGGVY.

During the 6 years period from 2006-07 to 2011-12, out of 105 un-/de-electrified villages 79 villages were electrified, representing an achievement of 75.2 per cent. As compared to progress in other facets of the RGGVY, the progress under the scheme for electrification of un-/electrified villages in the state is regarded as satisfactory. Number of free connection provided to BPL households was only 28379 out of the targeted households of 69900, marking an achievement of 40.6 per cent. The achievement was not even 50 per cent of the targeted number. The number of villages identified for intensive electrification was 1152 under the scheme; out of these villages the department could complete the intensification works only in 63.3 per cent of the targeted villages. The DoP, could not achieve the target set because of many reasons. Some of the factors for short fall in achievement are:

1. delay in finalization of contract awards,
2. longer than expected pre-award lead-time;
3. unavailability of contractors, equipment and manpower;
4. delay in issue of tenders due to non-familiarity with turnkey contracts.

CONSTRAINTS

Owing to some limitations, the DoP could not fully achieve the target within the predetermined time under this scheme. Some of these constraints faced in implementation of RGGVY are discussed under following heads.

1. **Topography and Environment:** All the districts of Nagaland are hilly areas. It is more difficult to work in hilly areas as compared to plane areas. Transportation of materials is another problem specifically for the un-electrified and de-electrified villages. Some of these villages are far away from the market and no good road exists for transportation of construction materials to these villages. Another genuine problem arises

during the rainy season. Due to heavy rains, it is possible to work only for six month in a year. Poor road conditions and occurrence of landslides during the rainy season badly affect the connectivity. Consequently, delaying the construction/installation works.

2. **Policy Constraints:** On policy front, a major constraint relates to application of uniform standards for selection criteria for project inclusion by the Government of India. Although some preference was given for the NER in later years, it is felt that the criteria did not take into account real situation in the field. Therefore the fund allocation for the project is not adequate to take care of the project infrastructure needs.

3. **Free cost of connection to BPL:** RGGVY programme target the poor rural households and aim to provide free cost of connection to all BPL households. It was observed that connections were provided free of cost to households BPL but most of the BPL households are not in a position to pay the monthly bills.

4. **Provision of Transformer Capacity up to 25 KVA:** Under the scheme provision is for transformer of capacity up to 25 KVA (such as 10 KVA, 16 KVA and 25 KVA). Low capacity transformer has been installed where the number of BPL households is less. For village electrification, no transformer has been installed with more than 25 KVA capacities. In some villages, two low-capacity transformers have been installed. Although, the households are currently consuming at low level, and all the households are not connected, yet in many villages, the transformers are at capacity.

   This means that further connections are constrained. The beneficiaries even if they want to have higher level of power consumption, the authorities would be constrained to provide power unless they increase the transformer capacity assuming adequate power is available from respective grids.

COMPARATIVE PERFORMANCE

An attempt has been made in this part of the chapter to evaluate the comparative achievements of all the Indian states under RGGVY. Particularly, a detail inter-states comparative study of the performance of the DoP, Nagaland and the DoP, Arunachal Pradesh under the scheme has been done in this part of the chapter.

TARGETS AND CUMULATIVE ACHIEVEMENTS OF RGGVY IN ALL THE INDIAN STATES

The targets and cumulative achievements of all the Indian states under RGGVY are shown in Table 4.8, 4.9 and 4.10. Table 4.8 presents the electrification of un-/de- electrified villages, Table 4.9 presents the intensive electrification of already electrified villages and Table 4.10 gives the number of connection provided to rural households (including BPL households) and number of connections provided to BPL households under the scheme.

In 2005, 6 states viz., Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra and Tamil Nadu had already achieved 100 per cent village electrification. In other states of the country, total of 117819 villages were reported un-/de-electrified under the scheme. Out of these villages, 102280 were reported electrified in 2011-12, marking an achievement of 86.8 per cent (Table 4.8).

Uttar Pradesh had the highest number of un-electrified villages of 30802, followed by Bihar with 23211villages without electricity connection. In Uttar Pradesh by March 2012, number of villages electrified under the scheme was 27759, marking an achievement of 90.01 per cent. In Bihar 21790 villages were covered representing an achievement of 93.9 per cent. The states with 100 per cent achievement in electrification of un-/de-electrified villages were Sikkim and Uttarkhand. Meghalaya achieved the lowest of 37.5 per cent electrification of un-electrified villages. Nagaland could achieve 75.2 per cent of electrification of the un-electrified villages under the scheme.

Table 4.8

Electrification of Un-/De-Electrified Villages

States	Target in No.	Achievement in No.	Achievement in %
Andhra Pradesh	0	0	0.0
Arunachal Pradesh	2129	1189	55.8
Assam	8525	7620	89.4
Bihar	23211	21790	93.9
Chhattisgarh	1021	549	53.8
Gujarat	0	0	0.0
Haryana	0	0	0.0
Himachal Pradesh	93	78	83.9
Jammu & Kashmir	283	138	48.8
Jharkhand	19737	17633	89.3
Karnataka	132	61	46.2
Kerala	0	0	0.0
Madhya Pradesh	921	491	53.3
Maharashtra	6	0	0.0
Manipur	882	383	43.4
Meghalaya	1943	728	37.5
Mizoram	137	86	62.8
Nagaland	105	79	75.2
Orissa	17211	13933	81.0
Punjab	0	0	0.0
Rajasthan	4454	3934	88.3
Sikkim	25	25	100.0
Tamil Nadu	0	0	0.0
Tripura	160	124	77.5
Uttar Pradesh	30802	27759	90.1
Uttarakhand	1469	1511	102.9
West Bengal	4573	4169	91.2
Total Of All States	**117819**	**102280**	**86.8**

Source: MoP, RGGVY.

Table 4.9

Intensive Electrification of Electrified Villages

States	Target in No.	Achievement in No	Achievement in %
Andhra Pradesh	27481	23938	87.1
Arunachal Pradesh	1756	818	46.6
Assam	13330	11382	85.4
Bihar	6651	4072	61.2
Chhattisgarh	17155	10275	59.9
Gujarat	17934	14401	80.3
Haryana	5985	2744	45.8
Himachal Pradesh	10666	1059	9.9
Jammu & Kashmir	6050	2317	38.3
Jharkhand	7622	5433	71.3
Karnataka	28191	24559	87.1
Kerala	630	37	5.9
Madhya Pradesh	34390	16556	48.1
Maharashtra	40292	32119	79.7
Manipur	1378	357	25.9
Meghalaya	3536	1537	43.5
Mizoram	570	308	54.0
Nagaland	1152	718	62.3
Orissa	29596	20232	68.4
Punjab	11840	0	0.0
Rajasthan	34841	29140	83.6
Sikkim	418	368	88.0
Tamil Nadu	12416	9992	80.5
Tripura	642	389	60.6
Uttar Pradesh	3287	2982	90.7
Uttarakhand	14105	8992	63.8
West Bengal	24775	17294	69.8
Total Of All States	**356689**	**242019**	**67.9**

Source: MoP, RGGVY.

One of the objectives of RGGVY is 100 per cent electrification of all villages in the country by 2012. However, as on March 2012, at national level the scheme could achieve only 86.8 per cent of the target. At the state level, only two states could achieve 100 per cent electrification under the scheme.

Table 4.9 shows that for intensive electrification 356689 already electrified villages in the country were identified under the scheme. As on march 2012, intensive electrification works were completed in 242019 villages, representing a cumulative achievement of 67.9 per cent. States with high percentage of achievement in intensification of electrification in the villages were Andhra Pradesh, Karnataka, Sikkim, Assam, Rajasthan, Gujarat and Tamil Nadu. These states could achieve a rate above 80 per cent.

Himachal Pradesh and Kerala were the two states with lowest percentage of 5.9 per cent and 9.9 per cent achievement respectively, followed by Manipur with 25.9 per cent and Jammu and Kashmir with 38.3 per cent. As on March 2012, no states could achieve the target.

The objectives of RGGVY is also to achieve 100 per cent household electrification by 2012 and to provide free of cost electricity connection to BPL households without electricity connection in the country. When the scheme was launch in 2005, there were about 54.6 million households (both rural and urban) un-electrified above the poverty line (Planning Commission, 2005) and 24.7 million un-electrified BPL households.

In 2005, the target was set to provide electricity connection to around 41.2 million rural households. As on march 2012, around 20.2 million households were electrified, marking an achievement of 49.2 per cent. This shows that only a half of the targeted numbers were covered; and still half of the targeted numbers remained un-electrified.

This indicates a poor performance at the national level, since the RGGVY objective of 100 per cent electrification by 2012 was not achieved. Likewise, at the state level the performances of all the states were unsatisfactory.

Table 4.10

Connection to BPL Households

States	No. of Connections to Rural Households including BPL			No. of Connections to BPL Households		
	Target in No.	Achieve-ment in No.	Achieve-ment in %	Target in No.	Achieve-ment in No.	Achiev-ement in %
Andhra Pradesh	3954128	3231049	81.7	2592140	2672509	103.1
ArunachalPradesh	76407	26123	34.2	40810	20996	51.4
Assam	1414828	790576	55.9	991656	790576	79.7
Bihar	6022036	1997486	33.2	2762455	1997486	72.3
Chhattisgarh	1121626	511285	45.6	799735	511285	63.9
Gujarat	1595853	793430	49.7	955150	793430	83.1
Haryana	569686	204421	35.9	224073	204421	91.2
Himachal Pradesh	36479	19349	53.0	12448	10078	81.0
Jammu& Kashmir	295221	54990	18.6	136730	42544	31.1
Jharkhand	2926260	1247662	42.6	1691797	1247662	73.7
Karnataka	1932797	995858	51.5	891939	831875	93.3
Kerala	92736	17238	18.6	56351	17238	30.6
Madhya Pradesh	2682385	801275	29.9	1393666	639012	45.9
Maharashtra	2633742	1248039	47.4	1876391	1157420	61.7
Manipur	192148	14882	7.7	107369	14454	13.5
Meghalaya	188648	54229	28.7	116447	54229	46.6
Mizoram	44334	14628	33.0	27417	14628	53.4
Nagaland	142992	38065	26.6	69900	28379	40.6
Orissa	4635981	2606063	56.2	3242789	2606063	80.4
Punjab	405023	53508	13.2	148860	53508	35.9
Rajasthan	2229442	1679971	75.4	1750118	1025210	58.6
Sikkim	28166	15961	56.7	11458	9111	79.5
Tamil Nadu	1692235	767469	45.4	545511	502956	92.2
Tripura	228759	75382	33.0	194730	75382	38.7
Uttar Pradesh	1694075	900618	53.2	1120648	900618	80.4
Uttarakhand	357309	229751	64.3	281615	229751	81.6
West Bengal	3974005	1847245	46.5	2699734	1829706	67.8
Total of All States	**41167301**	**20236553**	**49.2**	**24741937**	**18280527**	**73.9**

Source: MoP, RGGVY.

However, the scheme could electrify 73.9 per cent of number of targeted BPL households. In 2005, around 24.7 millions of BPL households were reported un-electrified. Out of these, around 18.3 million BPL households were reported electrified under the scheme. Only one state, Andhra Pradesh could achieve 100 per cent electrification of BPL households. Manipur achieve the lowest of 13.5 per cent electrification of BPL households.

COMPARATIVE PERFORMANCE OF NAGALAND AND ARUNACHAL PRADESH

TARGETS AND ACHIVEMENTS

The implementing agency of RGGVY scheme in Nagaland is DoP, Nagaland and in Arunachal Pradesh DoP, Arunachal Pradesh. The targets and the achievements thereout by both the implementing agencies under RGGVY are discussed under the following headings.

1. **Electrification of Un-/De-electrified Villages**: The target set and year-wise achievement in electrification of un-/de-electrified Villages under RGGVY of both the states is given in Table 4.11

Table 4.11

Electrification of Un-/De-Electrified Villages (Year-wise)

Year	**Nagaland**		**Arunachal Pradesh**	
	Target	**Achievement**	**Target**	**Achievement**
	No of Villages Un/De-Electriifed	**Number of Villages Electrified**	**No of Villages Un/De-Electriifed**	**Number of Villages Electrified**
2007-08	105	0	2129	0
2008-09	105	0		0
2009-10	105	14		215
2010-11	91	43		464
2011-12	48	22		267
Cumulative Achievement	-	79		946
Balance no of un/de-electrified villages	-	26		1189

Source: MoP, RGGVY.

It can be seen from Table 4.11 that both the states could not achieve the target set by 2012. However, it is observed that comparatively the progress in electrification of un-electrified villages is better in Nagaland. In Nagaland number of un-electrified villages was 105 in 2005 out of 1278 total villages (as per 2001 census). In Arunachal Pradesh it was 2129 villages out of total villages of 3863 (as per 2001 census).

The rate of village electrified in Arunachal Pradesh is comparatively lower than Nagaland. Though the scheme was launched in 2005, both the states showed the progress only from 2009-10 onwards. This is because all the DPRs were not approved by the MoP in 2005. Some DPRs of the districts were approved only in 2008 and 2009. Moreover, the electrification works were initiated only after the receipt of the Letter of award from MoP, which were received much later after the approval of the DPRs.

In 2009-10, Nagaland could achieve 13 per cent of the target and Arunachal Pradesh could achieve 10 per cent of the target. In both the states, number of villages electrified was higher in 2010-11. Electrification works were completed in 43 villages in Nagaland and 464 villages in Arunachal Pradesh in 2010-11. As on March 2012 in Nagaland, 79 villages were reported electrified and 946 villages in Arunachal Pradesh.

Electrification of BPL Households: One of the objectives of RGGVY is also to achieve 100 per cent electrification of BPL households. The scheme also envisages providing electricity free cost of connection to all BPL households. In view of this objective, BPL households were identified and reported under the scheme in all the districts of both the states. Table 4.12 presents the electrification of BPL households of both the states.

Table 4.12

Electrification of BPL Households (Year-wise)

Year	**Nagaland**		**Arunachal Pradesh**	
	Target	**Achievement**	**Target**	**Achievement**
	No of BPL Households	**Number of BPL Households Electrified**	**No of BPL Households**	**Number of BPL Households Electrified**
2007-08	69900	0	40810	0
2008-09		0		0
2009-10		4368		967
2010-11		13434		9205
2011-12		6767		7849
Cumulative Achievement		28379		20996
Balance no of BPL Households		41521		19814

Source: MoP, RGGVY.

In Nagaland, Number of BPL households reported under the scheme was 69900; in 2009-10, thereout 4368 BPL households were electrified. In 2010-11 and 2011-12, 13434 and 6767 BPL households were electrified. As on March 2012, total of 28379 BPL households were electrified.

While in Arunachal Pradesh 40810 BPL un-electrified households were reported. Out of these un-electrified households in 2009-10, 2010-11, and 2011-12 number of households electrified under the scheme were 967, 9205 and 7849 respectively. As on March 2012, cumulative number of BPL households electrified was 20996.

1. **Cumulative Achievements**: The cumulative achievements under the scheme of both the states as well as the cumulative achievements of all India have been given in Table 4.13 and a graphical presentation of the same by Exhibit 4.2.

Table 4.13

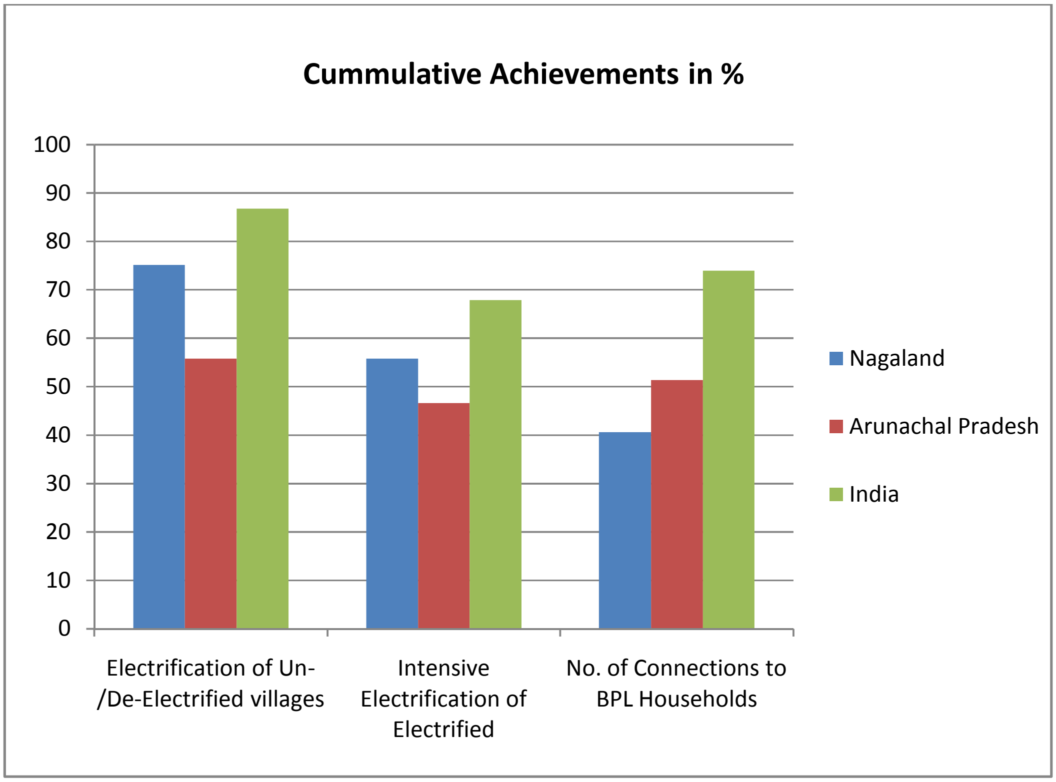
Cumulative Achievements

(as on March 2012)

Particulars	**Nagaland**		**Arunachal Pradesh**		**India**	
	Target in No.	**Achieve-ment in No.**	**Target in No.**	**Achieve m-ent in No.**	**Target in No.**	**Achievem -ent in No.**
Electrification of Un-/De-Electrified villages	105	79 (75.2%)	2129	1189 (55.8%)	26488.00	26967.61 (86.8%)
Intensive Electrification of Electrified Villages	1152	718 (62.3%)	1756	818 (46.6%)	117819	102280 (67.9%)
No. of Connections to BPL Households	69900	28379 (40.6%)	40810	20996 (51.4%)	41167301	20236553 (73.9%)
No. of Connections to Rural Households including BPL	142992	38065 (26.6%)	76407	26123 (34.2 %)	356689	242019 (49.2%)

Note: The figures in the brackets indicate achievements in percentage.
Source: MoP, RGGVY.

Exhibit 4.2



Source: As in Table 4.13.

From Table 4.13 and Exhibit 4.2, it can be noted that both states' cumulative overall achievements were not satisfactory as compared to all India's achievements. Electrification of un-/de-electrified villages was 75.2 per cent and 55.8 per cent of target in Nagaland and Arunachal Pradesh respectively. The achievements were below the achievements at national level. The electrification works at national level were reported completed in 86.8 per cent of the targeted un-electrified villages. Likewise, intensive electrification of electrified villages, as well as number of connections to BPL households in Nagaland and Arunachal Pradesh were below the achievement of targets at national level.

The intensive electrification was reported completed in 62.3 per cent and 46.6 per cent of targeted villages in Nagaland and Arunachal Pradesh respectively; whereas, it was reported completed in 67.9 per cent of targeted villages at national level. Number of connections to BPL households was provided to 40.6 per cent and 51.4 per cent in Nagaland and Arunachal Pradesh respectively. In all India level electricity connection was provided to 73.9 per cent of BPL households.

Number of Connection to rural households (including BPL households) was provided to 26.6 per cent and 34.2 per cent of rural households in Nagaland and Arunachal Pradesh respectively. The achievement in providing connection to rural households was also below the all India achievement of 49.2 per cent.

It is also evident from Table 4.13 and Exhibit 4.2 that comparatively, the cumulative achievements of the scheme have been better in Nagaland than Arunachal Pradesh. However, cumulative achievements of both the states were below the achievements at all India level. And it is also observed that both the states could not achieve the targets under the scheme.

Furthermore, the study also shows that India could not achieve the objectives of RGGVY: 100 per cent electrification of all villages in the country by 2009 and 100 per cent household electrification by 2012.

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CHAPTER V

THE STATE OWNED POWER SECTOR OF NAGALAND-THE CASE OF REFORM

Today the word ‘Reforms’ has come to mean effectively three things: un-bundling, privatization and creation of an autonomous regulatory body. Power sector across the world is undergoing a lot of restructuring; India is no exception to this. The Indian power sector is undergoing major transformations; the most important of these changes are the planned reforms of the SEBs and Eds. Traditionally, electric power system is considered to be natural monopoly and electricity is treated as an essential public service. Historically, vertically integrated generation, transmission and distribution systems as state-owned undertakings were established in most of the countries. However, technical and financial performance of the state-owned electricity utilities was unsatisfactory and they were starved of investment resources. Therefore, to ensure efficient use of resources and better levels of efficiency it was imperative to promote competition in the power sector.

Since early 1900s, there has been a paradigm shift in the power sector from natural monopolies to competitive model by encouraging unbundling and privatization of generation, transmission and distribution functions. It is hoped that restructuring will reduce various components of cost of supply and lowering tariff rates, benefitting the consumers. These measures will also attract adequate private and public investment in the electricity sector as well as ensure better allocation of resources in the economy. This fundamental structural change will have long term implications, hence is of enormous importance. With this perspective, power sector reforms and restructuring was initiated in India in 1991 amending the electricity laws at the state and national level.

As part of the reform process the Government of Nagaland have initiated the Communitisation programme in the power sector during 2002-2003. Communitisation is a unique way of decentralization of electricity management through community empowerment. Communitisation of electricity in rural areas is a major reform initiated in the power sector by the Government of Nagaland.

Reforms and restructuring process of power sector in Nagaland have also started with the signing of Memorandum of Understanding (MOU) with the Central Government and to go with it the State Government decided to undertake Power Sector Reforms and restructuring Study under the consultancy of International Management Institute (IMI), New Delhi for in-depth study and charting out a road map as required under the Indian Electricity Act, 2003.

An attempt has been made in this chapter to evaluate the effectiveness of Communitisation of electricity management in rural areas and also to review the process and status of corporatization and restructuring of power sector in Nagaland. This chapter has been divided into two sections; Section I gives a brief evaluation of Communitisation of electricity management in rural areas and Section II gives a brief review of Power Sector Reforms and Restructuring process and status in Nagaland.

SECTION I

COMMUNITISATION

The Department of power has decentralized revenue management in rural sector by involving the Village Councils as partners in electricity revenue management. Being encouraged by visible improvements on account of Communitisation in the field of elementary education and primary health services, the Government of Nagaland extended this programme to the power sector.

Communitisation is a unique way of reforms initiated solely in Nagaland. It consists of a unique partnership between the government and the community involving transfer of ownership and sharing responsibility of management of the government institutions with the community; all with the aim of improving the delivery of public utility systems. It thus, includes decentralization of authority, delegation of responsibility, empowerment of the community, and building up of a synergistic relationship between government and the community for growth and development of the institutions and their service delivery.

The Communitisation programme demands ensuring accountability of government employees posted at the service delivery level to local communities and control of government assets by village committees including the responsibility for maintenance, amelioration and augmentation of assets. As such Communitisation is based on triple 'T' approach. Trust the user community. Train them to discharge their newfound responsibilities and Transfer governmental powers and resources in respect of management.

OBJECTIVES OF COMMUNITISATION

The objectives for introduction and implementation of Communitisation through SPM are:

1. To reduce technical (T&D) and commercial losses in the rural areas.

2. To involve village community to work as business partners with the Department in the management of electricity revenue so as to provide the needed leverage for privatization in power sector in long run.
3. To entrust the responsibility to Village Council to check theft of energy in their respective villages.

BENEFITS OF COMMUNITISATION

For the Villages (VEMBs):

1. Under the SPM the VEMBs would benefit financially in the form of 20 per cent rebate for every unit of energy sold.
2. Out of the 20 per cent rebate benefit, the VEMBs can generate employment within their respective village for serving and collection of bills.
3. The VEMBs can now slowly generate their own resources and be in a position to establish common smaller amenities like installation of streetlights as per their requirements with the technical support from the Department.
4. Under the APDRP, Department provides 1.5 ckm of LT extensions for villages opting for SPM.
5. Department would get more time to focus attention on T&D maintenance for SPM villages and improve quality and stability of power supply.

For the Department:

1. Improvement in billing and reduction in commercial losses.
2. Guaranteed improved revenue collection.
3. A stepping-stone towards privatization of distribution sector in the future is an objective set forth by the MoP under APDRP.

Communitisation is a kind of privatization where the user community is the manager instead of a private individual or a firm.

COMMUNITISATION ACT, 2002

The Nagaland Communitisation of Public Institutions and Services Act, 2002 was passed by the Nagaland Legislative Assembly (Act No. 2 of 2002) and notified by the Govt. of Nagaland., Department of Law and Justice vide N0. Law/Act-63/2001 dated 15th April 2002. The Act provides for empowerment of the community and delegation of powers and functions of the state government to the local authorities by way of participation of the community in matters connected with the management of local public utilities, public services and the activities of the state government connected with education, water supply, roads, forest, power, sanitation, health and other welfare and development schemes and also to provide for promotion of community based schemes incidental thereto (preamble of the Act).

Some important provisions of the Act are as follows:

- The state government may constitute or declare local authorities (Board or Committee or any other nomenclature) to exercise the powers and to discharge the functions under the Act (Sec. 3)
- Delegation of power and functions pertain to management and operation of any of the public utilities and public services other activities of the state government connected with education, health, etc. as may be specified by the state government (Sec. 4).
- Whenever required, the government owned assets in relation to the public utilities and public services or the activities of the government may be transferred to the authorities (Sec. 4).
- Funds established for the local authority shall include the grants that may be released by the state government (sec. 7).

POWER SECTOR REFORMS THROUGH COMMUNITISATION

The Department launched the Communitisation of Electricity Management in the villages through Single Point Metering (SPM) system for billing and collection of revenue, under the Nagaland Communitisation Act of Public Institutions and Services Act, 2002. The Act provides for empowerment of the community through local authorities such as the Village Council, Ward, Village Development Board and Town Committee. The Department of power has therefore; accordingly framed its own legal framework called Additional Condition of Supply to Village Act, 2002 and transferred the responsibility of electricity revenue management in the villages to the Village Council. Community involvement will initially be in the area of revenue management including the prevention and control of energy theft which has a direct bearing on revenue collection. However, the Department in due course will delegate the responsibility of management in distribution of supply as well to the community within the village.

SINGLE POINT METERING SYSTEM (SPM)

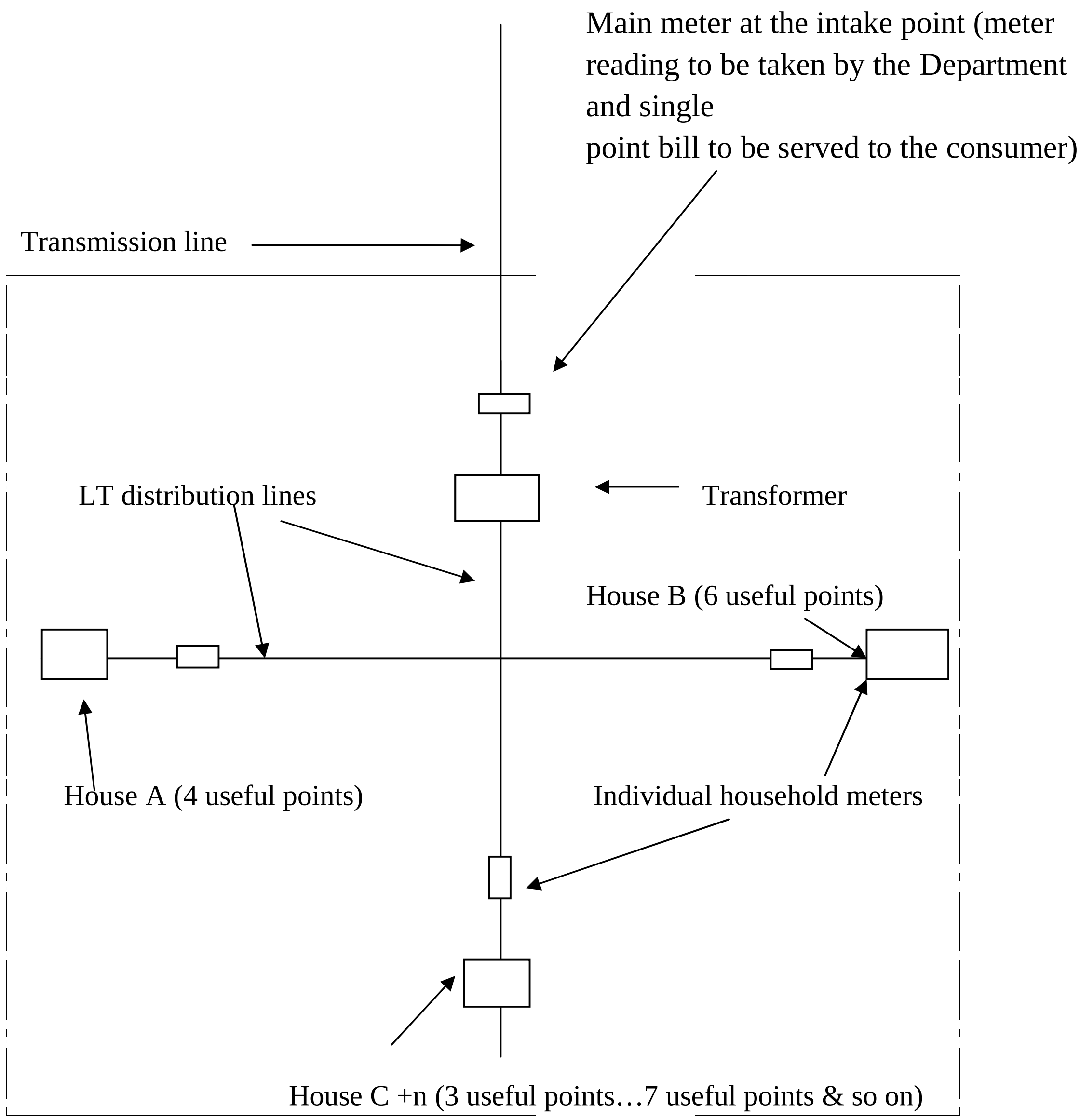
Single Point Metering (SPM) can be defined as collective metering of the power consumption by a village through one or more main meter(s) in the village and as provided in the Additional Conditions of Supply of Electricity to Villages, 2002. It is a system where a village is collectively billed with a single electricity bill through one or more main meter(s) at the intake point of the village and served to the Village Council/Village Electricity Management Board for payment to the Department of power.

For single point supply of electricity to a village the Department make a single point metering through the transformer or any other such appropriate point supplying electricity to that village. Provided, having regard to the requirement of a particular village where there are more than one transformer points, the Department may make more than one single point metering for that village but such arrangement is treated as covered by the scheme of single-point metering system.

A Single Point Metered village is presented by Exhibit 5.1.

Exhibit 5.1

Single Point Metered Village



Source: DoP, Nagaland.

Metering is done at the H.T side of the transformer wherever possible. For collection of revenue in a SPM village, the Department presents a single electricity bill for consumption of the energy on the basis of the single point metering or a consolidated energy bill on the basis of the single point metering where there are more than one single point metering.

Useful Points

In order to assess the consumption of power by an individual household the Department has innovatively developed the concept of 'useful points'. One 'useful points' is defined as equal to 40 W. The Village Electricity Management Board bills the individual electrified households either through the individual household meters or on the basis of 'useful points' in the house. An example of billing through useful points of a village with 5 households has been shown below:

If, the monthly power consumption of:

Household A, is 200 W, useful points	=	5 (200W ÷ 40W)
Household B, is 160 W, useful points	=	4 (160W ÷ 40W)
Household C, is 320 W, useful points	=	8 (320W ÷ 40W)
Household D, is 80 W, useful points	=	2 (80W ÷ 40W)
Household E, is 240 W, useful points	=	6 (240W ÷ 40W)
		25 points

Total useful points of the village will be equal to 25 points

And, if the total power consumption (of a month) of the 5 households in the village is 300 units as per the SPM and billed for, and if the rate is Rs. 2.50 per kWh, total energy charges of the village will be 300 units x Rs. 2.50.

Therefore, the total amount billed for power consumption of the village = Rs. 765.00 (Rs. 750. 00 plus Rs. 15 meter charges)

Rate per useful points=Total amount ÷ Total no. of useful points of the village

= Rs. 765/25

= Rs. 30.60

Bill for each household = Rate per useful point x number of useful point of that house.

Household A, Rs. 30.60 x 5 = Rs. 153.00
Household B, Rs. 30.60 x 4 = Rs. 122.40
Household C, Rs. 30. 60 x 8 = Rs. 244.80
Household D, Rs. 30.60 x 2 = Rs. 61.20
Household E, Rs. 30.60 x 6 = Rs. 183.60
Total = Rs. 765.00

Amount payable to the Department = Rs. 600 (300 units x Rs. 2.00*)
(20% of Rs. 2.50 – Rs. 2.50)
The VEMBs shall thus retain Rs. 165 (Rs. 765- Rs. 600.00)

Tariff under SPM

The rate of tariff for the single metering is governed by the tariff fixed by the State Government from time to time. The Village Electricity Management Board is billed at the flat rate of tariff so fixed which means that the tariff for all consumer categories is charged at the same rate. The flat rate of tariff is fixed by the Department in a manner as to ensure that the Village Council may receive the benefit of at least 20 per cent of the lowest rate of tariff that is ordinarily fixed for domestic consumers. The tariff rate fixed by the Department for the VEMBs is lower the cost of power.

At present, the tariff for the VEMBs is set at Rs.2.00 per unit of domestic consumption, accommodating a provision of 20 per cent rebate on Rs. 2.50 payable by the individual domestic consumers under the purview of the VEMBs. The VEMBs has the discretion to fix the power tariff at the rate other than the rate fixed by the State Government at their respective villages, provided that the rate so fixed does not exceed the general rate of tariff fixed by the State Government for the various categories of consumers.

Billing and Payment under SPM

The VEMBs select billing assistants and meter readers in their respective villages according to the requirement for monthly billing and collection of bills. A monthly joint meter reading is taken, based on which a single bill for the whole village is served to the VEMBs by the Department against the energy consumption record.

The single electricity bill so served by the Department to the VEMBs shall be paid within 30 days from the date of issue. The Department surcharge for delayed payment beyond 30 days as per the tariff. And if no payment is made after 45 days from the date of issue of the bill, notice for disconnection of not less than 7 days is served and yet again if there is no payment made by the VEMBs after serving of 7 days notice, the power supply to the village is disconnected at the source of the single point supplied by the Department. Reconnection of power supply is effected only when all the arrears are paid in full and for such cases, disconnection and reconnection fees are charged by the Department as per tariff fixed by the State Government.

The VEMBs are responsible for the preparation of individual bills and serve it to the consumers based on the 'Useful points' method or as per the meter reading recorded by the individual consumers' meters. Most of the energy meters in the villages are defective therefore all the domestic consumers are billed by the VEMBs on the basis of 'useful points' model. Commercial, industrial and water works under the jurisdiction of the Village Council are metered and billed as per the meter reading of the installed energy meters. The Village VEMBs are responsible of meeting the cost of street lighting and for which the board may adopt its own scheme of recovering the electric charges from the village community.

The board serves the bills to the individual consumers in a prescribed Bill form designed and made available to them by the Department as per Annexure-D of the Model Rules for Village Electricity Management Board, 2002, for payment of the electricity bills. The payments made by the individual consumers to the VEMBs are paid to the Department after retaining 20 per cent of the total amount received within the stipulated time. All transactions of billing and payments of the individual consumers are maintained by the Board in 'Consumer Register' as per Annexure-III of the Model Rules. And the Department maintains all transactions of billing and payments between the Department and the Board in the 'Record Book'.

VILLAGE ELECTRICITY MANAGEMENT BOARD

Nagaland Communitisation of Electricity Management in Villages by Village Council Rules, 2002 requires each village council to constitute a village Electricity Management Board consisting of 5 to 9 members as under:

1.	A person selected or nominated by the Village Council	:	Chairman
2.	Secretary, Village Development Board	:	Member
3.	One woman representative	:	Member
4.	One representative from each Khel (To be nominated by the respective Khel)	:	Member

The village council selects the Member Secretary from amongst one of the Board Member. The tenure of each member is three years and in the event of mid-year vacancy(s), new member(s) may be nominated by the Village Council/Khels for the remainder of that term. The Rules requires the Village Council to inform the Department of the constitution of the Board and submit the list of the members within one (1) month of the constitution of the Board.

The VEMBs members are required to meet at least once in a month and as often as required. A simple majority form the quorum. The Board is empowered to make regulations for the conduct of its day to day business, as by way of delegations of its respective power and functions as may be required for the purpose. The Village council may dissolve the Board with the approval of the Department of Power if it functions in violation of the Nagaland Communitisation of Electricity Management in Villages by Village Council Rules 2002 and the guidelines issued by the Village Council.

Functions of the Village Electricity Management Board

The board functions within the guidelines framed by the Village Council which are on the basis of parameters prescribed by the Department of Power from time to time. The following are the functions of the VEMBs:

Administrative Functions:

1. The Board monitors the availability of the power supply in the village and requisitions the assigned field staff of the Power Department as required.
2. The Villages council/Board coordinates and assists in the work of clearing of tress/objects touching the electrical lines within the vicinity

of the village, for the prevention of accidents and interruption of power supply.

3. The Board is responsible for the safe custody of all the equipments within the village such as. Transformer, electric poles, conductors etc.
4. The Board checks theft of energy within the village. The Board also makes recovery of loss ensuring out of theft of energy as may be determined and in appropriate cases reports to the Village Council for taking punitive action in accordance with law.
5. The Board reports to the SDO (electrical) about the absence, negligence duty or any misconduct/malpractices of the field staff assigned to the village. The board shall also report of good performance deserving recognition.

Maintenance of Record and Accounts:

1. The Board maintains daily records of major power failure and submits the record to the SDO (Electrical), at the end of each month.
2. All the electricity bill served by the Department of power and payment made by the Department is maintained by the board in a record book.
3. The Board maintain a separate consumer register containing the month wise details of every individual household/consumer
4. The board maintain a consumer wise load in a log sheet and update any increase or decrease in load in this log sheet
5. The village council shall constitute an audit Committee of not less than 3 members to audit all the account, transactions and records of the Board at least once in a year.

ROLE OF THE DEPARTMENT UNDER COMMUNITISATION

The Department of power is the nodal Department for coordinating the Communitisation of electricity management in the villages, through Single Point Metering and billing and the Chief Engineer Power is in general the overall in charge of Communitisation of electricity management in the villages as well as in urban areas. Under all the circles, divisions and sub-divisions, the Superintendent Engineers, executive engineers, SDO and JE carry out different task in implementation of Communitisation programme. Roles and responsibilities of all these electrical officers of the Department under Communitisation are highlighted below:

Superintendent Engineer (Electrical)

1. As the administrative head of the Electrical Circle, the Superintendent Engineer (SE) coordinates the activities in the divisions, relating to data collection of useful points and selection of villages for implementation of Single Point metering and billing.
2. The SE (E) ensures that suitable training is conducted in respect of Departmental Officers and staff and the VC/VEMB for the smooth implementation and effective functioning of the SPM.
3. The SE (E) conducts an annual inspection of all transactions executed between the Department and the board. The officers shall also independently hear grievances of the villages and suggest and/or take remedial action.

Executive Engineer (Electrical)

1. The Executive Engineer (EE) is overall in charge of the divisions for execution of all works for implementation of the SPM in the villages.
2. The EE (E) is responsible for the coordination between the SDO (E) and the VCs for the data collection of useful points and shall ensure authentically of the same.
3. The EE (E) is responsible to prepare the action plan works in the villages relating to installation of single point meters, line modifications etc.

4. The EE(E) also inspects the accounts of SPM villages in the Sub Division, at least twice in a year i.e., half-yearly and submit a report in respect of each inspection, to the SE(E).

Sub-divisional Officers (Electrical)

1. The SDO (E) supervises the works for implementation of SPM in the villages
2. The SDO (E) explores all possibility to ensure stable power supply to the villages.
3. The SDO (E) maintains a daily interruption report for timely restoration of power supply to the villages.
4. The SDO (E) is responsible to ensure accuracy of SPM at the time of installation, with the assistance of the staff of the METER Inspection & Testing Centre, wherever available.
5. The SDO (E) monitors and maintains accounts of all transaction executed between the Department and the VCs/VEMBs.
6. The SDO (E) takes all the readings of the SPM, at least three (3) times in a year. During such inspection, the technical condition of the meter(s) such as, phase sequence, terminal connection, seal etc. shall also be checked and a report shall be submitted to the EE (E).
7. The SDO (E) is also responsible to monitor the payment of bills and the outstanding dues of all the villages under single point metering and shall carry out disconnection of supply to such village(s) which fails to make payment within 45 + 7(notice) days.

Junior Engineer (Electrical)/Section in-charge

1. The JE (E) implements all the metering works on location in the village, under the direction of the SDO (E).
2. The JE (E) supply the daily interruption data to the SDO (E) and any major breakdown of power is reported immediately to the SDO (E).

3. The JE (E) surveys the requirement in the villages of line extension, augmentation of transformer, street lights etc. and submit the report to the SDO (E)
4. The JE (E) takes readings of the SP meters in all the villages under SPM, at least four (4) times in a year. During such inspections the technical condition of the meter(s) are checked and a report is presented to the SDO (E).
5. The JE (E) also conducts routine check to the sub-stations and lines in the villages, with respect to peak load condition of the transformer, level and dielectric strength of the transformer oil, sub-station earthing and jungle clearance. Remedial measures are initiated if any abnormal condition is detected. A log sheet is maintained separately for every village.
6. The JE (E) assists the Board in the preparation of individual consumer bills for an initial period of three (3) months from the date of implementation of the SPM.

EXPANSION OF SPM TO URBAN AREAS

With successful beginning of the SPM programme in villages, Dop has initiated steps to extend the programme to urban areas. In an urban set-up, single point refers to a transformer. The consumers connected with a given transformer would receive a single bill from DoP and share it among themselves based on metered consumption. Like VEMB, the consumers will form an Urban Electricity Management Board (UEMB), which will take up the responsibility of billing and revenue collection after signing a MOU with DoP. UEMB is entitled to a rebate on tariff payable to DoP.

The Department experimented the concept of the SPM in one ward each in Dimapur and Kohima through UEMBs in the line with the VEMBs in Villages during April/May 2004. The result showed an improvement in revenue to the tune of 90 per cent and increase in revenue collection of more than 200 per cent (DoP, Nagaland).

The Nagaland Communitisation of Public Institutions and Services Act, 2002 however had a limited jurisdiction of applicability only in villages. The Department therefore, moved a proposal for amendment of the act to enable extension of the act to the urban areas as well. The proposal for amendment was passed in the assembly and approved during June 2004. Accordingly, the Government issued the notification for the Model Rules and Additional Conditions of Supply for three UEMBs on 16th of July 2004. Since then SPM have been implemented in 12 wards in Kohima, Dimapur and Mokokchung.

STATUS OF VEMB/UEMB UNDER THE ELECTRICITY ACT, 2003

Under the state's own Rules 2002, the status of VEMB/UEMB is that of a bulk consumer who is authorized to supply electricity to end user within its jurisdiction. This role may be retained subject to the provisions of the Electricity Act, 2003. According to Section 12 of the Act 2003, one requires license for distribution/trading of electricity. However, Section 13 grants exemption. Under the provision of this section, local authority, panchayat institutions, users' association, co-operative societies, non-government organizations, or franchisees shall not require license for distribution or trading of electricity provided they are allowed to do so through notification by the appropriate regulatory commission, on the recommendations of the appropriate government, subject to such conditions or restrictions, if any, and for such period or periods as may be specified in the notification. Obviously, VEMB/UEMB may be covered under Section 13 and shall not require distribution/trading license but only for the periods notified by the appropriate regulatory commission. Thus, Section 13 is somewhat restrictive in granting exemption from distribution/trading license.

However, as provided under section 14, DoP as a distribution licensee can authorize VEMB/UEMB as person (agent or franchisee) to undertake distribution of electricity in a specified area within its area of supply and as such VEMB/UEMB shall not require any license from the appropriate regulatory commission. DoP, of course shall remain responsible as license holder for distribution of electricity by VEMB/UEMB in the specified area.

The power of VEMB/UEMB to fix tariff for consumers under its jurisdictions given under the state's own Rules 2002 is not valid under the Act 2003. The sale of electricity by VEMB/UEMB to end-users has to be treated as retail sale of electricity and, as stipulated under Section 62 (1) (d) of the Act 2003, only the state regulatory commission has the power to determine retail tariff. Even the state government does not have any power to fix tariff for any category of consumers including local bodies and bulk consumers. However, the present system of allowing tariff rebate to VEMB/UEMB may be continued without empowering them to set the retail tariff.

IMPLEMENTATION OF SINGLE POINT METER

PROCESS OF IMPLEMENTATION OF SINGLE POINT METER (SPM) SCHEME IN VILLAGES

With the promulgation of the Government notification of Nagaland Communistisation of Electricity Management in Villages by Village Councils Rules, 2002, the Department targeted 155 villages to experiment with the scheme on pilot basis across the state.

During the year 2002-2003, DOP targeted 155 villages for SPM but in due course of implementation identified and implemented the programme in 158 villages. Installation of HT meters was started in August

2003 and most of the identified villages were covered by late September 2003. The billing operation started immediately from October/November 2003.

The introduction and implementation of the programme was undertaken in various steps involving:

1. **Data collection:** Data collection to ascertain total number of electrified households and useful points of each household in a village.

2. **Constitution of VEMBs:** In all the identified villages, VEMBs were constituted and completed the formalities of MOU between the Department and the Village Council as per the Model Rules 2002. The Department also carried out a massive awareness campaign in all the identified villages.

3. **Imparting training to VEMBs on the electricity revenue management aspect:** The training to the Village Councils/VEMB was provided emphasizing on:
    - Concept of single point metering and Communitisation
    - Energy consumption and the tariff
    - Useful points data collection/updating and calculation of monthly rate per useful points
    - Need for Conservation of Energy
    - Preparation of Bills for individual households by the VEMBs, collection and payment to the Department.
    - Maintenance of various accounts and record as per the Model Rules 2002.

4. **Installation of Single Point Meter:** The Department along with the contracting firm began the installation work of Single point meter in all the identified villages from August 2003 and completed the installation

in 139 villages by September 2003 and the work in 19 villages was completed by February 2004.

5. **Billing:** Though it is normally desirable that the meter is kept under observation for some period before starting the billing process to avoid disputes over the malfunctioning in future, the billing operation for the SPM was started with immediate effect by October 2003.

REVENUE COLLECTION OF THE INITIAL MONTH AFTER COMMUNITISATION (IN 158 VILLAGES)

The initial report of the status of SPM billing and the sample analysis depicts a very favorable trend both for the Department as well as for the VEMBs. Table 5.1 shows the summary of Revenue collection in 6 electrical divisions before SPM and after SPM for Oct 2003.

Table 5.1

Summary of Revenue Collection Pre-SPM and Post-SPM for October 2003

Division	**Pre- SPM (Rs.)**	**Post-SPM (Rs.)**	**% increase**	**20% rebate for VEMBs**
Mokokchung	117525	223119	90	54,451
Changtonya	19472	22420	15	5,605
Dimapur	62268	113647	83	28,412
Kohima	27038	60062	122	15,016
Phek	581	720	24	1,031
Mon	14418	28566	98	7,142
Total	**241302**	**448534**	**86**	**1,11,656**

Source: Departmental data.

The revenue collection in the identified villages shows an increase by 86 per cent after the implementation of the SPM. The percentage of revenue collection to total billed in the rural areas was as low as 30 per cent pre-SPM. Since the analysis in Table 5.1 shows an encouraging figure the Department decided to go ahead with the implementation of the scheme in phase manner covering the whole state. Communitisation of electricity management is under implementation in a phased manner.

SOURCES OF FUND FOR IMPLEMENTATION OF SPM

Year wise funding for the Programme from various sources has been given in Table 5.2.

Table 5.2

Year-wise Source of Funds for Communitisation

Year	Amount (Rs. in lakh)	Source
2003-04	10	CM Corpus Fund
2004-05	Nil	Nil
2005-06	100	Additional Central Assistant (ACA)
2006-07	250	ACA
2007-08	200	ACA
2008-09	200	State Plan Allocation (SPA)
2009-10	450	SPA

Source: Departmental data

The preliminary implementation of SPM was taken up under the Accelerated Power Development Reforms Programme (APDRP), a Government of India sponsored scheme for implementation of effective energy auditing and accounting, which envisages installation of metering equipment in all Distribution Transformers. A sum of Rs.131.85 lakh under APDRP scheme was provided initially for investment in equipments and installation of SPM. An additional sum of Rs. 10 lakh was provided under the Chief Minister's Corpus Fund for meeting the expenses of training, course material, survey and data collection, printing of various booklets and overheads & administrative expenses. The Model Rules 2002 was also translated into different Naga dialects. The fund provided for the programme has been for capacity building, training, purchase of stationeries and the like items of VEMBs and infrastructural development.

STATUS OF COMMUNITISATION

The number of villages communitised, during the five years period, from 2002-03 to 2009-10 is given in the Table 5.3.

Table 5.3

No. of Villages Communitised as on March 2010

Year	No of VEMBs
2002-03 & 2003-04	158
2004-05	123
2005-06	171
2006-07	100
2007-08	Nil
2009-10	250
Total	**802**

Source: Departmental data.

The Communitisation programme has been launched and implemented successfully in 802 villages under VEMB and 12 urban colonies in Kohima, Dimapur and Mokokchung under UEMB with positive results. Efforts are being made to bring all the remaining villages under the programme. The number of communitised villages division-wise as on 31st March 2010 under VEMB is given in Table 5.4.

Table 5.4

Communitised Villages Division-wise as on 31st March 2010

Electrical division	No. of SPM village
Chumukedima	124
Tuensang	136
Dimapur	6
Zunheboto	103
Mokokchung	77
Mon	56
Kohima	75
Wokha	70
Changtongya	76
Phek	79
Total	**802**

Source: Departmental data.

Revenue Collection Efficiency under Communitisation

The total amount billed, total collection of revenue and percentage of collection and arrear in all the divisions since Communitisation of electricity management in the villages in 2003 till 31st Dec 2009 has been given in Table 5.

Table 5.5 shows the overall revenue collection efficiency under Communitisation since the implementation of the programme till Dec. 2009. The total of electricity billed was Rs. 128.85 lakh, out of which Rs. 936.42 lakh were collected representing a revenue collection efficiency of 72.77 per cent. The revenue collection efficiency in Mokokchung Electrical division of 82.09

per cent is significantly higher. The efficiency of revenue collection was recorded lowest of 32.36 per cent in Dimapur electrical division.

Table 5.5

Revenue Collection Efficiency under SPM Programme

(Rs. in Lakh)

Electrical division	No. of SPM village	Total billed (Oct.2003 upto Dec 2009 (Rs.)	Total collection (Oct 2003 upto Dec 2009 (Rs.)	Arrear (Rs.)	% of collection	% of Arrear
Chumukedima	124	180.22	136.21	44.01	75.58	24.42
Tuensang	136	173.6	141.48	32.12	81.50	18.50
Dimapur	6	45.12	19.03	26.09	42.18	57.82
Zunheboto	103	54.23	17.55	36.68	32.36	67.64
Mokokchung	77	275.12	225.84	49.28	82.09	17.91
Mon	56	10.15	5.2	4.95	51.23	48.77
Kohima	75	295.11	216.38	78.73	73.32	26.68
Wokha	70	106.47	79.86	26.61	75.01	24.99
Changtongya	76	79.86	51.34	23.44	64.29	35.00
Phek	79	66.97	43.53	23.44	65.00	35.00
Total	**802**	**1286.85**	**936.42**	**350.43**	**72.77%**	**27.23**

Source: Departmental data.

EVALUATION OF COMMUNITISATION OF ELECTRICITY MANAGEMENT IN RURAL AREA: A FIELD SURVEY

A field survey was conducted to evaluate the effectiveness and progress of Communitisation of electricity in rural areas by administering structured questionnaires. Respondents were asked to specify to which extend they agree or disagree with the progress, achievement, and operational effectiveness of Communitisation. Two sets of structured Questionnaire were prepared for the purpose of the survey. Information was collected through these two structured questionnaires (Questionnaires to the VEMBs and Department) as shown in Appendix-1.

The survey was conducted in five electrical divisions. The Five electrical divisions covered under the study are Kohima Electrical Division, Dimapur Electrical Divisions, Mokokchung Electrical Divisions, Changtongya Electrical Divisions and Phek Electrical Division. Out of 802 communitised villages in the state, VEMBs of 90 villages (Appendix- II) under the five electrical divisions were randomly selected for the study. One set of questionnaires were administered to the VEMBs of the 90 selected sample villages and another set of questionnaires was also administered to 30 officials (in-charge of Communitisation) in directorate and under all electrical divisional offices of the Department of Power.

The primary data collected through the questionnaires were evaluated with the following perspectives:

1. Effectiveness in achieving the objectives of Communitisation in terms of revenue collection, control of power theft, reduction of technical and commercial losses and employment generation in rural areas.
2. Effectiveness of functioning of SPMs and Service delivery under Communitisation
3. Effectiveness of VEMBs as well as the Department in discharging their role and duties under Communitisation

ACHIEVING THE OBJECTIVES OF COMMUNITSATION

Table 5.6 gives the VEMBs' Perceptions on achievement of the objectives of Communitisation of electricity in rural areas and the Department's Perceptions on achievement of the objectives of Communitisation of electricity in rural areas have been shown in Table 5.7.

Table 5.6

VEMBs' Perceptions on Achievement of the Objectives of Communitisation of Electricity

Sl. No	Statements	SA	A	N	D	SD	WS
1.	Collection of revenue has increased after Communitisation	51	47	2			4.49
2.	Power theft after Communitisation has decreased	63	31	4		2	4.53
3.	Setting up of VEMBs has helped in generation of employment in the village	13	20	23	34	10	2.92
4.	The differences between electricity billed and revenue collection has decreased	64	23	13			4.51

Note: SA: Strongly Agree A: Agree N: Neutral SD: Strongly Disagree D: Disagree WS:
Weighted Score
Weights: SA-5, A-4, N-3, D-2, SD-1.

Table 5.7

Department's Perceptions on Achievement of the Objectives of Communitisation

Sl. No.	Statements	SA	A	N	D	SD	WS
1.	Collection of revenue has increased after Communitisation	71	29				4.71
2.	Power theft after Communitisation has decreased	71	29				4.71
3.	Setting up of VEMBs has helped in generation of employment in the village	43	43	14			4.29
4.	The differences between electricity billed and revenue collection has decreased	61	29	10			4.51

Note: SA: Strongly Agree A: Agree N: Neutral SD: Strongly Disagree D: Disagree
WS: Weighted Score
Weights: SA-5, A-4, N-3, D-2, SD-1.

The success of the Communitisation of electricity management in rural areas can be judged by its effectiveness in achieving the objectives. For that reason, the structured questionnaires were administered to VEMBs of 90 villages and to 30 Departmental official in-charge of Communitisation under all the electrical divisions.

It can be seen from Table 5.6 and 5.7 that the implementation of Communitisation has helped in improving the collection of revenue in the rural areas. Out of 90 VEMBs, 51 per cent has strongly agreed and 47 per cent has agreed that the collection of revenue after Communitisation has increased. The officials of the Department are also of the opinion that the revenue collection has increased significantly after Communitisation. Out of 30 respondents, 71 per cent strongly agreed and 29 per cent agreed that collection of revenue has increased after Communitisation. Therefore, it can be inferred that the Communitisation has succeeded in improving revenue collection in rural areas.

One of the reasons for massive technical and commercial losses in the state is due to power theft; so, one of the objectives of Communitisation of electricity is to control power theft in the villages. After Communitisation, in all the communitised villages, VEMBs were effective in reducing the prevailing high scale of power theft in rural areas. During the field study it was found that the VEMBs firmly notified in the villages regarding the consequences of the offence of power theft. And likewise the VEMBs frequently check hooking of power, illegal connections and tampering of meters in the village. After Communitisation, not a single case of power theft was reported to the VEMBs in the surveyed villages.

As shown in Table 5.6 and Table 5.7, 63 per cent of VEMBs of sample villages and 71 per cent of Departmental officials strongly agreed that power theft in the villages has reduced significantly after Communitisation.

Controlling of power theft after Communitisation in the villages was also made possible because of the introduction of useful point method of billing. Since no individual households meters are installed in almost all the communitised villages, the consumers cannot tamper the meters and also it was found that in about 93 per cent of the sample communitised villages, useful points method is used and in 5 per cent of the sample villages billing according to individual households is used. And in about 2 per cent of the sample villages both useful point method as well as individual household metering method of billing is used. In these villages, households where no meter were installed or in case of defected meter, billing is done using useful method and billing of households with meter are done as per the meter reading.

Table 5.6 also shows that majority of the VEMBs were of the view that the differences between electricity billed and revenue collection also decreased significantly. Non- payment of electricity bill by rural consumers resulted in huge accumulation of arrears. Many rural consumers were using the electricity supply continually without paying for it. After Communitisation such non-payments of bills were reduced and accumulated arrears were also over the years recovered in some villages. Communitisation has also succeeded in reducing accumulated arrears in rural areas.

However, the provision of 20 per cent rebate on tariff to the VEMBs by the Department has not helped much in generation of employment in the villages. In most of the villages the VEMBs do not employ bill assistants or meter readers due to lack of funds. Therefore, the members of the boards take turns to do the job of billing and collection. The members of the board while they have been performing the duties of controlling power theft, maintenance of electrical equipments, meter reading, billing and collection of revenue, they get very less remuneration on the work done.

The weighted score of the opinion of the VEMBs of the statement that setting up of VEMBs has helped in generation of employment in the village is only 2.92. This shows that almost all the VEMBs are of the opinion that Communitisation has not helped in generation of employment in the villages. However, on the same statement the perception of the officials of the Department weighted score is 4.29, which means that a large majority of respondents agree with the statement.

As shown in Table 5.6 out of the possible best weighted score of 20 (i.e. 5X4) of the perceptions of the VEMBS on achievement of objectives of Communitisation, the overall weighted score is 16.45. And the weighted score of the perceptions of the Department on the achievement of the objectives is 18.22 as shown in Table 5.7. This shows that a large majority of respondents both the VEMBS and the officials of the Department agree that Communitisation has been successful in achieving its objectives.

However, there was a significant difference in perceptions of the VEMBs and the Department on the achievement of Communitisation. The Department's perceptions on success of achieving the objectives has been more encouraging than the VEMBs, though both parties agree that Communitisation has achieved in improving revenue collection, controlling of power theft and reduction of technical and commercial losses in rural areas.

SERVICE DELIVERY UNDER COMMUNITISATION

The effectiveness of Communitisation can also be evaluated in terms of service delivery under the programme. Service delivery has been assessed by the factors like service quality in terms of stable power supply, field staff responsiveness, getting new connection etc. VEMBs' perceptions on service delivery after Communitisation are shown in Table 5.8.

Table 5.8

VEMBs' Perceptions on Service Delivery after Communitisation

Sl. No.	Statements	SA	A	N	D	SD	WS
1.	There is less frequency of power failure in the village after Communitisation		10	22	45	23	2.19
2.	Duration of power failure in the village has decreased		15	26	32	27	2.29
3.	Getting new connection in the village is much easier under Communitisation	20	31	32	17		3.54
4.	Time taken for the new connection under Communitisation is quick	14	56	30			3.84
5.	Communitisation encourages establishment of commercial enterprises and cottage industries in the village	3	21	16	45	15	2.52
6.	The field staffs of the Power Department are co-operative and helpful	1	66	22	11		3.57

Note: SA: Strongly Agree A: Agree N: Neutral SD: Strongly Disagree D: Disagree WS: Weighted Score
Weights: SA-5, A-4, N-3, D-2, SD-1.

Though both the VEMBs and the Department agree that there has been an increase in revenue collection, reduction in power theft and decrease in differences between electricity billed and revenue collection after Communitisation; the study shows that the service delivery in rural areas has not been impressive. The weighted score of the perceptions of the VEMBs on the statement that 'there is less frequency of power failure in the village after Communitisation' is 2.19. And on the statement that 'duration of power failure in the villages has decreased after Communitisation' is 2.29. This shows that there has been no improvement in quality of power supply. About 70 per cent of the VEMBs are of the opinion that there has been no improvement in frequency as well as duration of power failure in the sample villages.

However, it was observed that, in relation to getting new connection of electric supply in the villages has become easier after Communitisation and also time taken for getting such connections also has become lesser. The problems which were faced by rural consumers in getting new connection have somewhat improved. It was also observed that the field staffs of the Department were co-operative and helpful.

ROLE OF THE DEPARTMENT

Table 5.9 presents the VEMBs' Perceptions on the Role of the Department of Power under Communitisation.

Table 5.9

VEMBs' Perceptions on Role of the Department of Power under Communitisation

Sl. No.	Statements	SA	A	N	D	SD	WS
1.	Trainings are conducted regularly for effective functioning of SPM		15	45	30	10	2.65
2.	Suggestions of the VEMB are given due weightage by the Department		39	38	16	7	3.09
3.	SDO(E) seriously and sincerely performs his responsibility		39	54	7		3.32
4.	The SDO(E) monitors the work properly		39	57	4		3.35
5.	The JE comes to the village regularly to check the works		37		22	41	2.33

Note: SA: Strongly Agree A: Agree N: Neutral SD: Strongly Disagree D: Disagree
WS: Weighted Score
Weights: SA-5, A-4, N-3, D-2, SD-1.

Table 5.9 indicates that a large majority of VEMBs are of the view that the SDO (E) seriously and sincerely performs his responsibility and also is affective in monitoring the work properly. And majority of the respondents also agreed that the VEMBs being the partners of the Department, the suggestions of the VEMBs are considered and gave due weightage by the Department.

However, majority of the VEMBS are of the opinion that the JE (E) does not visit the villages regularly to check the works. It is the responsible of the JE (E) to conduct routine check conduct routine check to the sub-stations and lines in the villages, with respect to peak load condition of the transformer, level and dielectric strength of the transformer oil, sub-station earthing and jungle clearance. Remedial measures are initiated if any abnormal condition is detected. But, from Table it is observed that 57 per cent of the respondents strongly disagree 'that the JE (E) visits the villages regularly'.

Furthermore, many respondents feel that proper trainings for effective functioning should be conducted regularly. Only 15 per cent of the respondents agreed that the trainings are conducted regularly. 10 per cent of the respondents are of the view that not a single training was conducted by the Department in their villages. It is seen from Table 5.9 that the weighted score of the VEMBs' perceptions on the training conducted is only 2.65; which shows that majority of the respondents disagree with the statement that 'trainings are conducted regularly'. Therefore, it is imperative on the part of the Department to impart formal trainings for proper functions of SPM in the villages.

The main problem reported by the VEMBs surveyed is the improper training facilities. No formal training on meter reading, revenue collection, and maintenance of record and other technical aspect are provided.

Trainings are not conducted regularly, it was provided only for one time in all the surveyed villages after the commencement of the operation of VEMBs.

Lack of trainings among the members hampers in effective functioning of SPM system in the villages. Since there is no permanent staff employed in villages by the VEMBs and also the member of the boards change after every 3 three years, the new members should be provided with formal trainings. Capacity building of the VEMBs on various technical aspects as well as commercial, social and managerial aspects is an immediate need. Otherwise, the scheme may fail in long run and casualties may occur.

Overall weighted score of the perceptions of the VEMBs on the role of Department under Communitisation is 14.79 out of best score of 25(5X5). This indicates that majority of VEMBs are of the view that the Department has not been effective in discharging their role under Communitisation.

ROLE OF THE VEMBS

Department's Perceptions on Role of the VEMBs under Communitisation has been presented in Table 5.10.

It can be seen from Table 5.10 that a majority of the respondents agree that the VEMBs have been discharging their duties effectively in the villages. Out of 30 respondents, 86 per cent agreed that the VEMBs monitor the availability of power supply in the village regularly. And majority of the respondents also somewhat agreed that the VEMBs maintain the record of account properly. Therefore, it can be stated that after Communitisation consumer records in villages have also been systematized. And 57 per cent of the respondents strongly agreed and 29 per cent of the respondents agreed that the VEMBs assist and co-ordinate in clearing the trees/objects for prevention of accidents and interruption of power supply in the village.

Table 5.10

Department's Perceptions on Role of the VEMBs under Communitisation

Sl. No.	Statements	SA	A	N	D	SD	WS
1.	The VEMBs monitor the availability of power supply in the village regularly		86	14			3.86
2.	The VEMBs are effective in recovering the accumulated arrears in the villages	42	34	13	11		4.07
3.	The VEMBs made the payments of collected revenue on time		37	32	25	6	3.00
4.	The VEMBs maintain the records of accounts properly	28	43	29			3.99
5.	The VEMBs maintain all the electrical equipments in the village properly		43	43		14	3.15
6.	The Audit committees are effective in executing their work	29	57	14			4.15
7.	For prevention of power supply interruption and accidents the VEMBs coordinates and assists in the work of clearing the trees/objects.	57	29	14			4.43

Note: SA: Strongly Agree A: Agree N: Neutral SD: Strongly Disagree D: Disagree WS: Weighted Score
Weights: SA-5, A-4, N-3, D-2, SD-1.

The respondents also to some extent agreed that the VEMBs maintain the electrical equipments in the villages properly. 14 per cent of the officials of the Department were of the view that the maintenance of the electrical equipments like transformers, SPMs, electrical poles and lines in some villages were very poor. Due to such poor maintenance in villages, break down of transformers and damages in other electrical equipments arises which hampers the supply of power.

After Communitisation the maintenance of electrical equipments in the villages is the responsibility of the VEMBs. It was observed that the official in-charge of Communitisation were of the view that electrical equipments in most of the villages were not maintained properly by the VEMBs. One of the reasons for such poor maintenance of equipments in the villages is due to lack of technical knowledge among the members of the board. It was also observed that since it is the duty of the VEMBs to take care of the equipments, the field staffs were less concern about it.

VEMBs has also been effective in recovery the arrears in some villages. 42 per cent of the respondents strongly agreed that VEMBs has been effective in recovering the accumulated arrears in the villages.

For effective performance of VEMBs, prompt payment of bills and also paying the arrears by the households; some villages under Kohima and Mokokchung divisions were acknowledged by the Department by providing Compact Florescent Lamp (CFL) luminaries as a onetime incentives to each household (2 Nos each) to create awareness on energy conservation as well as to minimize the frequent breakdown of the Distribution Transformer due to overloading. Such acknowledgement should be practiced by the Department for further strengthening and encouraging the VEMBs.

SECTION II

POWER SECTOR REFORMS AND RESTRUCTURING

In India, gradual evolution has been taking place within the power sector with the opening of the sector to the private players. However, the state still continues to dominate the sector. The changing environment of the power industry can be divided into three distinct phases as follows:

- **First Phase**: Establishment of SEBs i.e. Shift from private to public
- **Second Phase**: Establishment of central level generating companies i.e. consolidation of public sector
- **Third Phase**: Initiation of reforms i.e. shift from public to private

First Phase: From private to public: Till the India's independence in 1947, the supply of electricity was confined mainly in and around urban centers, chiefly for lighting purposes. Most of the ventures were due to the private entrepreneurs. However, after the independence, the enactment of the Electricity (Supply) Act in 1948 changed the scenario. This resulted in the establishment of State Electricity Boards (SEBs). SEBs took over the licensees operating in the private sector and enlarged the customer base and made the electricity available to the rural areas.

Second Phase: Consolidation of Public Sector: The eighties ushered in the era of central generating companies. During this period, the Government of India established generating companies like NTPC and NHPC. In 1986 the PFC was created to supplement the budgetary resources of the central government. In 1989, NTPC was unbundled and the transmission assets were transferred to a newly created company known as PGCIL. PGCIL was entrusted with the task of development the regional and national Grid.

Third Phase: Shift from public to private: The growing fiscal burden and poor performance of most of the SEBs and EDs forced the government to initiate reforms and make way for private investment. Some of the important initiatives taken by the government are as follows:

1. **Legislative Reforms**: In October 1991, GOI Formulated a policy to encourage greater participation by privately owned enterprises

in the activities of electricity generation, supply and distribution. The policy widened the scope for private investment in the electricity sector by introducing certain financial, administrative and legal reforms and modifications. Based on this policy, GOI framed a scheme, which enabled the private sector to establish licensee companies under section 3 of the Indian Electricity Act. 1910. i.e. companies licensed by the relevant State Government to supply electricity in a specified area within that state.

2. **Financial Reforms**: Similarly several changes were made relating to the financial matters. Some of them are as follows:
    a. Permissible debt: equity ratio for private sector licensees was increased to 4:1, however over the years brought down to 2.33:1.
    b. Up to 100 percent of the equity stake in such private sector enterprises could be held by foreign investors.
    c. The rate of return of licensees was raised from bank rate +2 percent to bank rate + 5 Percent for future investment
    d. State Governments were allowed to make special appropriations to cover higher debt redemption obligations of the licensee than had previously been the case.
    e. Licensees were permitted to capitalize interest during construction as part of the original cost of the project.
    f. Special appropriations may be permitted by the state Government each year to cover the higher debt redemption of the licensee.

3. **Administrative Reforms**: A Revised list of clearances for establishing projects in the electricity sector was provided and a High Powered Board was established to increase the pace at which such projects were cleared and to resolved outstanding

issues within a definite time frame and an investment Promotion Cell was established to provide information and assistance to prospective investors in the electricity sector.

4. **Legal Reforms**: The limit above which CEA approval had to be obtained in relation to electricity schemes was increased from Rs. 5 crore to Rs. 25 crore. Licensee companies were permitted to be granted licenses of 30 years in the first instance with subsequent renewals of 20 years, rather than initial licenses of 20 years and renewals of 10 years, as had previously been the case. This was done to ensure stability in the operation of the licensed activities. Effect was given to the above legal reforms by amendments to the Indian Electricity Act. (1910) and the Indian Electricity Supply Act.

5. **Structural Reforms**: As per the Coelho Committee's recommendations, it was decided to undertake the following:
    a. Break the monolithic structure of the SEBs into manageable and viable organizations;
    b. Create a regulatory mechanism which could set down the technical and financial parameters for performance;
    c. Identify and ensure a transparent arrangement by which the private sector could be involved in restructuring the sector.

6. **Regulatory Reforms**: A comprehensive regulatory regime has been ushered in by setting up the CERC and SERCs, for rationalization of tariffs, for transparent policies regarding subsidies in the power sector and for the promotion of efficient and environmentally friendly policies (Ramana, 2001).

GENESIS OF THE REFORM PROCESS

The reform process in power sector in India was initiated in 1991 with the introduction of Independent Power Producers (IPP) paradigm. Government initiated reform process due to the following reasons:

i. the ever-widening gap between the demand and availability of electricity,
ii. the poor technical and financial performance of the State Electricity Boards and
iii. inability of the Central and State Governments to finance and mobilize resources for generation capacity expansion projects, making third party investment in power sector imperative.

The initial step in this direction has been the amendment of legislation governing the electricity sector in 1991. The Indian Electricity Act, 1910 and the Electricity (Supply) Act, 1948 were amended to attract private investment in power generation. The first policy statement of October 1991, titled the Government of India Resolution – Policy on Private Participation in Power Sector, achieved the following:

- it allowed the private sector to ‘‘set up thermal projects, hydroelectric projects, and wind/solar energy projects of any size’’. Generators were invited to submit unsolicited proposals to SEBs for the purpose;
- it allowed the private sector to ‘‘supply and distribute energy in a specified area, … (even without ownership of) a generating station’’;
- foreign ownership up to 100% was allowed;
- the contract between the generator and the SEB would be a long-term power purchase agreement (PPA) offering a guaranteed return on equity of 16%. Foreign investors would receive exchange rate protection up to the benchmark return and for servicing the costs of foreign debt.

Acknowledging the imperative for reforms at the state level, the Government of India decided in 2000 to develop individual contractual frameworks with states, conditioning its financial support on the implementation of reforms. The Memoranda of Understanding it signed with the different states affirm the joint commitment of the parties to reform the power sector, stipulate the reform measures that the state will implement and define the support that the Government of India will provide.

One of the explicit aims of these memoranda is to restore the commercial viability of the electricity sector, providing reliable and quality power at competitive prices to all consumers in the state. The main focus is on reforms in the distribution sector. Through measures such as privatization of distribution, metering, and reducing pilferage, the Government of India is trying to improve revenue collection and to turn around the deteriorating ratio of average revenue to cost of supply. The Power Finance Corporation (PFC) is in charge of channeling the central funds to the states.

ELECTRICITY ACT, 2003

The Electricity Bill 2003, approved in Indian Parliament in May 2003, aims to enhance the scope of power sector reforms. This act consolidates all the existing laws and introduces provisions with respect to new developments in the sector. It focuses on creating competition, protecting consumer interests, rationalizing tariff, etc. All the necessary powers including issue of licenses are given to the regulators which are made independent entities from the government.

Salient Features of Electricity Act, 2003

Some of the major provisions of the Electricity Act are:

1. Generation has been delicensed and captive generation is being freely encouraged and permitted. For hydro projects, an approval of the State Government and clearance from the Central Electricity Authority (CEA) [5] are needed to check the safety aspects and optimum utilization of water resources.

2. There will be Government owned Transmission Utility at the Central as well as State level, having the responsibility of ensuring that the transmission network is developed in a planned and co-ordinated manner to meet the requirements of the sector. The load dispatch function can be integrated with or separated from the Transmission Utility and in either case it will remain under Government control

3. Provision for private transmission licensees has been made in this act.

4. Open access in transmission with provision of surcharge for cross subsidy and this surcharge will be gradually phased out.

5. Distribution licensees are free to undertake generation and generating companies are free to take up distribution licensees.

6. For rural and remote areas stand alone systems for generation and distribution would be permitted. This provision seems to be aimed at encouraging Captive Power Plants (CPPs) and Distributed Generation (DG). Authorized For rural areas decentralized management of distribution through Panchayats, Cooperatives, etc. would be permitted.

7. Regulatory Commissions are authorized to issue a license for power trading and they will fix up the upper limit on power trading margins.

8. If there is directly commercial agreement between a consumer and a generating company or trader, the price of power would not be regulated and only the transmission and wheeling charges with surcharge would be regulated.

9. State Governments can convert State Electricity Boards (SEBs) into companies or continue them as distribution licensees.

10. An Appellate Tribunal has been created for disposal of appeals against the decision of the CERC and State Electricity Regulatory Commissions (SERC) so that there is speedy disposal of such matters. The SERC is a mandatory requirement.

REFORMS STATUS IN INDIAN STATES

The implementation of ongoing reforms has not been uniform in the country. Various states are at different stages in the implementation of power sector reforms as envisaged in the Electricity Act 2003. The states can be grouped in terms of levels of reforms implemented:

1. States which have established only the State Electricity Regulatory Commissions (SERCs) without undertaking unbundling and corporatization of the SEBs.

2. States which have unbundled the SEBs into Separate Corporation and have also created SERCs but did not privatize the transmission and distribution business.

3. States which have unbundled the SEBs into separate power generation, transmission and distribution corporations, and also privatized the distribution business and have set up SERCs.

The status of power sector reforms in other Indian states as on 31st Dec 2010 has been shown in Table 5.11.

Table 5.11

Status of Power Sector Reforms (as on 31st Dec 2010)

SL. No	States/ UT	Reform Status
1.	Delhi and Orissa	· SERC functional · Tariff Orders issued · SEB unbundled · Distribution privatized · Consumer Grievances Redressal Forum established · Ombudsman appointed
2.	Assam, Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tripura, Uttar Pradesh, Uttaranchal, West Bengal.	· SERC functional · Tariff Orders issued · SEB unbundled · Consumer Grievances Redressal Forum established · Ombudsman appointed
3.	Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Kerala, Punjab, Tamil Nadu.	· SERC functional · Tariff Orders issued · Consumer Grievances Redressal Forum established · Ombudsman appointed
4.	Goa, Jammu & Kashmir, Meghalaya, Sikhim, Nagaland.	· SERC constituted
5.	Manipur and Mizoram	· JERC constituted (Manipur and Mizoram) (18.1.2005)
6.	Union Territories	· Joint Electricity Regulatory Commission has been set up for the Union Territories (except Delhi) (2.5.2005).

Source: Ministry of Power, India.

Before enactment of the Electricity Act, 2003, various states had enacted State Electricity Reforms Acts, which provided for reorganization of their State Electricity Board (SEB). So far, 14 states have reorganized their SEBs. 10 States namely, Orissa, Haryana, Andhra Pradesh, Karnataka, Uttar Pradesh, Uttarakhand, Rajasthan, Delhi, Gujarat and Madhya Pradesh have done so under their State Electricity Reforms Acts, Assam, Maharashtra, West Bengal (w.e.f.1.4.2007) Chhattisgarh (w.e.f. 1.1.2009) have reorganized their SEBs under the provisions of the Electricity Act, 2003. The SEB of Assam presently continues to discharge the licensee function only for trading of electricity. The Government of Tripura has corporatized its electricity Department. The remaining states of Bihar, Jharkhand, Kerala, Punjab, Tamil Nadu, Meghalaya, and Himachal Pradesh are in the process of formulating schemes for reorganization of their SEBs (MoP, 2007& 2008).

POWER SECTOR REFORMS AND RESTRUCTURING PROCESS AND STATUS IN NAGALAND

POWER SECTOR REFORMS AND RESTRUCTURING STUDY

The government of Nagaland assessed that, in fast changing environment brought about by the rapid expansion of the role of private generators and distribution licenses, the existing configuration of the Nagaland power Dept. as well as its place in the overall organizational, institutional and financial set-up of the sector, are no longer adequate to meet the requirements of the state. Government of Nagaland has thus decided to take necessary steps to distance itself from the power industry, and provide the power sector with operational, managerial and financial autonomy required to operate according to commercial principles.

The Government of Nagaland is firmly committed to bring about comprehensive reforms in the power sector to achieve the aforesaid objectives and accordingly, the Government of Nagaland decided to undertake Power Sector Reforms and restructuring Study under the consultancy of International

Management Institute (IMI), New Delhi for in-depth study and charting out a road map as required under the Indian Electricity Act, 2003. The Terms of Reference (ToR) for conducting the study for Reforms & Restructuring was approved by the state Govt. during March 2002 and commenced the study in April 2003. The objectives of reforms were:

1. Efficient supply of Electricity in terms of quality and cost to support the economic development of the state.
2. Financial sustainability of the sector in mid/long term without the state but state budget support.
3. Organizational restructuring for efficient and effective operation of power systems and delivery of services to consumers.
4. Strengthening rural distribution management through Communitisation.
5. Resource mobilization for capital investments, payment of outstanding liabilities and financing of transition period losses.

The study was sponsored by Power Finance Corporation (PFC). Fields visits and interactions for the study were conducted by several consultants and two seminars were held. Final inception report and recommendations on power sector reforms and restructuring was submitted on 1st March 2004 to the Department of power to examine in detail the feasibility.

THE IMPORTANT RECOMMENDATION OF THE IMI

1. **Setting up of State Electricity Regulatory Commission:** The IMI consultant emphasized the need for establishing an independent State Electricity Regulatory Commission (SERC) under the provision of the Electricity Act, 2003 in their Reform's inception report submitted to the Department. The government of Nagaland was advised to establish a single-member SERC as a joint SERC for the neighboring state (U/s 83 of the Electricity Act, 2003) would not be feasible.

2. **Corporatization and Restructuring:** The recommendations of the IMI- consultants for Reforms study- for reforms along with the road map for corporatization are already submitted to the Government and to the Department for policy decisions. The corporatization model recommended is as under:
    1. A separate State Transmission Utility (STU) in accordance with the Electricity, Act 2003 called the Nagaland Power Transmission Corporation Limited (NPTCL).
    2. A separate entity combining Distribution and Generation called Nagaland Power Development and Supply Corporation Limited (NPDSCL).
    3. A separate Rural Electrification Board.

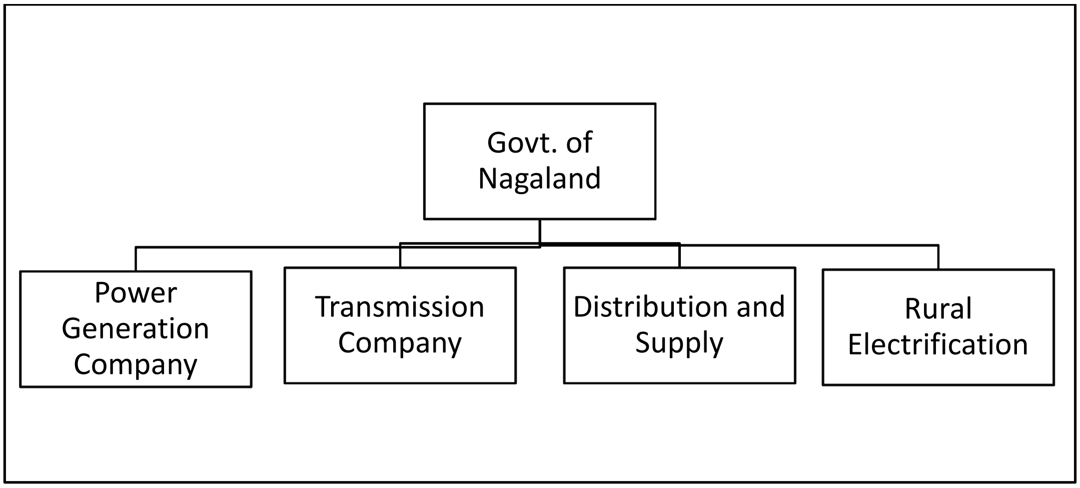
Recommended Corporatization Model

At present, DoP functions within the bureaucratic set up of the government. For every decision, it needs government level clearance and, therefore, faces typical procedural delays including delay in release of funds. Under the present set-up it cannot conduct business on commercial basis and, hence, attain financial sustainability for the power sector. DoP requires operational, managerial and financial autonomy to run the sector on commercial basis, and corporate structure is the logical organizational form for that purpose.

The electricity Act 2003 has liberalized the power sector and has made it mandatory to conduct the business of generation, transmission, distribution and supply of electricity on commercial principle. Corporate structure is more amenable to bringing in this commercial orientation and fixing accountability for performance (both financial and non-financial) at every level of management. For government too, corporate structure makes it easier to identify the extent of hidden subsidies provided to the sector. Exhibit 5.2 presents the unbundling structure.

Exhibit 5.2

Unbundling through Separate Entities



Source: IMI Report on power Sector Reforms of Nagaland, 2004.

NAGALAND ELECTRICITY REGULATORY COMMISSION

As recommended by the IMI consultant, the government of Nagaland decided upon corporatization of power sector and the constitution of the independent state Regulatory commission. The state government constituted the regulatory commission, which is known as the Nagaland Electricity Regulatory Commission (NERC) was constituted in the year 2010 and has issued the first draft of revised tariff in the month of July 2011.

However, the power sector in Nagaland is yet to unbundle and corporatize. Moreover, it is also too early to critically assess the impact of NERC on power sector in Nagaland.

The NERC was constituted as per the powers conferred by Section 87 read with Section 181 of the Electricity Act, 2003. The NERC was set up with the following objectives:

- To determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be within the State.
- To regulate electricity purchase and procurement process of distribution licensees including the price at which electricity shall be procured from the generating companies or licensees or from other sources through agreements for purchase of power for distribution of supply within the State.
- Facilitate intra-State transmission and wheeling of electricity.
- Issue Licenses to persons seeking to act as transmission licensees, distribution licensees, and electricity traders with respect to their operations within the State.
- Promote co-generation and generation of electricity from renewable sources of energy.
- Adjudicate upon the disputes between the licensees and generation companies and to refer any dispute for arbitration.
- Levy fee for the purposes of the EA, 2003. Specify State Grid Code.
- Specify or enforce standards with respect to quality, continuity and reliability of service by Licensees.
- Fix the trading margin in the intra-State trading of electricity, if considered, necessary.
- Discharge such other functions as may be assigned to it under the Act.
- Advise the State Government as mandated under Section 86(2) of the Electricity Act, 2003.

ACCELERATED POWER DEVELOPMENT AND REFORMS PROGRAMME (APDRP)

The Government of India approved Accelerated Power Development and Reforms Programme (APDRP) in March 2003 with a focus on distribution reforms with the following objectives:

- Reduce Aggregate Technical & Commercial losses
- Bring about commercial viability in the power sector
- Reduce outages & interruptions
- Increase consumer satisfaction

The programme has two components namely investment components and incentive components. Under the investment component of the programme, funds are provided as Additional Central Assistance to the state Utilities through respective state Governments for the projects relating to upgradation & strengthening of sub-transmission & distribution network (below 33kV or 66kV) for improving technical and commercial efficiencies of the utilities. Incentive component was introduced to motivate the Utilities to reduce their cash loss as it was felt essential to integrate the investment programme in the distribution segment with an incentive mechanism linked to efficiency improvement. It was envisaged that it will help the Utilities to bring about commercial viability through improvement in billing and collection efficiency. The state utilities are incentivized up to 50% of the actual cash loss reduction by them as grant. The year 2000-01 has been fixed as the base year for calculating the reduction of loss during subsequent years.

IMPLEMENTATION OF APDRP IN NAGALAND

Under the Accelerated Power Development and Reforms Programme (APDRP) the Ministry of Power has approved 3 projects amounting to Rs. 122.27 Crores to be implemented in three phases. The scheme was sanctioned by the MoP after the MoU was signed with the state Government. The MoU stipulates strict guidelines and execution of works on turnkey contract basis. The Department finalized the turnkey contract in packages and awarded to the contractors. The first phase covering feeder metering and improvement of sub-division & distribution amounting to Rs. 8.81 Crores has been completed during 2003-2004. The second phase amounting to Rs. 36.57 crores, covering metering of systems & consumers, Renovation & Modernization and new Sub Stations, new lines and new Distribution systems. The third phase amounting to Rs. 76.88 Crores covering the same scope of works as in Phase-II is ongoing and due for completion. With the completion of the above schemes, the losses in the distribution sector will be minimized through various reforms measures and quality of power supply will be improved. The detail of works undertaken through APDRP is given in Table.

Works Taken up under APDRP and Progress Thereon

The detail of works undertaken by the Department under APDRP and progress thereon are enumerated below:

1. **First Phase (APDRP)** works were executed Departmentally and completed during 2003-04. Works undertaken in first Phase are as follows:
    - 33 KV Feeder metering- 67 Nos
    - 11KV Feeder metering – 72 Nos
    - HT Metering for DTs – 849 Nos
    - Consumer Meter – 5840 Nos
    - New DTs – 12 Nos
    - LT Reconductoring – 58.27 Ckm
    - HT Reconductoring – 57.78 Ckm
    - LT line – 4.81 Ckm
2. **Second Phase (APDRP Phase-1)** works were completed through turnkey Contractors. Works executed under this phase are:

    Metering
    - 33KV Feeder/SS/DT (HT) meters – 107 Nos
    - 11KV Feeder/DT (HT) meters – 140 Nos
    - DTC (LT) – 339 Nos
    - Consumer meters – 26000 Nos

Sub stations

- Renovation and Modernisation – 14 Nos
- Construction of New Sub stations – 7 Nos

Reconductoring and new lines

- 33KV Feeders – 179 Km
- Reconductoring of 33KV Feeder – 69 Ckm
- Reconductoring of 11KV Feeder – 20 Ckm

Distribution Transformers

- Renovation and Modernisation in Dimapur 374 DTs
- New DTs – 33 Nos
- New 33KV Feeder for new DTs – 6 Ckm
- New 11KV Feeder for new DTs – 41 Ckm
- LT Lines for New DTS and SPM villiages – 209 Km
- LT Capacitors in Dimapur – 40 Nos

3. **Third Phase (APDRP phase - II)** works are still not completed and in progress. Information Technology package is also in process and are due for completion.

Metering

- Feeder meters (33KV and 11KV) – 90 Nos
- DTC metrs (LT) – 114 Nos
- Consumer meter – 12132 Nos
- Spot Billing Machine – 20 Nos
- Less LT (HVDS) – 2 colonies in Dimapur Town

Sub Stations

- R&M and capacity addition – 16 Nos
- New Sub Stations – 11 Nos

Lines and Reconductoring

- Reconductoring of 33KV Feeders- 35 Ckm
- Reconductoring of LT lines – 67 Ckm
- 33KV Feeders – 90 Ckm
- 33 KV Feeders – 88 Ckm

Distribution Transformers

- R&M of DTs – 286 Nos
- New DTs -181 Nos
- 11KV lines for New DTs – 189 Ckm
- 33KV lines for New DTs – 3 Ckm
- LT lines – 130 Ckm

33KV Ring Main for Kohima town.

- New substations – 3 Nos
- 33KV lines – 44 Ckm
- 11KV Lines – 4 Ckm

IT Package for Dimapur, Kohima and Mokokchung

- Automatic Data Logging System
- Computerised Billing
- Consumer indexing, GIS mapping and Asset Coding.

Before APDRP was launched the role of the Department was that of electricity provider without emphasizing much on the commercial impact. However, with APDRP, a sense of realization has set in the Department to conduct the business of electricity in a commercialized manner and at the same time provide quality power supply and address consumer grievances. Through monthly energy accounting Department is able to vividly assess the performance of the divisions. At present the performance of the state may not be much efficient, but the Department with its limited options & resources is making sincere attempt to bring down the Aggregate Technical & Commercial losses.

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CHAPTER VI

CONCLUSION, FINDINGS AND SUGGESTIONS

The commercial production of electricity which began in 1878 in New York, became within a few decades, not only the most popular and convenient form of energy, but also an essential tool of development and a symbol of modernity, largely because of its un- matching ability to operate a varieties of Industrial equipments and household appliances. Being a universal input and its consumption being considered as an index of economic development; there has been a phenomenal increase in the demand for electric energy in almost all countries, the world over. Demand for electricity grows with great rapidity as a nation modernizes and its economy develops. Historically, the growth rate for electricity demand has outstripped that for other forms of energy.

In the developing countries both electricity generating capacity as well as actual production has been increasing during the last two decades, faster than the developed countries. With rapidly growing demand for power, drastic changes in the technical process of power generation and the rising prices of power inputs, the power sector of most countries began to face several problems: a) Power Shortage, b) Cost Escalation in Power Generation, c) High T&D Loss, d) Environmental Issues, e) Depleting Fuel Inputs like Coal, Oil and Gas and f) Financial crisis of the Utilities. India has been facing almost all problems stated above during the last few decades, although the country had made significant strides in power capacity, generation, per capita consumption and electrification of villages.

Among the Indian states, Nagaland possesses certain unique features and problems with respect to the power sector. The unique features and the issues found in the power system of Nagaland are: -

1. Exclusive dependence on power purchase from outside source and meager generation from state owned micro hydro stations,
2. Low installed capacity,
3. The state has no major hydro generation stations as well as no thermal power stations,
4. Inadequate transmission and distribution network,
5. Acute and chronic power shortage,
6. T&D losses higher than the all India average,
7. Lower per capita energy consumption as compared to the rest of the country, and
8. High power cost and low cost recovery ratio.

In spite of such peculiar characteristics and problems, the power sector of Nagaland has not been subjected to any systematic and serious study by researchers. The present study is a comprehensive analysis of the performance of power sector of Nagaland from technical and financial angle. The overall objective of this study is to evaluate the performance of state owned power sector in Nagaland.

This chapter summarizes the major findings of the study. Suggestions are also made pertaining to the performance of DoP for future policy formulation and research. Accordingly this chapter has been divided into two sections. Section I deals with the summary of major findings of the study and testing of hypotheses. Section II provides suggestions for future policy formulation and conclusion.

SECTION I

SUMMARY OF FINDINGS

The major findings of the study have been summarized in this section of the chapter.

POWER SYSTEM OF NAGALAND

Nagaland does not have any major generation projects and therefore power requirement of the state depends mainly on central sector allocation from the CPSUs operating in the NE region. Despite the availability of adequate hydro power potential in the state, Nagaland is yet to harness its energy mainly because of limited resources. At present the state has 28.30 MW installed capacity which generates 78.81 MkWh of energy. Power generation being very negligible in the state the Department has to purchase energy from outside sources mainly from the central sector agencies such as North Eastern Electric Power Corporation (NEEPCO) and National Hydro Power Corporation Ltd (NHPC). An average proportion of 92.84 per cent of total availability of power is purchased from central sector and other states mainly from ASEB and MSEB.

The Transmission and Distribution network consists of 132 KV, 66 KV, 33 KV, 11 KV and LT lines. The total length of state's 132 KV and 66 KV transmission lines is l738.53 Ckms (Circuit kilo meters), and the total length of 33 KV and 11 KV lines is 6200 Ckms. The state has distribution 33 KV lines of 1216 Ckms, 11 KV lines of 4965 Ckms and total length of distribution LT lines of 7300 Ckms. The total capacity of distributions transformers in the state is 130 MVA and the existing total distribution transformer of the state is 1468. It was found that the present capacity of the transmission and distribution network system is inadequate to cater to the full requirement of the state.

ORGANIZATIONAL STRUCTURE

The organization of power sector in India is determined by the country's federal structure. As a result, all major issues affecting the power sector require concurrent action by the central government and state governments. The Ministry of Power is the apex body responsible for the development of electrical energy in India. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decisions, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

At the State level, SEBs and EDs are responsible for development and operation of generation, transmission and distribution; and power pricing within their own states and territories. The SEBs and EDs are not autonomous bodies, but a part of the state government power ministry.

In Nagaland, the Department of Power (DoP) was established in 1964 to generate, transmit and distribute power in the state and it functions within the bureaucratic set up of the government. It exists as a departmental undertaking of government ministry headed by the minister and manned by civil servant. And the Department is financed by Annual Appropriation from the treasury and is subject to strict parliamentary and budgetary control.

Currently, it is functioning under the civil secretariat and the directorate (Power). At civil secretariat, the minister of power, is assisted by Commissioner and Secretary (Power); who with 2 (Two) Deputy Secretaries and other ministerial staff comprise the Administrative Department of Power.

The Commissioner & Secretary is the overall administrative head of the Department. In order to carry out the works in field the Department is run by a Chief Engineer in the directorate (Power) with centrally located Head Quarter at Kohima.

At directorate, the Department is functioning with two offices; namely the Chief Engineer's Office and the Chief Inspectorate. The Chief Engineer's Office is headed by the Chief Engineer (Power) and the Chief Inspectorate is headed by the Chief Inspector in the rank of Chief Engineer. Both the chief Engineers exercise the same power in their respective offices and are directly accountable to the Commissioner & Secretary. The staffing pattern of the Department composed of both technical and non-technical staff. The Department being relatively a technical organization, number of technical staff is more than the non-technical staff. The percentage share of technical staff is 73.74 per cent out of 4380 employees as on 31st March 2010.

The operational jurisdiction of the Department is diffused over the length and breadth of the state. The Field set up consists of 3 operational circles, 10 electrical divisions, 3 transmission divisions and 3 civil divisions under the circles.

PHYSICAL AND FINANCIAL PERFORMANCE

One of the important indicators of physical performance of any power system is the installed capacity. The growth rate of the installed capacity has been slow and inadequate during the last 20 years under study in the state. The capacity addition in the power system was only 24 MW during the last 2 decades. The installed capacity of 6 MW in 1990-91 rose to 29.20 MW in 2001 with the commissioning of 24 MW Likimro HEP in 2001. Since then, there was no further addition in the installed capacity, as all the HEPs of the state were under progress and not a single HEP was commissioned since 2001 in the state. At present, the installed capacity of the state is 28.34 MW which generates 73.36 MkWh of energy.

The reasons for slow growth in installed capacity has been (1) inordinate delay in the completion of ongoing projects that were started years ago, (2) inadequate share of state's investment in power sector, (3) and total dependence on hydro projects to the virtual exclusion of other options till date. Due to poor capacity addition to its power system; the growth in power generation in the state has also been tardy and insufficient.

The state exclusively generates hydro electric power which is too little and not sufficient for the huge demand of the power in the state. The gross power generation stayed at a very low level ranging from 1 Mkwh to 81.16 MkWh annually during the study period. And the power consumption in the state ranged at the level of 78.13 MkWh and 362.97 MkWh annually during the study period. The gap between power generation and the power consumption shows that the state has not been self-sufficient in power generation.

Furthermore, in addition to this technical inadequacy in energy generation, it was found that the high level of auxiliary consumption at generation end that eats into the energy available for transmission was also considerably high. It is benchmarked for every hydro generating station to maintain the auxiliary consumption at a level of 5 per cent in the country but in Nagaland the auxiliary consumption has been nearing to 7 per cent throughout the study period.

In view of the fact that Power generation is very negligible in the state the Department has been purchasing energy from outside sources mainly from the central sector agencies. An average proportion of 92.84 per cent of total availability of power is purchase from central sector and other states mainly from ASEB and MSEB.

An important factor that affects the technical as well as economic efficiency of the power system is the T&D losses. The level of T&D losses in the state remained at very high level throughout the study period and found no improvement in the aggregate energy saving. Against the norm of 15.5 per cent of the transmission and distribution (T&D) losses as prescribed by the Central Electricity Authority (CEA), T&D losses during the period from 1990-91 to 2009-10 ranged from 28 per cent to 58 per cent of the total power available for sale. In addition, it is the requirement of the CEA that every state should reduce the T&D losses by 5 per cent every year. It was also found that the T&D losses in Nagaland are above all India average of 25.6 per cent in 2009-10.

The T&D losses in the state were also double of the gross power generation in the state throughout the study period. The T&D losses in 2009-10 was 186.81 MkWh, on this figure if the power system of Nagaland can reduce the T&D losses at least by 1 per cent, there will be an additional availability of 1.87 MkWh of energy to the system. At the present condition it may be difficult to achieve the required norms of the CEA; but it is definitely, considered necessary that the present high proportion of losses should be brought down at least those that occur on account of theft. Modern and efficient technologies and equipments are also rarely used in Nagaland in curbing T&D losses.

Energy sales in the state have been increasing significantly. The reason for this increase is chiefly due to increase in number of power consumers in the state mainly the domestic consumers. The trends in the growth of power per-capita consumption, consumption per-capita and power consumers are also on the increasing side, which implies that the demand and consumption of power in the state has increased substantially. The ACGR of per-capita consumption, actual consumption per-capita and consumers are 6.21 per cent, 2.36 per cent and 2.99 per cent respectively; the highest growth rate being the per capita consumption.

The number of employees per 1000 consumer over the years has been declining. This shows that the gap between the number of consumers and employees has been increasing. The number of consumers and the number of employees has been increasing at an ACGR of 2.99 per cent and 1.6 per cent. This difference in the growth rate of consumers and employees signifies shortage of manpower in the Department to provide efficient service to the consumers.

However, a decline in ratio of number of employees to MkWh of energy sold indicates labour productivity. The ratio of employee to MkWh of energy sold has also been declining. The ratio of employee to MkWh of energy sold of 42.02 in 1990-91 declined dramatically to 8.55 in 2009-10, representing an ACGR of -7.65 per cent.

It was observed that the financial position of the State power sector has worsened over the years even though its physical performance has improved slightly over the years. The total cost of power in the state has been increasing throughout the study period. And it was found that the cost of power purchase constitutes the largest of the total cost of power followed by the Establishment and Administration expenses. These two elements account for 74 per cent of the total cost. Other items take the remaining 26 per cent share.

The rate of growth of expenditure (14.0 per cent) of the power system exceeded that of revenue (13.69 per cent) during the period under review, leading to financial crisis. Excessive reliance on purchase of power from outside source is one of the reasons for the high total cost of power and heavy tariff subsidy to domestic consumers and uneconomic method of fixing electricity tariff are the two reasons for the declining rate of revenue of the state power system.

The level of cost recovery has remained at a very low level throughout the two decades under review. On an average the Department recovered only 39.49 per cent of power cost through revenue each year during the period under study. The revenue collection from sale of power not only falls short of total power cost of supply, it could not even meet the expenditure on purchase of power.

To analyze the profitability of the Department; profitability ratios like Operating ratio, Net Profit Ratio, Operating Profit Ratio and Return on Capital Employed or Investment were used in the study. Along with these profitability ratios Capital Turnover ratio was also calculated to measure the ability of the Department to generate sales per rupee of capital employed.

The analysis reveals that the operating ratio has been very high and it has remained above 100 in all the years. And as far as the profit to revenue ratios are concerned, the financial performance of the Department is neither impressive nor satisfactory. This is evident from net profit ratio and operating profit ratio; wherein the ratios are negative for all the years under study. It was also observed that the return on investment also is negative in all the years during the last decade under study. Capital turnover ratio also remained at a very low level during the study period.

The overall performance analysis of the growth of physical and financial parameters reveals that the operational efficiency of the Department both in physical as well as financial terms have been poor throughout the study period. The Department has been supplying electrical energy at a very uneconomical rate; consequently there has been huge gap between the cost and revenue.

A multiple linear regression analysis was used to analyze the quantitative inter-relationship between the performance parameters, both physical and financial. The result of Regression Analysis shows that the dependent variable, net deficit is explained fairly well by the independent variables. The R square value of 1 also reveals that the Independent variables included in the regression model explained 100 per cent of variation in the dependent variable. Furthermore, the analysis also shows that the overall regression is significant at 5 per cent level of significance which means that the relationship of the dependent variable and the independent variables in this model is not an occurrence of chance since the value of significance of F carried out in ANOVA is less than 0.05.

It is significant to note that the total cost of power has been the largest single factor that has a telling positive impact on Net Deficit. The regression coefficient showed that the total cost has positive contribution to net deficit while negative correlation was observed between total revenue and net deficit. It can be, therefore, be inferred from the analysis that the increase in total cost in each year with disproportionate increase in revenue has widened the gap between the cost and revenue resulting in huge deficit for the DoP.

IMPLEMENTATION OF RURAL ELECTRIFICATION SCHEME: RGGVY

Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), launched in 2005, is a scheme for rural electricity infrastructure and household electrification. This scheme was launched for attaining the goal for providing access to electricity to all households in five years. The scheme aims at:

- electrifying all villages and habitations as per new definition,
- providing access to electricity to all rural households, and
- providing electricity connection to Below Poverty Line (BPL) families free of charge.

The Nagaland State Government have over the years given importance to rural development through electrification. As per 1991 census the Department has achieved electrification of 100 per cent villages however, as per 2011 census there are still some un-electrified villages in the state. Currently the Department had implemented the RGGVY scheme of rural electrification in the state. The DoP targeted to electrify those un-electrified villages as per 2001 census under RGGVY scheme by 2012. Many un-/de-electrified villages were electrified under the scheme and various electrification works under the scheme are under progress.

Initially, in 2005 the MoP approved a DPR of a district and by 2009 the MoP sanctioned the cost of implementation of the scheme for all the districts. A total amount of Rs. 11,116.83 lakh were sanctioned for all the districts under the scheme for the electrification of un-electrified, de-electrified villages as well as intensive electrification of already electrified villages and for providing free cost of electricity connection to the households below poverty line (BPL).

Under RGGVY the DoP, Nagaland targeted to:

- electrify 105 villages Number of un-/de-electrified villages,
- complete intensive electrification works in 1173 already electrified villages,
- provide free cost of connection to 69900 Households (DoP, Nagaland).

During the 6 years period, since implementation, from 2006-07 to 2011-12, out of 105 un-/de-electrified villages 79 villages were electrified, representing an achievement of 75.2 per cent. Number of free connection provided to BPL households was 28379 out of the targeted households of 69900, marking an achievement of 40.6 per cent. The number of villages identified for intensive electrification was 1152 under the scheme; out of these villages the Department could complete the intensification works in 63.3 per cent of the targeted villages.

An evaluation of the achievement of all Indian states under RGGVY reveals that Uttar Pradesh had the highest number of villages without electricity connection followed by Bihar. In Uttar Pradesh, under RGGVY by March 2012, number of villages electrified under the scheme was 27759, marking an achievement of 90.01 per cent. In Bihar 21790 villages were covered representing an achievement of 93.9 per cent. The states with 100 per cent achievement under the scheme in electrification of un-/de-electrified villages were Sikkim and Uttarkhand. Meghalaya achieved the lowest of 37.5 per cent electrification of un-electrified villages. Nagaland could achieve 75.2 per cent of electrification of un-electrified villages under the scheme. As on March 2012, at national level the scheme could achieve 86.8 per cent of the target.

States with high percentage of achievement in intensification of electrification in the villages were Andhra Pradesh, Karnataka, Sikkim, Assam, Rajasthan, Gujarat and Tamil Nadu. These states could achieve a rate above 80 per cent. Himachal Pradesh and Kerala were the two states with lowest percentage of achievement, followed by Manipur and Jammu and Kashmir. As on March 2012, no states could achieve the target. India could achieve 67.9 per cent of target for intensive electrification of villages.

Only one state, Andhra Pradesh, could achieve 100 per cent electrification of BPL households. Manipur achieve the lowest of electrification of BPL households. At national level the scheme could electrify 73.9 per cent of number of targeted BPL households.

The inter-state comparative study of the performance of the DoP Nagaland and the DoP Arunachal Pradesh under the scheme reveals that comparatively the cumulative achievements of Nagaland have been better than Arunachal Pradesh; though both the states' cumulative achievements were below the achievements at national level. Electrification of un-/de-electrified villages was 75.2 per cent and 55.8 per cent of target in Nagaland and Arunachal Pradesh respectively; whereas the electrification works at national level was reported completed in 86.8 per cent of target un-electrified villages.

The intensive electrification was reported completed in 62.3 per cent and 46.6 per cent villages in Nagaland and Arunachal Pradesh respectively; whereas, it was reported completed in 67.9 per cent target villages in all Indian states.

Number of connections to BPL households was provided to 40.6 per cent and 51.4 per cent in Nagaland and Arunachal Pradesh respectively. In all India level electricity connection was provided to 73.9 per cent of BPL households.

Thus, the analysis reveals that the cumulative achievements of both the states were below the achievements at national level. The study also shows that both the states could not achieve the target outlined under the scheme.

COMMUNITISATION

With regard to the status and progress of Communitisation of electricity in rural areas of Nagaland, the study reveals that:

Communitisation have succeeded in achieving its objectives in terms of revenue collection, control of power theft, reduction of technical and commercial losses and employment generation in rural areas. Out of 90 sample VEMBs, 51 per cent has strongly agreed and 47 per cent has agreed that the collection of revenue after Communitisation has increased. The officials of the Department were also of the same opinion; out of 30 respondents 71per cent strongly agreed and 29 per cent agreed that collection of revenue has increased after Communitisation.

VEMBs have also been effective in reducing the prevailing high scale of power theft in rural areas; 63 per cent of VEMBs of sample villages and 71 per cent of Departmental officials strongly agreed that power theft in the villages has reduced significantly after Communitisation. Majority of the sample VEMBs as well as Departmental officials were also of the view that the differences between electricity billed and revenue collection also decreased significantly.

However, the VEMBs were of the opinion that the provision of 20 per cent rebate on tariff to the VEMBs by the Department has not helped much in generation of employment in the villages. On the other hand, majority of the officials of the Department agreed that the 20 per cent rebate on tariff has helped in generation of employment in the villages.

The Department’s perceptions on success of achieving the objectives has been more encouraging than the VEMBs, though both parties agreed that Communitisation has achieved in improving revenue collection, controlling of power theft and reduction of technical and commercial losses in rural areas.

However, after Communitisation there has been no improvement in service delivery in terms of stable and quality supply of power in rural areas; about 70 per cent of sample VEMBs were of the opinion that there has been no improvement in frequency as well as duration of power failure in the villages. But, the respondents were of the view that the problems faced by rural consumers in getting new connections have somewhat improved and also the field staffs of the Department were co-operative and helpful.

Majority of VEMBs were of the view that the Department has not been effective in discharging their role under Communitisation. However, the Departmental officials agreed that the VEMBs have been discharging their duties effectively in the villages.

The main problem reported by the VEMBs surveyed is the improper training facilities under Communitisation. No formal training on meter reading, revenue collection, and maintenance of record and other technical aspect were provided regularly.

TESTING OF HYPOTHESES

The present study aims to test the following hypotheses:-

1. The state power Department generates, transmits as well as distributes power at an uneconomical rate.
2. Self sufficiency in power generation would contribute significantly to increase the Government revenue.
3. The Communitisation system of management of power and scheme of rural electrification has yielded good results since implementation.

In the process of testing hypothesis the following aspects were considered, analyzed and studied so as to evaluate the performance of the power sector in Nagaland.

1. Physical performance of the DoP emphasizing on the trends in growth of power demand and supply variables.
2. Financial performance of the DoP emphasizing on power cost and revenue collection and cost-revenue relationship.

3. Status and progress of rural electrification in Nagaland.
4. Case of power sector reforms in Nagaland emphasizing on Communitisation of electricity management in rural areas.

The Department of Power, Nagaland is responsible for generation, transmission and distribution of power in the state. Since its inception, the DoP have been maintaining generation stations and transmission and distribution network in the state. Power Department is by virtue a public utility and its main motive is to provide service to public. But the Department of Power unlike other Government establishments is a revenue earning organization and like all other business enterprises, its profitability indicates its health.

However, the financial position of the Department has not been impressive neither satisfactory and it has deteriorated over the last 20 years under study. Revenue collection in the state remained well below power cost in the state throughout the study period. Consequently, the gap between the cost and revenue has been widening year after year. As a result, the Department has been incurring huge operating deficit and this further resulted in an inadequate fund for maintenance causing unstable and irregular supply of power. One of the main reasons for such increase in operating deficit can be attributed to high total power cost.

The total power cost in the state remained at a very high level throughout the study period. In 2009-10 the level of total unit/average cost of 809.99 paise per kWh was almost the double of all India average of 478.00 paise per kWh. Low installed capacity, insufficient power generation, high auxiliary consumptions, excessive T&D losses and heavily subsidized rate of tariff for domestic consumers are some of the causative factors for high power cost in the state.

The result of Regression Analysis in Chapter 3 reveals that the total cost of power has been the largest single factor that has a telling impact on Net Deficit and that the total cost has positive contribution to net deficit. As per the analysis results, the regression coefficient of total cost is 1 which means that if the cost is increased by 1 then net deficit will also increased by 1 and vice versa.

If the Department could reduce its total power cost it will subsequently aid in lessening the operating deficit. However, the trends in the growth rate of total power cost in the state shows that the total power cost as well as cost per kWh has been increasing continuously year after year during the two decades under study. High total power cost in the state has resulted in excessive operating deficit in the state throughout the study period. This shows that the DoP has been supplying power in the state at an uneconomical rate. Hence, the hypothesis that "*The state power Department generates, transmits as well as distributes power at an uneconomical rate*" stands proved and accepted.

One of the main factor for high cost of power supply in the state have been due to the exclusive reliance on purchase of power from outside source due to meager generation from the state owned hydro generating stations. The power generation in the state is very scanty for the huge demand of power in the state. The power generation stayed at a very low level ranging from 1 Mkwh to 81.16 MkWh annually during the study period. And the power consumption in the state ranged at the level of 78.13 MkWh and 362.97 MkWh annually during the study period. The gap between power generation and consumption has been very high; indicating that the state has not been self-sufficient in power generation.

An average proportion of 92.84 per cent of total availability of power in the state is purchased from central sector and other states mainly from

ASEB and MSEB. As a result, the single largest power cost components of the Department have been the cost of power purchase. The cost of power purchase alone account for 57 per cent of the total power cost in the state. The power cost of Rs. 8.11 crore in 1990-91, rose to Rs. 28.51 crore in 1999-00 and it further rose drastically to Rs. 116.27 crore in 2009-10. The cost of power purchase has been increasing at an ACGR of 14.24 per cent, which is even higher than the growth rate of the total power cost at14.01per cent.

In view of the fact that cost of power purchase is the largest cost components, it was found that changes in trend of cost of power purchase have a huge impact on total power cost. An increase in cost of power purchase resulted in subsequent increase in total power cost and vice-versa. Thus, to curb the total cost of power augmentation of power generation within the state is imperative.

It was found that the percentage of power purchase to total availability was recorded lowest in 2001-02 and 2009-10 due to increase in power generation and also because of the 12 per cent of power generation free benefit from Doyang HEP. This shows that increase in generation of power within the state has resulted in reduction of volume of power purchases from outside sources. And any reduction in the volume of power purchase will result in decline of total power cost; and subsequently a decrease in net deficit of the Department.

Hence, the hypothesis that *"Self sufficiency in power generation would contribute significantly to increase the Government revenue"* stands proved and accepted.

Government of Nagaland introduced Communitisation programme in rural areas in 2003. The main objectives of Communitisation are to involve community in electricity revenue management, to reduce technical and commercial losses and to control power theft in villages through VEMBs.

A field survey was conducted to evaluate the effectiveness and progress of Communitisation of electricity in rural areas by administering structured questionnaires. The structured questionnaires were administered to VEMBs of 90 villages and to 30 Departmental official in-charge of Communitisation under all the electrical divisions. Out of 90 sample VEMBs, 51 per cent has strongly agreed and 47 per cent has agreed that the collection of revenue after Communitisation has increased. The officials of the Department were also of the opinion that the revenue collection has increased significantly after Communitisation. Out of 30 respondents, 71 per cent strongly agreed and 29 per cent agreed that collection of revenue has increased after Communitisation.

It was also found that majority of the VEMBs were of the view that the differences between electricity billed and revenue collection also decreased significantly. Non- payment of electricity bill by rural consumers resulted in huge accumulation of arrears. Many rural consumers were using the electricity supply continually without paying for it. After Communitisation such non-payments of bills were reduced and accumulated arrears were also over the years recovered in some villages. Communitisation has also succeeded in reducing accumulated arrears in rural areas.

Furthermore, it was found that VEMBs were also effective in controlling power theft in villages. Majority of the respondents were of the view that power theft in villages has reduced considerably after Communitisation. Out of total respondents of 90 VEMBs and 30 Departmental officials, 63 per cent of VEMBs of sample villages and 71 per cent of Departmental officials strongly agreed that power theft in the villages has reduced significantly after Communitisation. Thus, it can be inferred that Communitisation has been successful in fulfilling its objectives.

Government of Nagaland have also over the years given importance to rural development through electrification in the state. The DoP, had implemented various rural electrification schemes launched from time to time by the Ministry of Power, Government of India. The Department is also undertaking the current scheme for system improvement and augmentation and extensions of the existing system towards providing power to every household, in accordance with the declared policy of the Government of India of power to all by 2012.

Currently the Department implemented the RGGVY scheme of rural electrification in the states. Many un-/de-villages were electrified under the scheme and various electrification works under the scheme are under progress. During the 6 years period from 2006-07 to 2011-12, out of 105 un-/de-electrified villages 79 villages were electrified, representing an achievement of 75.2 per cent. As compared to progress in other facets of the RGGVY, the progress under the scheme for electrification of un-/de-electrified villages in the state is regarded as satisfactory.

Number of free connection provided to BPL households was 28379 out of the targeted households of 69900, marking an achievement of 40.6 per cent. The number of villages identified for intensive electrification was 1152 under the scheme; out of these villages the Department could complete the intensification works only in 63.3 per cent of the target villages.

Hence, the hypothesis that "*The Communitisation system of management of power and scheme of rural electrification has yielded good results since implementation*" stands proved and accepted.

SECTION II

SUGGESTIONS

In this section of the chapter, suggestions are made to improve the overall performance of the DoP based on the analysis of various quantitative and qualitative variables. These recommendations are relating to organizational structure, physical and financial performance, Communitisation and implementation of RGGVY scheme of rural electrification in the state.

INSTITUTIONAL RESTRUCTURING

It can be stated on the basis of the study that a low level of operational efficiency coupled with an irrational tariff structure, has led to increasing losses, it is in this background that the Department is required to operate on commercial principles. In order to enable the power Department commercially viable and to meet the power demand efficiently in the state, the government interference should be kept to a minimum and let the Department function as autonomous commercial-cum-service corporation.

The Government of Nagaland has already initiated the process of power sector reforms and restructuring in the state. However, it was observed that the pace of these reforms process has been slow. As part of the reforms process, the Department of Power has decentralized revenue management in rural sector by involving the Village Councils as partners in electricity revenue management through Communitisation programme. But, Communitisation is not an alternative to corporatization. Furthermore, Communitisation and corporatization are not mutually exclusive approaches; both can be pursued simultaneously.

The Department should be corporatized and restructured as recommended by the IMI New Delhi - consultants for Reforms Study. Therefore, it is suggested as recommended by IMI, to unbundle the Department by setting up:

1. A separate State Transmission Utility (STU) in accordance with the Electricity, Act 2003
2. A separate entity combining Distribution and Generation
3. A separate Rural Electrification Board.

HUMAN RESOURCE DEVELOPMENT

The technical knowledge acquired from engineering colleges, polytechnics, industrial training institutes and other technical institutions should be supplemented with the applied engineering skills required for professional success in particular specialty. All these skills are to be regularly updated to cope with the ever progressing and rapidly advancing technologies being introduced in the power sector where the speed of obsolescence often overtakes the acquisition of particulars skill and knowledge. To achieve the above objectives, it is very important to assess the manpower engaged in the Department and future trends in this regard (based on the assumed norms of Man/MkWh and capacity addition programmes) so that identification of important thrust areas for vital, essential and desirable training activities for the future are planned in an appropriate manner.

CAPACITY ADDITION

Poor capacity addition has been the chief reason for the insufficient power generation in the state and high level of power purchase. In order to ensure reliable and dependable supply of quality power in Nagaland, the state has to create ample additional capacity. For achieving it the state has to fully exploit the micro, mini or small hydro potential, which the state possesses in abundance. And priority must be given to complete and commission the various ongoing hydro projects in the state. If all the ongoing hydro projects are fully completed and commissioned, the state might be self-sufficient in power generation and be able to meet the present demand in the immediate future. To supply adequate power on a sustained basis and to trim down the excessive reliance on outside source, the installed capacity has to increase in proportion with the increase in energy requirement. The enormous scope that exists for non-conventional energy sources like solar and wind also may be tapped to the maximum extent as possible.

STRENGTHENING AND AUGMENTATION OF TRANSMISSION CAPACITY

In its 16th power survey, CEA has projected increase in energy requirement of Nagaland from 420 MkWh in 2009-10 to 554 MkWh by the end of 11th Plan (2011-12) and further to 790 MkWh by the end of 12th plan (2016-17) (CEA, MoP, 2001). In view of the CEA's projection of power requirement in the state, it would be necessary to augment transmission capacity. Without adequate T&D capacity, it would not be feasible to meet the growing requirement of power in the state, irrespective of whether power is being generated or procured from available sources. It is, therefore, recommended that the DoP draw up plan for augmentation of transmission and distribution capacity through APDRP.

SYSTEM UP-GRADATION

The technological advancements in generation; transmission and distribution areas of electrical engineering should be introduced. In advanced countries, for instance, electronic meters (electronic meters can also, in addition to measuring energy used, record other parameters of the load and supply such as maximum demand, power factor and reactive power used etc.) are used in all types of electrical connections and high quality conductors and underground cables of high voltage ratings are used to curb T&D losses.

Long transmission lines (when extending the grid to rural areas) are at risk of high transmission and distribution (T&D) losses. Line quality and the quality of transformers also hamper the efficiency of T&D. Regular maintenance and upgrading of power lines and transformers will significantly reduce such losses. To reduce the T&D losses, it is essential that a number of substations, transformers of various capacities and length of HT lines be enhanced. Likewise, computer net work should be extended in all segments of power system, including billing, data compilation, and load forecasting. Such technological innovations should be introduced in the power system of the state. It is crucial for enhancing the existing power system of the state.

BILLING AND COLLECTION EFFICIENCY

The important reasons for increase in gross operating deficit can be attributed to low metering, billing and collection efficiency. Proper billing and strict collection of revenue is necessary for achieving a healthy rate of return, which can improve the financial position of the Department. Effective steps should be taken for collection and accounting of revenue with special focus on the collection of arrears of revenue.

INTERNAL CONTROL AND MONITORING

Effective internal control mechanism, monitoring system and evaluation of performance are essential for smooth running of the Department. However, it is observed that the Department of Power has not streamlined the internal controls and monitoring mechanism which has resulted in huge accumulation of arrears of revenue, meters lying defective, not repaired or replaced for years together, delay in deposit of revenue, etc. Therefore, it is suggested that internal control and monitoring system should be strengthened, streamlined and made more effective.

Rational Tariff Policy

The government interference in price determination has also much to do with the poor financial performance of the Department. Huge variation in cost of power and revenue collection can also be attributed to the irrational and unscientific method of tariff fixation and heavily subsidized tariff charged to domestic consumers. In Nagaland, the state Government, like many other states follow the power pricing procedures based upon historical pricing as well as cost plus pricing principles. Instead of these generally practiced methods, a rational tariff policy would require charging the consumer for the actual cost of service provided to them. To achieve such a truly cost-oriented tariff, the average price structure should be based on the marginal cost pricing procedure which is practice by many power utilities abroad. Timely revision of tariff should also be carried out keeping in view the rising cost of purchase of power.

DEMAND SIDE MANAGEMENT

As the demand for power of domestic and commercial categories of consumers is on the increase in the state, it is highly helpful for the power system to apply the concept of Demand Side Management (DSM). Demand Side Management can be achieved through energy efficiency, which is the reduction of kWh of energy consumption. Efficient use of energy or energy efficiency measures such as the use of modern energy-saving appliances, simple demand-side management measures, or energy conservation in buildings reduce electricity demand significantly. The Department should encourage the power consumers to use such energy saving appliances. Energy efficiency policies or measures should be implemented effectively in the state.

EFFECTIVE IMPLEMENTATION OF RURAL ELECTRIFICATION SCHEMES

Effective and prompt implementation of existing rural electrification scheme and any future new programme is imperative as it has lasting impact on socio-economic development of the state through electrification in rural areas. For successful implementation of any rural electrification scheme, publicity of the existing as well as future schemes should be provided more resourcefully to enhance the awareness of the benefits of the schemes among the beneficiaries.

CAPACITY BUILDING OF VEMBS

Capacity building and skill development of the VEMBs are also important issues for better functioning of SPMs in the villages. The main problem reported by the VEMBs surveyed is the improper training facilities. Majority of the members of VEMBs were of the view that the success of the VEMBs depends upon their social skill and their standing in the village, and their capacity to undertake responsibility associated with assigned work. The DoP should, therefore, provide trainings regularly on various technical aspects as well as commercial, social and managerial aspects. Existing Capacity building exercise should include training on team building, organization building, and their role in socio-economic development of village, management and administration associated with their job and energy efficiency measures. Unless capacity building and skill formation are done properly, the scheme may fail in long run and casualties may occur.

Currently, community involvement in power management is in the area of revenue management only, including prevention and control of power theft in rural area. The DoP should also extend the responsibility of management to distribution of power within the villages as well. The DoP should also begin the process of community involvement and ownership in operation and maintenance activities. The government should begin the process by transferring the ownership of existing as well as the new micro/mini hydro projects to the VEMBs and make them responsible for operation and maintenance of the projects.

CONCLUSION

The importance of electricity as one of the key inputs for socio-economic development is well recognized. The availability of affordable and quality power is also one of the main determinants of the quality of life. Efficient provision of electricity contributes to poverty reduction by fuelling economic growth and enabling the fulfillment of the basic human needs of health and education. Despite its importance, the study shows that the overall performance of the Department of Power, Nagaland has not been impressive. Inadequate installed capacity, insufficient power generation, low per capita power consumption, high T&D losses, high power cost and low cost recovery ratio; indicates the operational inefficiency of the Department of Power, Nagaland.

Nevertheless, the study shows that the state has achieved considerable progress in rural electrification; it indicates that the implementation of various rural electrification schemes in the state has been effective. The implementation of RGGVY has also yielded good result since implementation in the state. The study also shows that the Department's initiative in involving community in electricity management in rural areas of the state through Communitisation has also been effective in revenue collection efficiency in rural areas as well as in controlling power theft in the villages. However, to make the functioning of Communitisation more effective, the Department of Power, Government of Nagaland should give more importance on providing proper trainings to the VEMBs on technical as well as non-technical aspects of the electricity management. The Department should also give more emphasis on revenue collection as well as uninterrupted power supply in rural areas, which will enable to establish small scale industrial enterprises at the village level.

Power being a significant infrastructural input for industrial development, the Government of Nagaland should explore the possibility of inviting private sector in power generation, transmission and distribution. The Government should frame the investment friendly policies for inviting large scale investment from private sector. The Government should also accelerate the power sector reforms measures in the state.

The present study is an attempt to evaluate the overall performance of state owned power sector in Nagaland. The study is based on both primary and secondary data. The present study highlights the physical and financial performance of the Department of Power, Nagaland, status and progress in implementation of rural electrification scheme and reforms initiated by the Government of Nagaland in power sector. The findings of this study will help the Department of Power to improve its overall performance.

AREA FOR FURTHER RESEARCH STUDY

Further research on the following lines can be undertaken:

1. A critical study of the administrative aspects and governance of power sector in India, with special reference to Nagaland.
2. An enquiry into the nature and problems of financial management in Nagaland power sector and remedial measures for improvement.
3. Rural electrification in Nagaland: A study of progress, prospect and its impact on rural socio-economic development.

APPENDIX – I

QUESTIONNAIRE

Dear Respondent,

The undersigned research scholar is undertaking a research work on topic entitled "Performance Evaluation of Power Sector in Nagaland: An Analytical Study (1990-2006)" for the award of PhD degree. One of the objectives of the research work is to evaluate the effectiveness of Communitisation of Electricity in rural areas in Nagaland.

In order to accomplish the stated objective, the researcher requires some relevant information from your end and seeks your co-operation and help. The research work cannot be completed without your support.

A Structured Questionnaire is prepared and enclosed for collecting the valuable information. You are requested to fill up the Questionnaire and return it to the researcher at the earliest. The information so collected will be used only for academic purpose.

Soliciting your valued co-operation,

Dated:…………….

Tongpangkumla
Research Scholar
Department of Commerce
Nagaland University
Campus: Meriema, Kohima

SET I
QUESTIONNAIRE FOR THE VEMBS

Section I
Please supply relevant information in the space provided against each item in the following.

1. Name of the Village: ……………………………………………………….

2. Year of institution of VEMB in the village:……………………………

3. No. of VEMB members:………………………………………………..

4. No. of staff employed by the VEMB in the village:……………………

5. No. of households electrified in the village:……………………………

6. Electricity revenue collection in a month

    a. Minimum: Rs. …………………………………………..
    b. Maximum: Rs. ..…………………………………………

7. Total Consumption of Energy in a month in the village
    a. Minimum: ………………………………units (kWh)
    b. Maximum: .………………………………units (kWh)

8. Tariff fixed per units by the VEMBs in the village is: @ Rs.…………Per unit.

Section II
Please read the following carefully and give your response by putting a tick mark (√) in the space provided.

9. Number of transformers in the village
    a. One ( )
    b. Two ( )
    c. Three ( )

d. More (Specify)…………………….

10. Individual bills are prepared on the basis of
    a. Useful points method ( )
    b. Individual household meters ( )

11. How often do the VEMB members meet?
    a. Once in a month ( )
    b. Twice in a month ( )
    c. Meet only when requires ( )
    d. Meet as often as requires in a month ( )

12. How many power theft cases have been reported to the VEMB so far after communitisation?
    a. Nil
    b. 1 – 10 ( )
    c. 10 – 20 ( )
    d. 20 – 30 ( )

13. How often the officials from the department come to the village for inspection?
    a. Once in a week ( )
    b. Once in a month ( )
    c. Once in three months ( )
    d. Never ( )
    e. Others (specify)………………….

Section III

Please indicate the extent to which you agree or disagree with the following statements by putting a tick mark (√) in the appropriate column.

Sl.no	Particulars	Strongly Agree	Agree	Neutral	Strongly Disagree	Disagree
1.	Collection of revenue has increased after communitisation					
2.	Payment of bills by individual					

	households is more regular after communitisation					
3.	Power theft after communitisation has decreased					
4.	Setting up of VEMBs has helped in generation of employment in the village					
5.	There is less frequency of power failure in the village after communitisation					
6.	Duration of power failure in the village has decreased					
7.	The differences between electricity billed and revenue collection has decreased					
8.	The electricity consumers in the village are happy with the billing system using ‘Useful points’ method under SPM					
9.	Using ‘useful points’ method of billing discourages use of electronic equipments and gadgets in the village					
10.	The field staffs of the Power					

	Department are co-operative and helpful					
11.	Getting new connection in the village is much easier under communitisation					
12.	Time taken for the new connection under communitisation is quick					
13.	There is an increase in establishment of commercial enterprises and cottage industries in the village after communitisation					
14.	Trainings are conducted regularly for effective functioning of SPM					
15.	Suggestions of the VEMB are given due weightage by the department					
16.	SDO(E) seriously and sincerely performs his responsibility					
17.	The SDO(E) monitors the work properly					
18.	The JE comes to the village regularly to check the works					

SET II

QUESTIONNAIRE FOR THE OFFICIALS OF THE DEPARTMENT

1. Name of the Division:…………………………………………
2. Sud-division:…………………………………………………..
3. Does the Department provide any incentive/award to the VEMBS for their efficient performance?...
4. Please indicate the extent to which you agree or disagree with the following statements by putting a tick mark (√) in the appropriate column.

Sl.no	**Particulars**	**Strongly Agree**	**Agree**	**Neutral**	**Strongly Disagree**	**Disagree**
1.	Collection of revenue has increased after communitisation					
2.	Payment of bills by individual households is more regular after communitisation					
3.	Power theft after communitisation has decreased					
4.	Setting up of VEMBs has helped in generation of employment in the village					
5.	There is less frequency of power failure in the village					

	after communitisation					
6.	Duration of power failure in the village has decreased					
7.	The differences between electricity billed and revenue collection has decreased					
8.	The electricity consumers in the village are happy with the billing system using ‘Useful points’ method under SPM					
9.	Using ‘useful points’ method of billing discourages use of electronic equipments and gadgets in the village					
10.	The villagers co-operate with the VEMBs in executing the work					
11.	There is an increase in establishment of commercial enterprises and cottage industries in the village after communitisation					
12.	Trainings are conducted regularly for effective functioning of SPM system					

13.	Suggestions of the VEMBs are given due weightage by the department					
14.	The VEMBs monitor the availability of power supply in the village regularly					
15.	The VEMBs maintain the records of accounts properly					
16.	The VEMBs maintain all the electrical equipments in the village properly					
17.	The Audit committees are effective in executing their work					
18.	For prevention of power supply interruption and accidents the VEMBs coordinates and assist in the work of clearing the trees/objects.					

APPENDIX- II

COMMUNITISED VILLAGES

(Sample for the Field Survey)

Sl.No	Name of the Village	Electrical Division	Year of Communitisation	No. of Households Electrified
1.	Khuzama	Kohima	2002	370
2.	Tsiesema Basa	Kohima	2003	109
3.	Tsiesema Bawe	Kohima	2003	40
4.	Phekerkriema Basa	Kohima	2003	15
5.	Henbenyu	Kohima	2003	19
6.	Pleize A	Kohima	2003	7
7.	Dzulakie	Kohima	2003	9
8.	Sechuma	Kohima	2003	34
9.	Jotsoma	Kohima	2003	379
10.	Khonoma Village	Kohima	2004	287
11.	Nerhema Village	Kohima	2004	197
12.	Kedima	Kohima	2004	379
13.	Mima	Kohima	2004	--
14.	Thizama Village	Kohima	2006	--
15.	Secu Zubza	Kohima	2005	256
16.	Jakhama Village	Kohima	2009	--
17.	Mezoma	Kohima	2006	405
18.	Ziezou	Kohima	2003	24
19.	Gariphema	Kohima	2003	60
20.	Kijuimetouma old	Kohima	2003	27
21.	Kigwema	Kohima	2005	357
22.	Viswema	Kohima	2011	887
23.	Henivi	Dimapur	2003	50
24.	Vidima	Dimapur	2003	40
25.	Tuolazuoma	Dimapur	2003	90
26.	Toluvi	Dimapur	2003	81
27.	Zani	Dimapur	2003	29
28.	Shozukhu	Dimapur	2003	25
29.	L Hotovi	Dimapur	2003	24

30.	Shokhuvi	Dimapur	2003	71
31.	Khehoku	Dimapur	2003	60
32.	Hoito	Dimapur	2003	32
33.	Zukihe	Dimapur	2003	50
34.	Siethehe Basa	Dimapur	2003	70
35.	Ungma	Mokokchung	2003	1500
36.	Kubza	Mokokchung	2004	92
37.	Longsa	Mokokchung	2003	324
38.	Sapotomi	Mokokchung	2003	63
39.	Meyilong	Mokokchung	2003	37
40.	Moalenden	Mokokchung	2003	37
41.	Khensa	Mokokchung	2003	450
42.	Mekhuli	Mokokchung	2003	62
43.	Chungtia	Mokokchung	2003	503
44.	Aliba	Mokokchung	2003	240
45.	Kinunger	Mokokchung	2003	62
46.	New Camp	Mokokchung	2003	357
47.	Chuchuyimpang	Mokokchung	2003	307
48.	Mokokchung Village	Mokokchung	2003	309
49.	Longmisa	Mokokchung	2003	325
50.	Longkhum	Mokokchung	2003	330
51.	Aosettsu	Mokokchung	2003	120
52.	Mangmetong	Mokokchung	2003	360
53.	Aree Old	Mokokchung	2004	56
54.	Aree New	Mokokchung	2004	62
55.	Sungro Compound	Mokokchung	2004	65
56.	Okotso	Mokokchung	2004	98
57.	Ajikami	Mokokchung	2004	37
58.	Phangsang	Mokokchung	2009	55
59.	Izheto	Mokokchung	2004	42
60.	Sastami	Mokokchung	2004	59
61.	Debuia	Mokokchung	2005	210
62.	Debuia Compound	Mokokchung	2005	63
63.	Mongchen	Mokokchung	2003	37
64.	Japu	Mokokchung	2003	37
65.	Woromong	Mokokchung	2004	51
66.	Woromong Compd.	Mokokchung	2004	362
67.	Changki	Mokokchung	2003	886
68.	ChangtongyaYimsen	Changtongya	2003	--

69.	Akhoya	Changtongya	2003	--
70.	Yachem	Changtongya	2003	--
71.	Orangkong	Changtongya	2003	--
72.	Longpha	Changtongya	2004	357
73.	Longpha Compound	Changtongya	2004	326
74.	Sungratsu	Changtongya	2004	430
75.	Mopongchukit	Changtongya	2004	375
76.	Longjang	Changtongya	2004	382
77.	Surhoba	Phek	2002	15
78.	Losa Thepe	Phek	2003	--
79.	Reguri	Phek	2003	105
80.	Molen	Phek	2003	60
81.	Phek Basa	Phek	2007	55
82.	Old Thewati	Phek	2003	25
83.	Proza	Phek	2004	15
84.	Letsam	Phek	2003	25
85.	Losami	Phek	2011	273
86.	Thevopisu	Phek	2007	180
87.	Phek Village	Phek	2004	300
88.	Kotisu	Phek	2007	60
89.	Yoruba	Phek	2009	--
90.	Sohomi	Phek	2004	70

APPENDIX- III

STATUS OF UN-/DE-ELECTRIFIED VILLAGES COVERED UNDER RGGVY

District	Block	Sl.No	Name of the Village	Status*
Dimapur	Nuiland	1.	Xukhuvi	Electrified
		2.	Luhevi	Electrified
		3.	Yetoho	Electrified
		4.	L. Vihoto	Electrified
		5.	Shiwoto	Electrified
		6.	Luhezhe	Electrified
		7.	Zhexuche	Electrified
		8.	Shokhevi	Electrified
		9.	Aghunaga	Electrified
		10.	Aoyimchen	Electrified
		11.	Qhitohe	Electrified
		12.	Khehuto	Electrified
		13.	Nitozu	Electrified
		14.	Hevuxu	Electrified
		15.	Hozheto	Electrified
		16.	Ngamjalan	Under Progress
		17.	Nizheto	Electrified
	Kuhuboto	18.	Pukhaho	Electrified
Kiphire	Pungro	1.	Tsutang	Electrified
		2.	Khong	Electrified
		3.	Khongjiri	Electrified
		4.	Khongkha	Electrified
		5.	Lofukhong	Electrified

	Sitimi	6.	Pungren	Electrified
Longleng	Tamlu	1.	Shitap	Under Progress
		2.	Ladaigarh	Under Progress
		3.	Konsong S/Comp	Electrified
		4.	Yotan S/Comp	Electrified
	Longleng	5.	Pongo S/Comp	Electrified
		6.	S/Compongphang S/Comp	Electrified
Mon	Tobu	1.	Shingnyu	Under Progress
	Wakvhing	2.	Tiru (Lower)	Electrified
	Chen	3.	Chingkao Chingha	Electrified
		4.	Wangti	Electrified
		5.	Sowa	Electrified
	Phomching	6.	Longzang	Under Progress
		7.	Nyahnyu	Electrified
		8.	Longwa	Electrified
		9.	Tamkong	Electrified
		10.	Pesao	Electrified
		11.	Yongkhao	Electrified
	Wakching	12.	Wanching	Electrified
		13.	Chingtang	Electrified
		14.	Chingphoi	Electrified
Peren	Jalukie	1.	Jalukielo	Electrified
		2.	Libamphai	Electrified
		3.	Old Beisumpui	Electrified
		4.	Jalukie Sangtam	Electrified
		5.	Ikeisingram	Electrified
	Peren	6.	Kendung	Electrified
		7.	Kipeujang	Electrified
	Tening	8.	Mpaupungwa	Electrified

		9.	Tening Christ	Electrified
		10.	Nsenlwa	Electrified
		11.	Nkio (New)	Electrified
		12.	Nkio'B'	Electrified
		13.	New Ngaolong	Electrified
		14.	Lalong	Electrified
		15.	Nzauna	Under Progress
		16.	Upper Sinjol	Electrified
Wokha	Bhandari	1.	Khakuthato	Under Progress
		2.	Mithene	Under Progress
		3.	Azuhoto	Under Progress
		4.	Sumito	Under Progress
		5.	Lichuyan	Electrified
	Wozhuro	6.	Tsuchanphen	Under Progress
		7.	S. Wochan	Electrified
		8.	Anlum	Under Progress
		9.	Soshan	Electrified
		10.	Wochan	Under Progress
		11.	Lishayan	Electrified
		12.	Lika	Electrified
		13.	Phiro New (UR)	Electrified
		14.	Yathung (UR)	Electrified
		15.	Liphayan	Electrified
	Bhandari	16.	Tssori (New)	Under Progress
		17.	Tssori (Old)	Under Progress
		18.	Wozhu (Old)	Electrified
		19.	Wozhu (New)	Electrified
		20.	ONGC Changpang	Electrified
		21.	Serika 'A'+'B'	Electrified
		22.	Pangtong	Electrified

		23.	Roni (Old)	Electrified
		24.	Roni (New)	Electrified
		25.	Liowokha (Old)	Electrified
		26.	Liowokha (New)	Electrified
		27.	Sungkha	Electrified
		28.	Liphi (Liphayan)	Electrified
		29.	Richanyan	Electrified
		30.	Yamhon (Old)	Electrified
		31.	Yamhon (New)	Electrified
		32.	Koro	Electrified
		33.	Suphayang	Electrified
Zunheboto	Satakha	1.	XamunubotoS/Compd.	Under Progress
		2.	Tsuthoho	Under Progress
		3.	Thakiye	Under Progress
		4.	Khuvuxu	Under Progress
	Tokiye	5.	Hoshepu S/Compound	Under Progress
	Ghathashi	6.	Poneboto	Under Progress
	Zunheboto	7.	Asukiqa	Under Progress
		8.	Lizu (Aviqato)	Under Progress
	Suruhoto	9.	Atunakugha	Under Progress
		10.	Tizu Island	Under Progress
		11.	Yevishe	Under Progress
		12.	Sahuboto S/Compd.	Under Progress

* Electrified under RGGVY and Work under Progress under RGGVY

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